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Nuclear Data Sheets for A = 113*

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Abstract: This evaluation for A=113 updates one by J. Blachot, (2005Bl05), published in *Nuclear Data Sheets 104, 791 (2005)*

Cutoff Date: All data available before May 2009 have been considered.

General Policies and Organization of Material: See the January issue of the *Nuclear Data Sheets* or http://www.nndc.bnl.gov/nds/NDSPolicies.pdf.

General Comments: Throughout this evaluation, rotational band parameters have been calculated from the standard energy equation:

$$E(J,K)=E_0+A[J(J+1)+\delta_{K,1/2}(-1)^{J+1/2}a(J+1/2)]+BJ^2(J+1)^2$$

The constant A is reported in keV and the constant B, in eV. When "A" alone is given, "B" is assumed to be 0.

Acknowledgments: Many useful comments and suggestions by the editors are greatly appreciated. The author wishes to thank the compilers of the Experimental Unevaluated Nuclear Data List (XUNDL), an experimental file maintained by the NNDC. XUNDL may be accessed via the NNDC web site (www.nndc.bnl.gov). Thanks to G. Audi for many enlightening discussions.

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0090-3752/$ – see front matter
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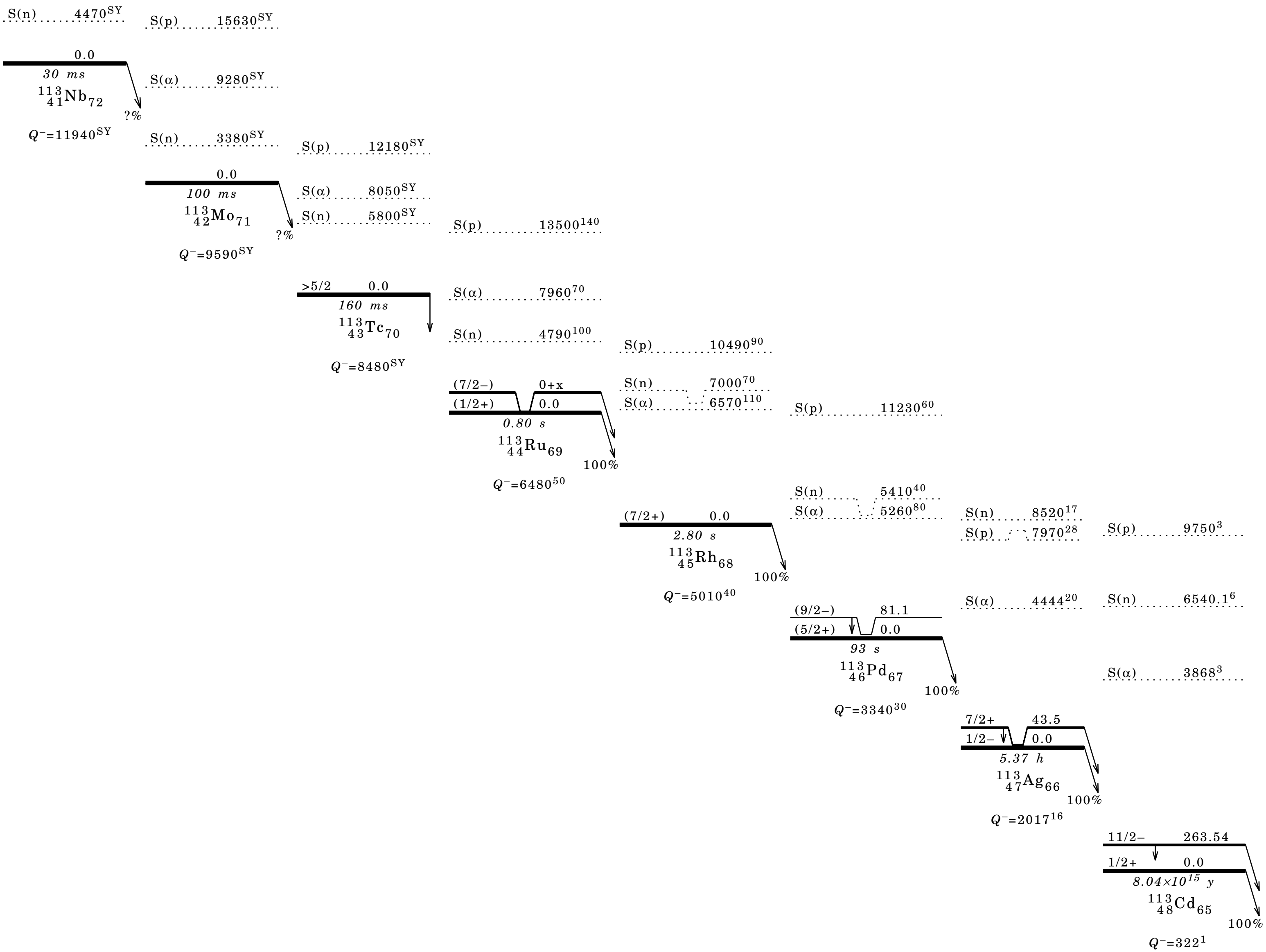
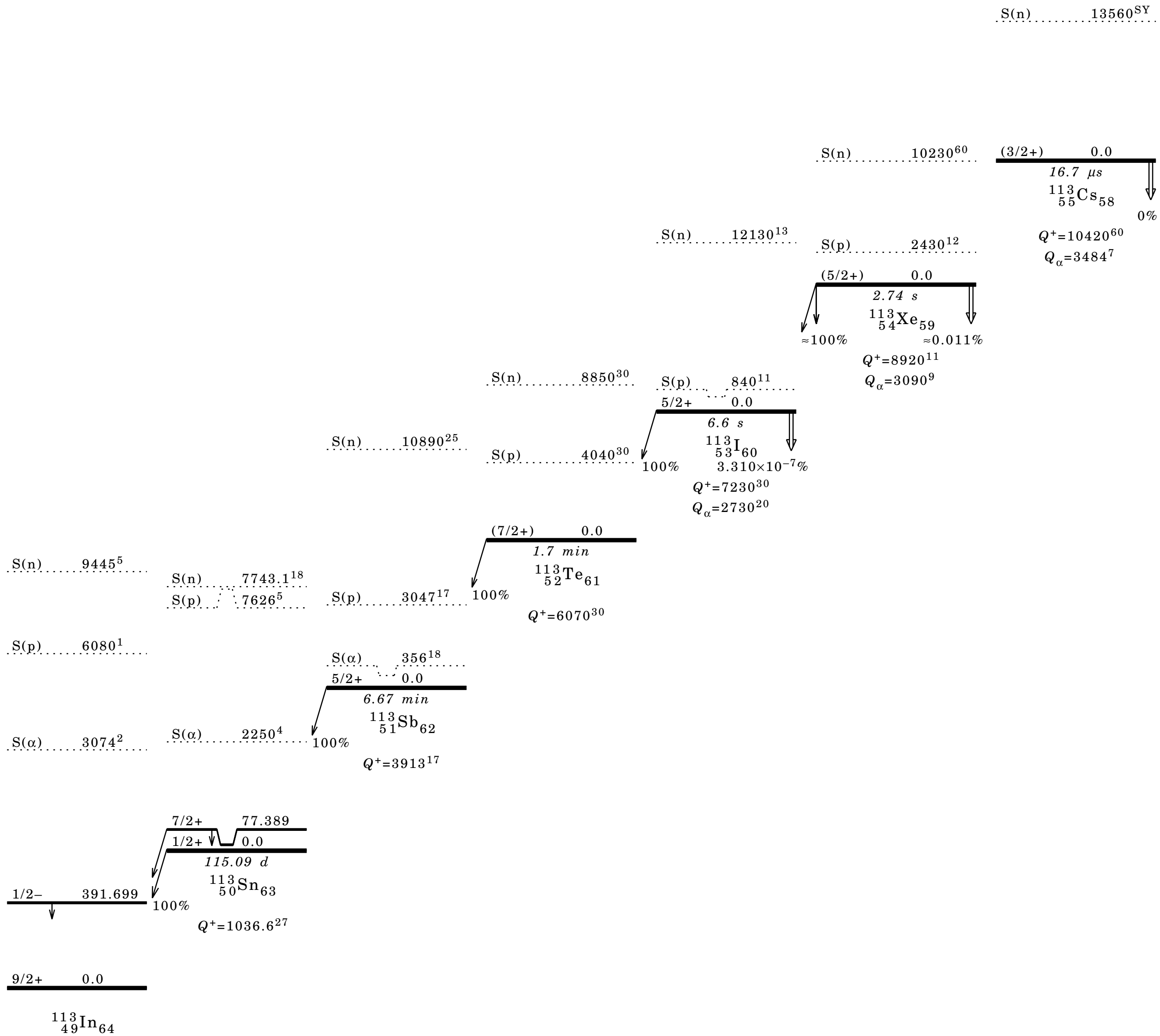
Index for A = 113

Skeleton Scheme for A=113



Skeleton Scheme for A=113 (continued)



Ground–State and Isomeric–Level Properties for A=113

Nuclide	Level	Jπ	$T_{1/2}$	Decay Modes
^{113}Nb	0.0		30 ms syst	%β^-=?
^{113}Mo	0.0		100 ms syst	%β^-=?
^{113}Tc	0.0	>5/2	160 ms *+50–40*	%β^-n=2.1 *3*
^{113}Ru	0.0	(1/2+)	0.80 s *5*	%β^-=100
	0+x	(7/2−)	510 ms *30*	%β^-≈100
^{113}Rh	0.0	(7/2+)	2.80 s *12*	%β^-=100
^{113}Pd	0.0	(5/2+)	93 s *5*	%β^-=100
	81.1	(9/2−)	0.3 s *1*	%IT=100
^{113}Ag	0.0	1/2−	5.37 h *5*	%β^-=100
	43.5	7/2+	68.7 s *16*	%IT=64 *7*; %β^-=36 *7*
^{113}Cd	0.0	1/2+	8.04×10^{15} y *5*	%β^-=100
	263.54	11/2−	14.1 y *5*	%IT=0.14; %β^-=99.86
^{113}In	0.0	9/2+	stable	
	391.699	1/2−	99.476 min *23*	%IT=100
^{113}Sn	0.0	1/2+	115.09 d *3*	%ε+%β^+=100
	77.389	7/2+	21.4 min *4*	%IT=91.1 *23*; %ε+%β^+=8.9 *23*
^{113}Sb	0.0	5/2+	6.67 min *7*	%ε+%β^+=100
^{113}Te	0.0	(7/2+)	1.7 min *2*	%ε+%β^+=100
^{113}I	0.0	5/2+	6.6 s *2*	%ε+%β^+=100; %α=3.310×10^{-7}
^{113}Xe	0.0	(5/2+)	2.74 s *8*	%ε+%β^+≈100; %α≈0.011; %εp=7 *4*; %β^+α≈0.007 *4*
^{113}Cs	0.0	(3/2+)	16.7 μs *7*	%p=100; %α=0
^{114}Cs	≥0	(1+)	0.57 s *2*	%εp=?; ...

Adopted Levels

Q(β⁻)=11940 *SY*; S(n)=4470 *SY* 2003Au03,2009AuZZ.
Produced from ^{208}Pb(U,f) E=750 MeV/u (1994Be24).
Identified with on–line fragment separator at GSI and time of flight.

^{113}Nb Levels

E(level)	$T_{1/2}$	Comments
0.0	30 ms *SY*	$T_{1/2}$: tof measurement implies $T_{1/2}$>300 ns. Using extrapolation for Z=41 (2003Au03), the evaluator estimates $T_{1/2}$=30 ms. %β⁻=?

$^{113}_{42}Mo_{71}$ $^{113}_{42}Mo_{71}$

Adopted Levels

Q(β⁻)=9590 *SY*; S(n)=3380 *SY*; S(p)=15630 *SY*; Q(α)=–9280 *SY* 2003Au03,2009AuZZ.
Produced from ^{208}Pb(U,f) E=750 MeV/u (1994Be24).
Identified with on–line fragment separator at GSI and time of flight.

^{113}Mo Levels

E(level)	$T_{1/2}$	Comments
0.0	100 ms *SY*	$T_{1/2}$: tof measurement implies $T_{1/2}$>300 ns. Using extrapolation for Z=42 (2003Au03), the evaluator estimates $T_{1/2}$=100 ms. %β⁻=?

$^{113}_{43}Tc_{70}$–1 $^{113}_{43}Tc_{70}$–1

Adopted Levels

Q(β⁻)=8480 *SY*; S(n)=5800 *SY*; S(p)=12180 *SY*; Q(α)=–8050 *SY* 2003Au03,2009AuZZ.
Production and identification: ^{238}U(p,F) E=20 MeV, on–line isotopic separator IGISOL. Measured: γ, Xγ (1988Pe13).
^{113}Tc formed by fragmentation of ^{136}Xe beam at 120 MeV/nucleon at NSCL facility using Coupled Cyclotrons and A1900 fragment separator. The time–of–flight and transversal positions of each particle was measured using two plastic scintillators. The ΔE energy loss in a Si PIN detector was measured which, when combined with time–of–flight (tof) and transversal position measurements, allowed for an event–by–event identification of the transmitted nuclei. Transmitted nuclei and their β decays were measured using the β counting system consisting of four Si PIN detectors and a double–sided Si strip detector. β–delayed neutrons were measured in coincidence with β–decay precursor using neutron emission ratio observer (NERO) detector consisting of 60 proportional gas counter tubes embedded in polyethylene moderator matrix. The γ rays were measured with SeGA Ge detectors.
Measured isotopic half–lives and delayed neutron emission probabilities.
Isotopic half–life was measured by 2009Pe06 from least–squares fit and maximum likelihood method of time differences of implantations and correlated β decay events.

Adopted Levels (continued)

^{113}Tc Levels

E(level)	Jπ	$T_{1/2}$	Comments
0.0	>5/2	160 ms *+50−40*	%β⁻n=2.1 *3* (1999Wa09). $T_{1/2}$: from 2009Pe06; systematic uncertainty=5 and statistical uncertainty=+50−40 combined in quadrature. Others: 170 ms 20 (1999WA09), 130 MS 50 (1992Ay02). Jπ: Suggested by 2007Ku23 due to lack of feeding of the 98.4 (3/2+) level.

$^{113}_{44}Ru_{69}$–1

$^{113}_{44}Ru_{69}$–1

Adopted Levels, Gammas

Q(β⁻)=6480 *50*; S(n)=4790 *100*; S(p)=13500 *140*; Q(α)=−7960 *70* 2003Au03,2009AuZZ.

Production and identification: ^{238}U(p,F) E=20 MeV, on–line isotopic separator IGISOL. Measured: γ, Xγ (1988Pe13).

^{252}Cf SF decay. K x–ray coin (1969WiZX).

Thermal–neutron–induced fission of ^{239}Pu and ^{249}Cf. Chemical separation. Relative activity compared with mass distribution (1978Fr16).

^{113}Ru Levels

Cross Reference (XREF) Flags

A ^{252}Cf SF Decay
B ^{113}Ru IT Decay
C ^{113}Tc β⁻ Decay: 160 ms
D ^{248}Cm SF Decay

E(level)‡	Jπ†	XREF	$T_{1/2}$	Comments
0.0	(1/2+)	ABC	0.80 s *5*	%β⁻=100. $T_{1/2}$: from decay of 263.5γ assigned to ^{113}Ru after mass separation (1998Ku17). This value confirms previous values of the same group: 0.80 s *10* (1988Pe13) and 0.80 s *6* (1992PeZX). Others: 2.69 s *10* (1969WiZX) 3.2 s *3* (1976MaYL), 3.0 s *7* (1978Fr16). These early assignments seem close to the new assignment ^{113}Rh half–life. Jπ: from 2007Ku23.
98.4 *3*	(3/2+)	BC		
164.2 *6*	(5/2+)	C		
295.0 *6*	(5/2+,7/2+)	C		
433.7 *7*		C		
688.2 *7*		C		
963.1 *12*		C		
1618.6 *10*		C		
0+x#	(7/2−)	B D	510 ms *30*	%β⁻≈100. $T_{1/2}$: from 1998Ku17. E(level): x 130 *18* (2003Au03) because above the 99 keV level and below. 160 keV. 2007Ku23 propose about 120 keV in agreement with 2003Au03.
113.36+x§ *24*	(9/2−)	A D		
130.44+x# *24*	(11/2−)	A D		E(level): from 2003Zh14. There is no connection between this band head given by 2003Zh14 and the level scheme from 2007Ku23. More work is needed to clarify the level scheme.
392.5+x§ *3*	(13/2−)	A D		
546.5+x# *3*	(15/2−)	A D		
952.4+x§ *4*	(17/2−)	A D		
1008.8+x# *4*	(19/2−)	A D		
1805.6+x# *5*	(23/2−)	A D		
2610.2+x# *6*	(27/2−)	A		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{113}Ru Levels (continued)

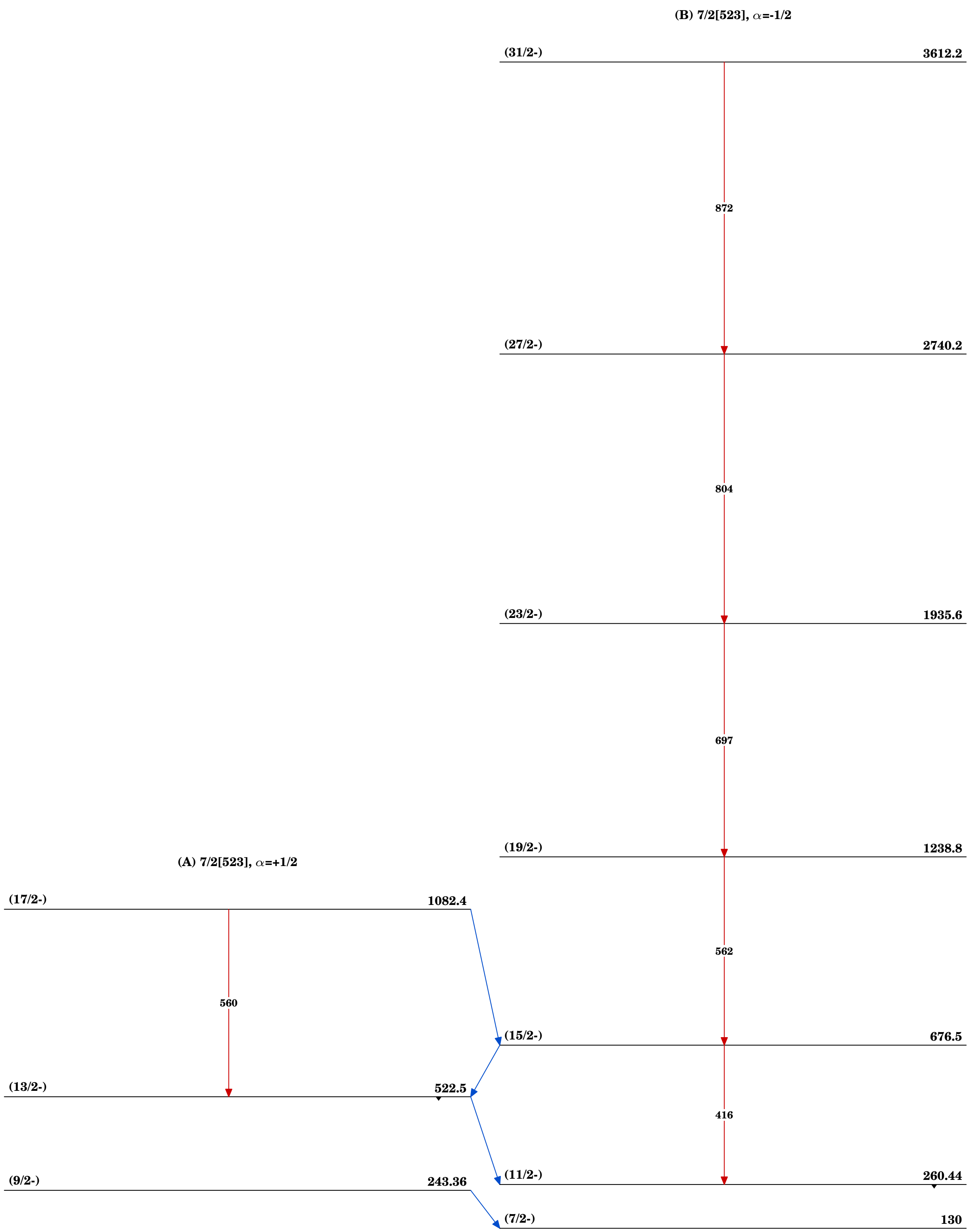
E(level)‡	Jπ†	XREF
3482.2+x# 7	(31/2−)	A

† Jπ without comments are based on band assignments.
‡ From least-squares fit to Eγ's, assuming Δ(Eγ)=0.3 keV.
§ (A): 7/2[523], α=+1/2.
# (B): 7/2[523], α=−1/2.

γ(^{113}Ru)

E(level)	Eγ†	Iγ	Mult.	α	Comments
98.4	98.5 3	100	D		Mult.: From α(K)exp in ^{113}Ru IT decay.
164.2	65.8	8			
	164.3	54	(E2)	0.219	
295.0	131.1	67			
	197.1	50			
	294.3	100			
433.7	335.5	100			
	433.4	91			
688.2	589.5	100			
	688.5				
963.1	668.1	100			
1618.6	1520.1	100			
113.36+x	113.4 3	100			
130.44+x	147.1 3	100			
	260.4 3	14			
392.5+x	262.1 3	100			
	409.2 3	91			
546.5+x	154.0 3	14			
	416.1 3	100			
952.4+x	405.9 3	90			
	559.9 3	100			
1008.8+x	562.3 3	100			
1805.6+x	696.8 3	100			
2610.2+x	804.5 3	100			
3482.2+x	872.0 3	100			

† From ^{113}Ru IT decay and ^{252}Cf SF decay.


(B) 7/2[523], α=-1/2
(31/2-) 3612.2
872
(27/2-) 2740.2
804
(23/2-) 1935.6
697
(19/2-) 1238.8
562
(15/2-) 676.5
416
(11/2-) 260.44
(7/2-) 130
(A) 7/2[523], α=+1/2
(17/2-) 1082.4
560
(13/2-) 522.5
(9/2-) 243.36

$^{113}_{44}Ru_{69}$

^{113}Tc β^- Decay: 160 ms 1998Ku17,2007Ku23

Parent ^{113}Tc: E=0; Jπ=(gt5/2); $T_{1/2}$=160 ms *+50–40*; Q(g.s.)=8480 syst; %β^- decay=100.
^{113}Tc–$T_{1/2}$: from 2009Pe06.
^{113}Tc–J: From 2007Ku23.
^{113}Tc–%β^- decay: %β^-n=2.1 *3* (1999Wa09).
1998Ku17: ^{113}Tc produced in the proton induced fission of ^{238}U using 25 MeV protons delivered by the K–130 cyclotron at Jyvaskyla. Mass separator IGISOL used. Measured Eγ, Iγ, γγ using LEGe array of Ge detectors and a BGO shield.
2007Ku23: Reanalysis of data in 1998Ku17.

^{113}Ru Levels

E(level)†	Jπ	$T_{1/2}$
0.0	(1/2+)	0.80 s *5*
98.27 *23*	(3/2+)	
164.1 *3*	(5/2+)	
294.9 *3*	(5/2+,7/2+)	
433.6 *3*		
688.1 *3*		
963.0? *5*		
1618.4? *5*		

† From least–squares fit to Eγ's, assuming an uncertainty of 0.4 keV.

β^- radiations

Eβ⁻	E(level)	Iβ⁻†‡	Log *ft*†	Comments
(6862)	1618.4?	12.0 *4*	4.8	av Eβ=3100 *150*.
(7792)	688.1	9.1 *3*	5.2	av Eβ=3540 *150*.
(8046)	433.6	30.3 *8*	4.7	av Eβ=3670 *150*.
(8185)	294.9	25.0 *6*	4.8	av Eβ=3730 *150*.
(8316)	164.1	22.1 *8*	4.9	av Eβ=3790 *150*.
(8382§)	98.27	1.4 *16*	6.1	av Eβ=3830 *150*.

† From 2007Ku23, values should be considered as approximate due to the complex nature of the level scheme and observation of no levels above 1620 keV whereas the Q value is ≈8500.
‡ Absolute intensity per 100 decays.
§ Existence of this branch is questionable.

γ(^{113}Ru)

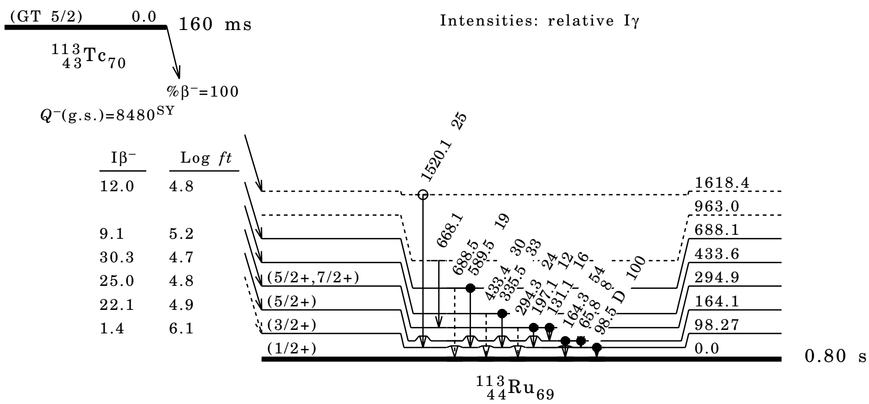
Eγ	E(level)	Iγ‡	Mult.	Comments
65.8	164.1	8		
98.5	98.27	100	D	α(K)exp=0.24 *12*.
x113.2		12		
131.1	294.9	16		
x147.1		≈0.0		
164.3	164.1	54		
197.1†	294.9	12		
x274.7†		≈5		
294.3§	294.9	24		
335.5	433.6	33		
433.4§	433.6	30		
589.5	688.1	19		
668.1†	963.0?			
688.5†§	688.1			
1520.1	1618.4?	25		

† The γ ray is also from ^{113}Rh decay.
‡ For absolute intensity per 100 decays, multiply by ≈0.50.
§ Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

^{113}Tc β^- Decay: 160 ms 1998Ku17,2007Ku23 (continued)

Decay Scheme

Intensities: relative Iγ



^{113}Ru IT Decay 2007Ku23,1998Ku17

Parent ^{113}Ru: E=130 *18*; Jπ=(11/2–); $T_{1/2}$=510 ms *30*; %IT decay=100.

^{113}Ru–E: From 2003Au03 but 0+x in Adopted Levels.

Activity: ^{238}U(p,f), E=20 MeV, on–line isotope separator IGISOL.

2007Ku23,1998Ku17 are from the same group. Data here are from 2007Ku23.

Measured: γ, $\gamma\gamma$, γ(t), ce, Ge(Li), Ge, Si(Li), elli spectrometer.

^{113}Ru Levels

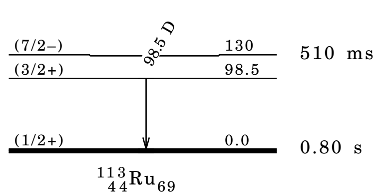
E(level)	Jπ	$T_{1/2}$	Comments
0.0	(1/2+)	0.80 s *5*	
98.5 *3*	(3/2+)		
130 *18*	(7/2–)	510 ms *30*	$T_{1/2}$: from 1998Ku17.

γ(^{113}Ru)

Eγ	E(level)	Mult.	Comments
98.5 *3*	98.5	D	α(K)exp=0.24 *12*.

Decay Scheme

Intensity: I(γ+ce) per
100 parent decays
%IT=100



^{248}Cm SF Decay 2007Ku23

Parent ^{248}Cm: E=0; Jπ=0+; $T_{1/2}$=348×10^3 y *6*; %SF decay=?
^{248}Cm–$T_{1/2}$: From 2003Au03.
Measured Eγ, γγ coin using EUROGAM2 array and IGISOL mass spectrometer.

^{113}Ru Levels

E(level)†	Jπ	$T_{1/2}$	Comments
0+x§	(7/2−)	0.51 s	%β⁻≈100; %IT=? E(level): x≈120 (2007Ku23), the energy is above the 98.5 level and below the 164.3 level in ^{103}Ru.
113.0+x‡ *3*	(9/2−)		
259.7+x§ *3*	(11/2−)		
521.2+x‡ *3*	(13/2−)		
675.5+x§ *4*	(15/2−)		
1080.7+x‡ *5*	(17/2−)		
1237.6+x§ *5*	(19/2−)		
1934.3+x‡ *6*	(23/2−)		

† From least-squares fit to Eγ's, assuming an uncertainty of 0.3 keV.
‡ (A): 7/2[523], α=+1/2.
§ (B): 7/2[523], α=−1/2.

γ(^{113}Ru)

Eγ	E(level)	Eγ	E(level)	Eγ	E(level)
112.9	113.0+x	261.5	521.2+x	559†	1080.7+x
146.7	259.7+x	405.2	1080.7+x	562.1	1237.6+x
154.2	675.5+x	408.1	521.2+x	696.7	1934.3+x
259.8	259.7+x	415.9	675.5+x		

† Placement of transition in the level scheme is uncertain.

^{252}Cf SF Decay 2003Zh14

Parent ^{252}Cf: E=0.0; Jπ=0+; $T_{1/2}$=2.645 y *8*; %SF decay=?
Measured Eγ, Iγ, γγ, and γγγ using the GAMMASPHERE detector array comprised of 102 Compton-suppressed Ge detectors.

^{113}Ru Levels

E(level)†	Jπ‡
0.0+x	
113.36+x# *24*	(9/2−)
260.44+x§ *24*	(11/2−)
522.5+x# *3*	(13/2−)
676.5+x§ *4*	(15/2−)
1082.4+x# *4*	(17/2−)
1238.8+x§ *5*	(19/2−)
1935.6+x§ *6*	(23/2−)
2740.2+x§ *6*	(27/2−)
3612.2+x§ *7*	(31/2−)

† From least-squares fit to Eγ's, assuming Δ(Eγ)=0.3 keV.
‡ Based on band assignment.
§ (A): possible $\nu h_{11/2}$, α=−1/2.
# (B): possible $\nu h_{11/2}$, α=+1/2.

γ(^{113}Ru)

Eγ	E(level)	Iγ	Eγ	E(level)	Iγ	Eγ	E(level)	Iγ
113.4	113.36+x	>100	405.9	1082.4+x	9	696.8	1935.6+x	26
147.1	260.44+x	100	409.2	522.5+x	21	804.5	2740.2+x	8
154.0	676.5+x	8	416.1	676.5+x	57	872.0	3612.2+x	2
260.4	260.44+x	14	559.9	1082.4+x	10			
262.1	522.5+x	23	562.3	1238.8+x	52			

Adopted Levels, Gammas

Q(β⁻)=5010 *40*; S(n)=7000 *70*; S(p)=10490 *90*; Q(α)=−6570 *110* 2003Au03,2009AuZZ.
Production and identification: ^{238}U(p,F) E=20 MeV, on-line isotopic separator IGISOL.
^{252}Cf SF decay. Mass from kinetic energy of fragment (1970Jo20). (K x-ray)γ coin (1972Ho08).

^{113}Rh Levels

Cross Reference (XREF) Flags

A ^{113}Ru β⁻ Decay (0.80 s)
B ^{113}Ru β⁻ Decay (0.51 s)
C ^{252}Cf SF Decay
D ^{208}Pb(^{18}O,Fγ)
E ^{248}Cm SF Decay

E(level)†	Jπ‡	XREF	$T_{1/2}$	Comments
0.0§	(7/2+)	ABCDE	2.80 s *12*	%β⁻=100. $T_{1/2}$: From 1993Pe11.
211.72# *6*	(9/2+)	ABCDE	0.21 ns *13*	$T_{1/2}$: From centroid-shift in βγ(t)(2002Ku18).
263.21b *6*	(3/2+)	ABC E	0.38 ns *12*	$T_{1/2}$: From centroid-shift in βγ(t)(2002Ku18).
351.35b *6*	(5/2+)	ABC E		
444.01§ *7*	(11/2+)	BCD		
570.96@ *7*	(11/2+)	CD		
578.98b *7*	(7/2+)	ABC E		
600.72c *7*	(3/2+)	ABCDE	0.66 ns *14*	$T_{1/2}$: From centroid-shift in βγ(t)(2002Ku18).
666.2 *10*	(1/2−)	E		
684.67# *8*	(13/2+)	CD		
784.8b *6*	(9/2+)	E		
785.13e *9*	(7/2−)	ABC		
786.55c *12*	(7/2+)	ABC E		
823.4 *4*		A		
834.36d *8*	(5/2+)	ABC E		
883.2 *14*		E		
911.92 *9*	(9/2+)	C E		
936.33& *8*	(13/2+)	CD		
967.9 *3*		A		
978.0 *3*		A		
1008.9 *3*		A		
1034.0 *4*		A		
1060.9 *3*		A		
1071.0b *8*	(11/2+)	E		
1075.73§ *8*	(15/2+)	CD		
1138.5 *10*	(11/2+)	E		
1206.4 *5*		B		
1258.62d *13*	(9/2+)	C E		
1259.9 *10*		E		
1284.26@ *7*	(15/2+)	CD		
1320.22# *10*	(17/2+)	CD		
1412.0@ *7*	(17/2+)	D		
1463.9 *7*		A		
1485.2 *6*		A		
1529.8 *6*		B		
1673.62& *9*	(17/2+)	C		
1775.49§ *11*	(19/2+)	CD		
1843.4 *6*		B		

E(level)†	Jπ‡	XREF
1908.6 *5*		A
1945.8§ *4*		A
1965.8 *5*		A
2025.31@ *9*	(19/2+)	C
2037.98# *12*	(21/2+)	CD
2058.4 *6*	(9/2−)	B
2122.0 *4*		A
2133.19 *12*	(21/2+)	C
2191.3 *3*		A
2221.4 *4*		A
2287.5 *5*		A
2297.4 *7*		A
2367.9 *4*	(9/2−)	B
2398.49& *11*	(21/2+)	C
2417.5 *5*	(9/2−)	B
2446.50a *15*	(23/2+)	C
2470.33§ *12*	(23/2+)	C
2525.7 *4*		A
2623.6 *9*		A
2675.4 *13*		A
2723.25# *13*	(25/2+)	C
2776.90 *15*	(25/2+)	C
3090.77§ *14*	(27/2+)	C
3133.07a *18*	(27/2+)	C
3334.76# *15*	(29/2+)	C
3770.05§ *15*	(31/2+)	C
4006.04# *16*	(33/2+)	C

† From least-squares fit to adopted gamma energies.
‡ Based on bands assignments and systematics.
§ (A): g.s. band, α=−1/2.
# (B): g.s. band, α=+1/2.
@ (C): 11/2+ band, α=−1/2.
& (D): 13/2+ band, α=+1/2.
a (E): 23/2+ band, α=−1/2.
b (F): 3/2+ band.
c (G): π1/2[431] band, α=−1/2.
d (H): π1/2[431] band, α=+1/2.
e (I): π1/2[301] band.

Adopted Levels, Gammas (continued)

γ(^{113}Rh)

E(level)	Eγ†	Iγ†	Mult.	α
211.72	211.70 *10*	100	M1	0.0444
263.21	263.17 *10*	100		
351.35	88.17 *10*	78 *16*		
	351.44 *10*	100 *20*	M1	0.01209
444.01	232.28 *10*	100 *13*		
	443.95 *10*	91 *13*		
570.96	359.26 *10*	100 *20*		
	571.0 *1*	15 *3*		
578.98	227.68 *10*	100 *20*		
	315.73 *10*			
	367.25 *10*	29 *6*		
600.72	337.58 *10*	100 *20*		
	600.7 *1*	14 *3*		
666.2	403‡	100		
684.67	240.65 *10*	82 *11*		
	472.93 *10*	100 *12*		
784.8	206.0			
	433.5			
785.13	206.10 *10*	100		
	433.82 *10*			
	785			
786.55	185.82 *10*	100		
823.4	560.1 *4*	100		
834.36	233.69 *10*	100 *20*		
	483.04 *10*	27 *6*		
	571.07 *10*	82 *16*		
883.2	217‡	100		
911.92	332.97 *10*	100		
	560.54 *10*			
936.33	365.33 *10*	100 *20*		
	724.60 *10*	42 *9*		
967.9	181.0 *7*	28 *14*		
	367.2 *5*	100 *14*		
	704.9 *7*	31 *3*		
978.0	626.8 *5*	40.0 *20*		
	715.1 *4*	100 *3*		
1008.9	657.8 *5*	86 *4*		
	745.9 *5*	83 *4*		
	1008.7 *6*	100 *7*		
1034.0	247.0 *8*	50 *30*		
	682.8 *8*	58 *17*		
	770.9 *7*	100 *8*		
1060.9	226.0 *7*	30 *15*		
	274.7 *7*	33 *4*		
	709.4 *5*	100 *5*		
	797.8 *6*	85 *4*		
	1061.2 *6*	93 *7*		
1071.0	286.5			
	491.7‡			
1075.73	391.18 *10*	100 *14*		
	631.65 *10*	62 *8*		
1138.5	352‡	100		
1206.4	994.7 *5*	100		
1258.62	424.26 *10*	100		
1259.9	348	100		
1284.26	347.84 *10*	100 *20*		
	599.45 *10*	46 *9*		
	713.40 *10*	23 *5*		
	840.3 *1*			
1320.22	244.48 *10*	51 *10*		
	635.55 *10*	100 *16*		
1412.0	475.7 *7*	100		
1463.9	1112.2 *10*	70 *60*		

E(level)	Eγ†	Iγ†
1463.9	1464.3 *10*	100 *15*
1485.2	906.2 *8*	73 *9*
	1133.9 *8*	100 *30*
1529.8	1318.4 *7*	100
1673.62	389.36 *10*	100 *20*
	737.34 *10*	65 *13*
1775.49	455.34 *10*	100 *20*
	699.76 *10*	38 *12*
1843.4	1631.7 *6*	100
1908.6	1123.0 *8*	33 *10*
	1645.7 *7*	100 *20*
1945.8	1367.6 *6*	100 *8*
	1593.8 *7*	83 *8*
1965.8	1180.4 *7*	100 *50*
	1614.7 *8*	100 *50*
2025.31	351.65 *10*	100 *20*
	740.95 *10*	23 *5*
	949.61 *10*	69 *14*
2037.98	262.55 *10*	44 *9*
	717.66 *10*	100 *20*
2058.4	1225.0 *10*	30 *20*
	1846.1 *8*	100 *10*
	2058.4 *13*	15 *15*
2122.0	1770.2 *7*	79 *9*
	1858.1 *7*	100 *6*
	1911.0 *9*	32 *3*
	2121.8 *11*	21 *3*
2133.19	357.67 *10*	100
	813.0 *1*	
2191.3	246.4 *11*	7 *4*
	1223.3 *7*	38 *4*
	1367.6 *6*	64 *22*
	1840.8 *7*	64 *4*
	1927.6 *7*	100 *7*
	2191.0 *8*	64 *22*
2221.4	1160.8 *9*	19 *3*
	1213.1 *7*	36 *3*
	1869.7 *7*	64 *6*
	1957.8 *7*	100 *8*
2287.5	1226.6 *6*	100 *3*
	1936.3 *10*	19 *8*
	2023.9 *10*	24 *11*
2297.4	2034.5 *10*	47 *6*
	2297.1 *9*	100 *18*
2367.9	1534.6 *11*	10 *5*
	1583.1 *6*	100 *10*
	1922.9 *7*	100 *10*
	2156.5 *11*	20 *5*
	2368.0 *9*	40 *9*
2398.49	373.09 *10*	100
	724.95 *10*	60
2417.5	888.1 *8*	10 *3*
	1973.2 *6*	100 *10*
	2417.6 *10*	12 *4*
2446.50	313.35 *10*	100
2470.33	432.26 *10*	100 *20*
	694.87 *10*	74 *15*
2525.7	403.4 *5*	100 *21*
	1548.9 *7*	71 *4*
	2173.6 *8*	21 *4*
2623.6	2360.4 *9*	100
2675.4	2324.0 *13*	100
2723.25	252.95 *10*	69 *14*

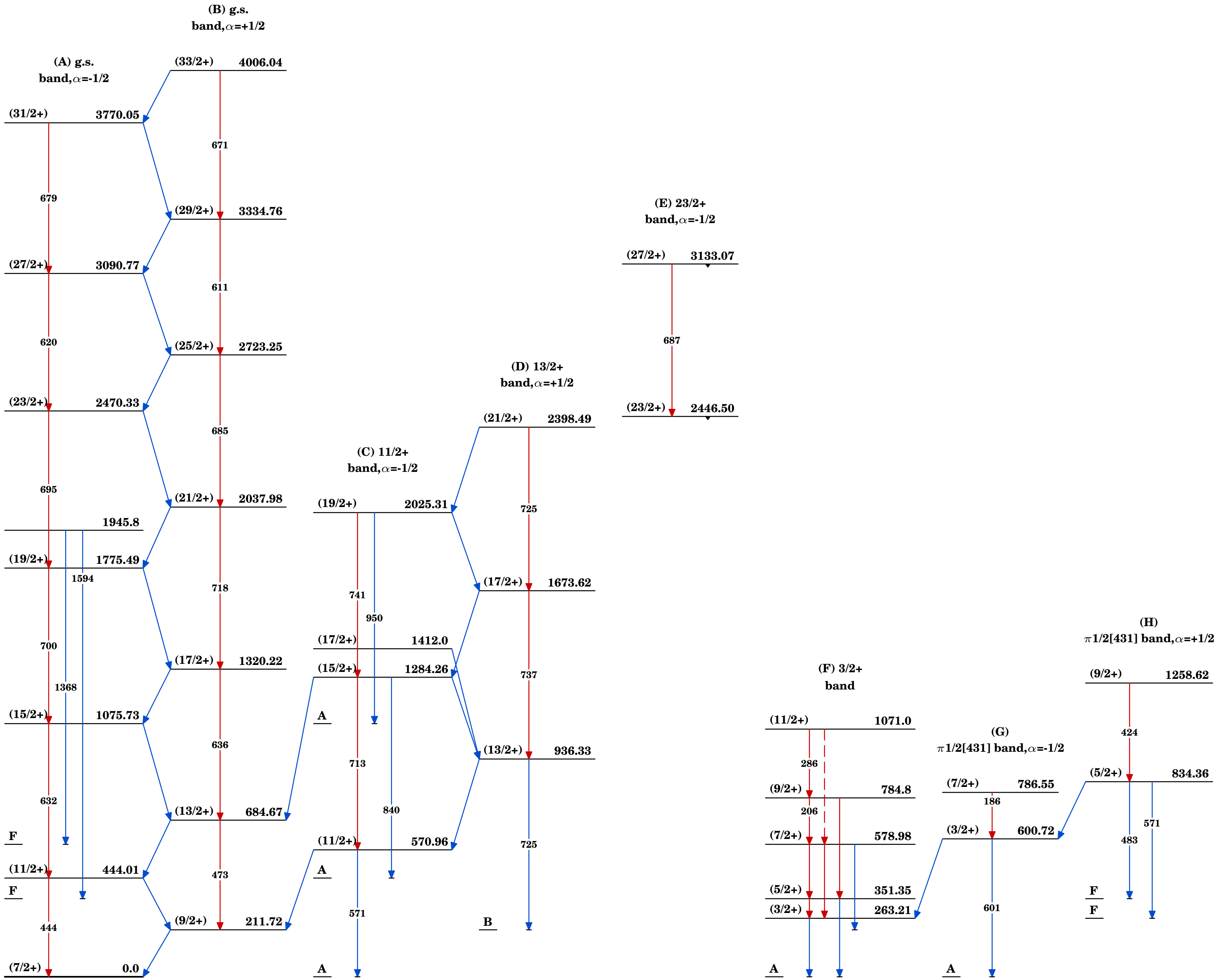
Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{113}Rh) (continued)

E(level)	Eγ†	Iγ†
2723.25	685.32 *10*	100 *20*
2776.90	330.45 *10*	100 *20*
	643.66 *10*	56 *11*
3090.77	367.67 *10*	100 *20*
	620.35 *10*	40 *8*
3133.07	356.1‡	
	686.57 *10*	100
3334.76	244.0 *1*	
	611.45 *10*	100
3770.05	435.24 *10*	
3770.05	679.33 *10*	100
4006.04	236.0 *1*	
	671.27 *10*	100

† If possible, taken from 2004Lu03, otherwise from 2002Ku18.
‡ Placement of transition in the level scheme is uncertain.


(A) g.s. band,α=-1/2
(B) g.s. band,α=+1/2
(C) 11/2+ band,α=-1/2
(D) 13/2+ band,α=+1/2
(E) 23/2+ band,α=-1/2
(F) 3/2+ band
(G) π1/2[431] band,α=-1/2
(H) π1/2[431] band,α=+1/2
(31/2+) 3770.05
(27/2+) 3090.77
(23/2+) 2470.33
1945.8
(19/2+) 1775.49
(15/2+) 1075.73
(11/2+) 444.01
(7/2+) 0.0
(33/2+) 4006.04
(29/2+) 3334.76
(25/2+) 2723.25
(21/2+) 2037.98
(17/2+) 1320.22
(13/2+) 684.67
(9/2+) 211.72
(19/2+) 2025.31
(17/2+) 1412.0
(15/2+) 1284.26
(11/2+) 570.96
(21/2+) 2398.49
(17/2+) 1673.62
(13/2+) 936.33
(27/2+) 3133.07
(23/2+) 2446.50
(11/2+) 1071.0
(9/2+) 784.8
(7/2+) 578.98
(5/2+) 351.35
(3/2+) 263.21
(7/2+) 786.55
(3/2+) 600.72
(9/2+) 1258.62
(5/2+) 834.36
679
620
695
700
632
444
1594
1368
671
611
685
718
636
473
741
950
713
840
571
725
737
725
687
286
206
186
601
424
571
483
F
F
A
A
A
B
A
A
F
F

$^{113}_{45}$Rh$_{68}$

^{113}Ru β⁻ Decay (0.80 s) 2002Ku18,2007Ku23

Parent ^{113}Ru: E=0; Jπ=(1/2+); $T_{1/2}$=0.80 s *5*; Q(g.s.)=6480 *50*; %β⁻ decay=100.

2002Ku18: Measured Eγ, Iγ, γγ, βγ coin, lifetimes by βγ(t) using a LEGe–detector and a 37% Ge–detector operated with two plastic scintillators and in anti–coincidence with a BGO shield.

2007Ku23: Re–interpretation of the β feedings.

All data are from 2002Ku18, except for intensities of some of the γ rays, β feedings and associated log *ft* values. Revised division (amongst two activities of ^{113}Ru) of γ–ray intensities and β feedings are from 2007Ku23 and e–mail reply of Oct 15, 2007 from the first author of 2007Ku23 to the evaluator.The questionable and unplaced γ rays are not listed in this e–mail reply.

The 578, 785, 786 and 834 levels and deexciting γ rays have been removed by 2007Ku23 and associated with only the decay of the 0.51–s isomer.

^{113}Rh Levels

E(level)†	Jπ	$T_{1/2}$§
0.0	(7/2+)	2.80 s *12*
211.66 *20*	(9/2+)	0.21 ns *13*
263.18 *16*	(3/2+)	0.38 ns *12*
351.27 *19*	(5/2+)	
600.7 *3*	(3/2+)	0.66 ns *14*
823.4 *4*		
968.0 *4*		
978.0 *4*		
1008.9 *3*		
1034.1 *6*		
1060.9 *4*		
1463.9 *8*		
1485.2 *9*		
1711.6? *10*		
1908.9 *8*		
1945.0‡ *7*		
1966.0 *9*		
2121.9 *4*		
2191.2 *4*		
2221.4 *4*		
2287.4?‡ *5*		
2297.4 *7*		
2525.6?‡ *5*		
2623.6?‡ *10*		
2675.3?‡ *14*		

† From least–squares fit to Eγ's.
‡ Level not shown in figure 1 of 2002Ku18.
§ From centroid–shift method in βγ(t).

β⁻ radiations

Eβ⁻	E(level)	Iβ⁻†§	Log *ft*	Comments
(3800# *50*)	2675.3?	0.3‡ *1*	6.2	av Eβ=1636 *24*.
(3860# *50*)	2623.6?	1.7‡ *2*	5.5	av Eβ=1660 *24*.
(3950# *50*)	2525.6?	4.4‡ *5*	5.1	av Eβ=1707 *24*.
(4180 *50*)	2297.4	2.4	5.5	av Eβ=1816 *24*.
(4190# *50*)	2287.4?	5.1‡ *5*	5.1	av Eβ=1820 *24*.
(4260 *50*)	2221.4	7.6	5.0	av Eβ=1852 *24*.
(4290 *50*)	2191.2	14.9	4.7	av Eβ=1866 *24*.
(4360 *50*)	2121.9	7.6	5.0	av Eβ=1899 *24*. Iβ⁻: Compilers deduce 5.3 *6* from intensity balance.
(4510 *50*)	1966.0	1.3	5.9	av Eβ=1973 *24*.
(4540 *50*)	1945.0	1.7	5.8	av Eβ=1983 *24*. Iβ⁻: 2.0 (obtained by compilers from intensity balance).
(4570 *50*)	1908.9	2.6	5.6	av Eβ=2001 *24*.
(4770# *50*)	1711.6?	<1.6‡	>5.9	av Eβ=2095 *24*.
(4990 *50*)	1485.2	1.1	6.1	av Eβ=2203 *24*.
(5020 *50*)	1463.9	1.2	6.1	av Eβ=2213 *24*.
(5420 *50*)	1060.9	6.5	5.5	av Eβ=2406 *24*. Iβ⁻: Compilers deduce 3.0 *3* from intensity balance.
(5450 *50*)	1034.1	1.8	6.1	av Eβ=2418 *24*.
(5470 *50*)	1008.9	6.2	5.6	av Eβ=2431 *24*.
(5500 *50*)	978.0	7.8	5.5	av Eβ=2445 *24*. Iβ⁻: Compilers deduce 6.14 *17* from intensity balance.
(5510 *50*)	968.0	2.0	6.1	av Eβ=2450 *24*.
(5660 *50*)	823.4	2.1	6.1	av Eβ=2519 *24*.
(5880 *50*)	600.7	12.6	5.4	av Eβ=2626 *24*.
(6220 *50*)	263.18	20.5	5.3	av Eβ=2787 *24*. Iβ⁻: Compilers deduce 16.1 *23* from intensity balance.

† From 2007Ku23.
‡ Deduced from intensity balance.
§ Absolute intensity per 100 decays.
\# Existence of this branch is questionable.

^{113}Ru β^- Decay (0.80 s) 2002Ku18,2007Ku23 (continued)

γ(^{113}Rh)

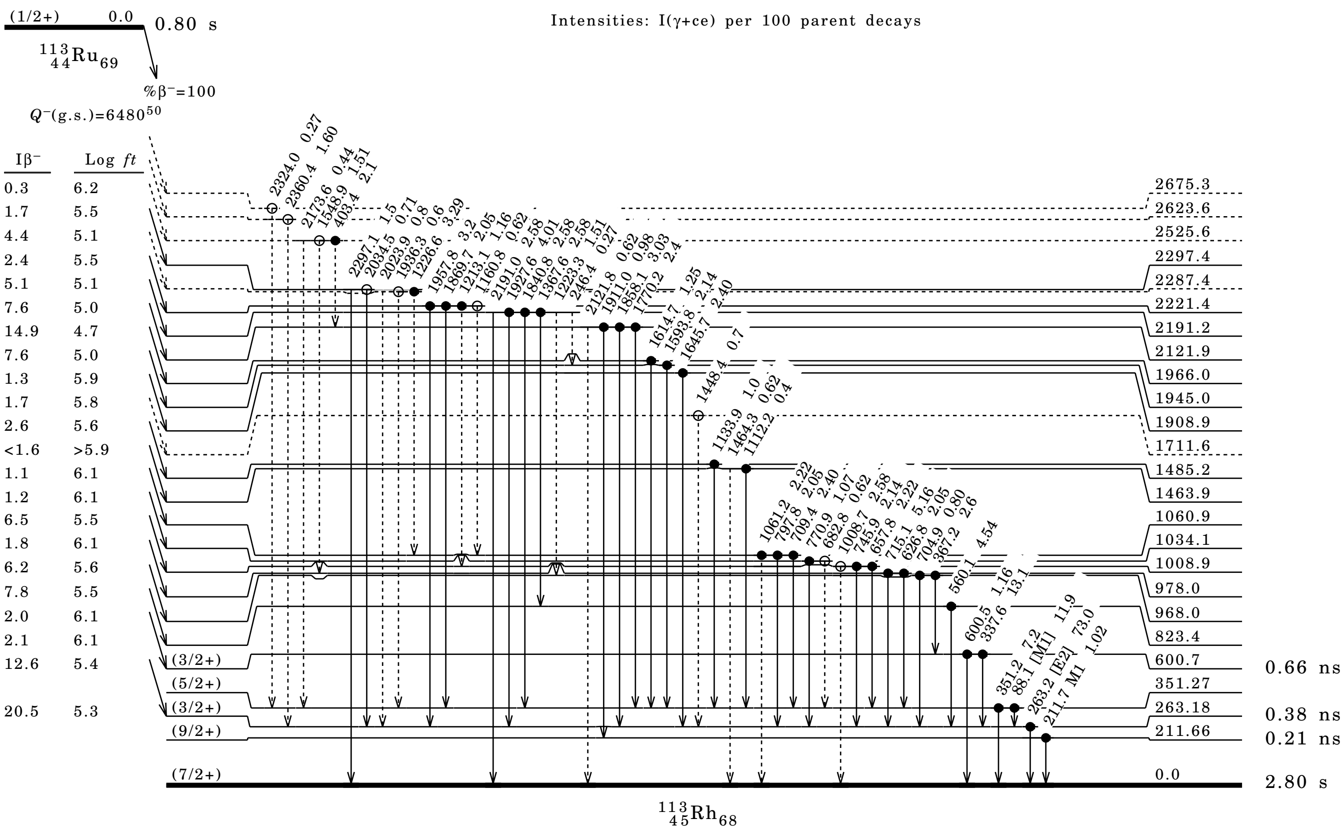
Iγ normalization: From comparison of β feedings given by 2007Ku23 and γ intensities from 2002Ku18, assuming no β feeding to the g.s.

Eγ	E(level)	Iγ§	Mult.	α	Comments
88.1 *3*	351.27	9.0‡ *13*	[M1]	0.490 *9*	Iγ: combined intensity from both isomers=13.1 *13*.
x181.0† *7*		0.8 *4*			
211.7 *2*	211.66	1.1‡ *1*	M1	0.0444	Iγ: combined intensity from both isomers=32.8 *8*.
x226.0 *7*		0.8 *4*			
246.4# *11*	2191.2	0.3 *2*			Iγ: total transition intensity is listed as 0.6 *2* in e-mail reply of Oct 15, 2007 from the first author of 2007Ku23.
x247.0† *8*		0.6 *4*			
263.2 *2*	263.18	78.6‡ *4*	[E2]	0.0439	Iγ: combined intensity from both isomers=100.0 *5*.
x274.7† *7*		0.9 *1*			
337.6 *3*	600.7	14.7‡ *3*			Iγ: combined intensity from both isomers=23.4 *4*.
351.2 *3*	351.27	8.1‡ *13*			Iγ: combined intensity from both isomers=11.8 *17*.
367.2 *5*	968.0	2.9 *4*			
x401.0† *7*		1.1 *1*			
403.4# *5*	2525.6?	2.4 *5*			
x422.9† *5*		2.3 *1*			
560.1 *4*	823.4	5.1 *2*			
600.5 *5*	600.7	1.3‡ *2*			Iγ: combined intensity from both isomers=2.1 *3*.
626.8 *5*	978.0	2.3 *1*			
657.8 *5*	1008.9	2.5 *1*			
682.8# *8*	1034.1	0.7 *2*			
704.9 *7*	968.0	0.9 *1*			
709.4 *5*	1060.9	2.7 *1*			
715.1 *4*	978.0	5.8 *1*			
745.9 *5*	1008.9	2.4 *1*			
770.9 *7*	1034.1	1.2 *1*			
797.8 *6*	1060.9	2.3 *1*			
x906.2† *8*		0.8 *1*			
1008.7# *6*	1008.9	2.9 *2*			
1061.2# *6*	1060.9	2.5 *2*			
1112.2 *10*	1463.9	0.5 *4*			
x1123.0† *8*		0.9 *1*			
1133.9 *8*	1485.2	1.1 *3*			
1160.8# *9*	2221.4	0.7 *1*			
x1180.4† *7*		1.4 *7*			
x1194.6† *6*		2.6 *2*			
1213.1# *7*	2221.4	1.3 *1*			
1223.3# *7*	2191.2	1.7 *2*			
1226.6# *6*	2287.4?	3.7 *1*			
1367.6 *6*	2191.2	2.9 *1*			Eγ: other placement from 1945–578 level (2002Ku18) is now omitted since 578 level is populated only in the decay of 0.51-s isomer according to 2007Ku23.
1448.4# *9*	1711.6?	0.8 *8*			Eγ: placement not shown in figure 1; also fits between levels 2417–968, the 2417 level is populated in the decay of 0.51-s isomer.
1464.3# *10*	1463.9	0.7 *1*			
1548.9# *7*	2525.6?	1.7 *1*			
1593.8 *7*	1945.0	2.4 *2*			
1614.7 *8*	1966.0	1.4 *1*			
1645.7 *7*	1908.9	2.7 *2*			
x1661.2† *10*		0.6 *1*			
1770.2 *7*	2121.9	2.7 *3*			
1840.8 *7*	2191.2	2.9 *2*			
1858.1 *7*	2121.9	3.4 *2*			
1869.7 *7*	2221.4	2.3 *2*			
1911.0 *9*	2121.9	1.1 *1*			
1927.6 *7*	2191.2	4.5 *2*			
1936.3# *10*	2287.4?	0.7 *3*			
1957.8 *7*	2221.4	3.6 *3*			
2023.9# *10*	2287.4?	0.9 *4*			
2034.5 *10*	2297.4	0.8 *1*			
2121.8# *11*	2121.9	0.7 *1*			
2173.6# *8*	2525.6?	0.5 *1*			
2191.0 *8*	2191.2	2.9 *1*			
2297.1 *9*	2297.4	1.7 *3*			
2324.0# *13*	2675.3?	0.3 *1*			
2360.4# *9*	2623.6?	1.8 *2*			

† The unplaced γ belongs to the decay of either or both the isomers.
‡ Intensity divided based on β feeding proposed by 2007Ku23. Value is different in authors' earlier work (figure 1 of 2002Ku18).
§ For absolute intensity per 100 decays, multiply by 0.89.
# Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

^{113}Ru β⁻ Decay (0.80 s) 2002Ku18,2007Ku23 (continued)

Decay Scheme



^{113}Ru β⁻ Decay (0.51 s) 2002Ku18,2007Ku23

Parent ^{113}Ru: E≈120; Jπ=(7/2−); $T_{1/2}$=0.51 s *3*; Q(g.s.)=6480 *50*; %β⁻ decay=100.

^{113}Ru–$T_{1/2}$: from 1998Ku17:

^{113}Ru–E,J: from 2007Ku23, probable 7/2[523] state.

2002Ku18: Measured Eγ, Iγ, γγ, βγ coin, βγ(t) using a LEGe–detector and a 37% Ge–detector operated with two plastic scintillators and in anti–coincidence with a BGO shield.

Measured Eγ, γγ coin, Iβ using EUROGAM2 array and IGISOL mass separator. These data are re–interpreted by 2007Ku23.

All data are from 2002Ku18, except for intensities of some of the γ rays, β feedings and associated log *ft* values. Revised division (amongst two activities of ^{113}Ru) of γ–ray intensities and β feedings are from 2007Ku23 and e–mail reply of Oct 15, 2007 from the first author of 2007Ku23. The questionable and unplaced γ rays are not listed in this e–mail reply.

^{113}Rh Levels

E(level)†	Jπ	$T_{1/2}$‡	E(level)†	Jπ	$T_{1/2}$‡	E(level)†	Jπ
0.0	(7/2+)	2.80 s *12*	600.5 *3*	(3/2+)	0.66 ns *14*	1843.4 *7*	
211.73 *18*	(9/2+)	0.21 ns *13*	785.0 *4*	(9/2+)		2058.4 *6*	(9/2−)
263.10 *17*	(3/2+)	0.38 ns *12*	786.3 *4*	(7/2+)		2367.9 *4*	(9/2−)
351.24 *20*	(5/2+)		834.1 *3*	(5/2+)		2417.6 *5*	(9/2−)
444.12 *25*	(11/2+)		1206.4 *6*				
578.80 *25*	(7/2+)		1529.8? *6*				

† From least–squares fit to Eγ's.

‡ From centroid–shift in βγ(t).

^{113}Ru β⁻ Decay (0.51 s) 2002Ku18,2007Ku23 (continued)

β⁻ radiations

Eβ⁻	E(level)	Iβ⁻†‡	Log *ft*	Eβ⁻	E(level)	Iβ⁻†‡	Log *ft*
(4180 *50*)	2417.6	13.9	4.4	(5810 *50*)	786.3	8.9	5.3
(4230 *50*)	2367.9	13.5	4.5	(5820 *50*)	785.0	2.4	5.8
(4540 *50*)	2058.4	3.6	5.2	(6020 *50*)	578.80	12.8	5.2
(4760 *50*)	1843.4	6.5	5.0	(6160 *50*)	444.12	1.4	6.2[1u]
(5070 *50*)	1529.8?	0.7	6.1	(6250 *50*)	351.24	1.4	6.2
(5390 *50*)	1206.4	4.5	5.4	(6340 *50*)	263.10	2.4	6.0[1u]
(5770 *50*)	834.1	12.3	5.1	(6390 *50*)	211.73	15.7	5.2

† From 2007Ku23.
‡ Absolute intensity per 100 decays.

γ(^{113}Rh)

Iγ normalization: From comparison of β feedings given by 2007Ku23 and γ intensities from 2002Ku18, assuming no β feeding to the g.s.

Eγ	E(level)	Iγ#	Mult.	α	Comments
48.1 *13*	834.1	0.2‡ *2*	[M1]	2.8	
88.1 *3*	351.24	4.2† *4*	[M1]	0.49	Iγ: combined intensity from both isomers=13.1 *13*.
ˣ181.0§ *7*		0.8 *4*			Placement by 2002Ku18: 968–786 is omitted since 786 level is now associated to 0.51–s isomer decay only (2007Ku23). In coin with 168γ, 186γ, 263γ, 338γ.
185.8 *3*	786.3	5.9‡ *8*	[E2]	0.147	
206.2 *4*	785.0	2.7‡ *4*			
211.7 *2*	211.73	31.7† *8*	M1(+E2)	0.045	Iγ: combined intensity from both isomers=32.8 *8*. α(K)exp=0.06 *2*.
ˣ226.0 *7*		0.8 *4*			Tentative placement by 2002Ku18: 1061–834 is omitted since 834 level is now associated to 0.51–s isomer decay only (2007Ku23). In coin with 351γ, 263γ, 338γ.
227.6 *3*	578.80	8.2‡ *4*			
232.3 *3*	444.12	7.4 *3*			
233.9 *4*	834.1	2.7‡ *4*			
ˣ247.0§ *8*		0.6 *4*			Tentative placement by 2002Ku18: 1034–786 is omitted since 786 level is now associated to 0.51–s isomer decay only (2007Ku23). In coin with 186γ, 338γ and possibly with 263γ.
263.2 *2*	263.10	22.3† *2*	[E2]	0.044	Iγ: combined intensity from both isomers=100.0 *5*.
ˣ274.7§ *7*		0.9 *1*			Placement by 2002Ku18: 1061–786 is omitted since 786 level is now associated to 0.51–s isomer decay only (2007Ku23). In coin with 88γ, 161γ, 186γ, 190γ, 263γ, 338γ.
337.6 *3*	600.5	8.7† *2*			Iγ: combined intensity from both isomers=23.4 *4*.
351.2 *3*	351.24	3.7† *6*			Iγ: combined intensity from both isomers=11.8 *17*.
367.1 *5*	578.80	2.1‡ *2*			
ˣ401.0§ *7*		1.1 *1*			In coin with 88, 117, 152, 186, 263 γ's; fits between levels 2368–1966.
ˣ422.9§ *5*		2.3 *1*			In coin with 88, 162, 263, 338 γ's; fits between levels 2368–1945.
443.9 *4*	444.12	5.5 *2*			
482.0 *8*	834.1	0.7‡ *2*			
571.1 *4*	834.1	6.6‡ *2*			
578.7 *6*	578.80	1.9‡ *2*			
600.5 *5*	600.5	0.8† *1*			Iγ: combined intensity from both isomers=2.1 *3*.
785.0 *5*	785.0	2.7‡ *2*			
888.1@ *8*	2417.6	0.9 *4*			
ˣ906.2§ *8*		0.8 *1*			Tentative placement by 2002Ku18: 1485–578 is omitted since 578 level is now associated to 0.51–s isomer decay only (2007Ku23). In coin with 88γ.
994.7 *5*	1206.4	3.3 *4*			
ˣ1123.0§ *8*		0.9 *1*			Tentative placement by 2002Ku18: 1909–785 is omitted since 785 level is now associated to 0.51–s isomer decay only (2007Ku23). In possible coin with 212γ.
ˣ1180.4§ *7*		1.4 *7*			Tentative placement by 2002Ku18: 1966–785 is omitted since 785 level is now associated to 0.51–s isomer decay only (2007Ku23). In coin with 88γ, 190γ, 212γ, 263γ.

Continued on next page (footnotes at end of table)

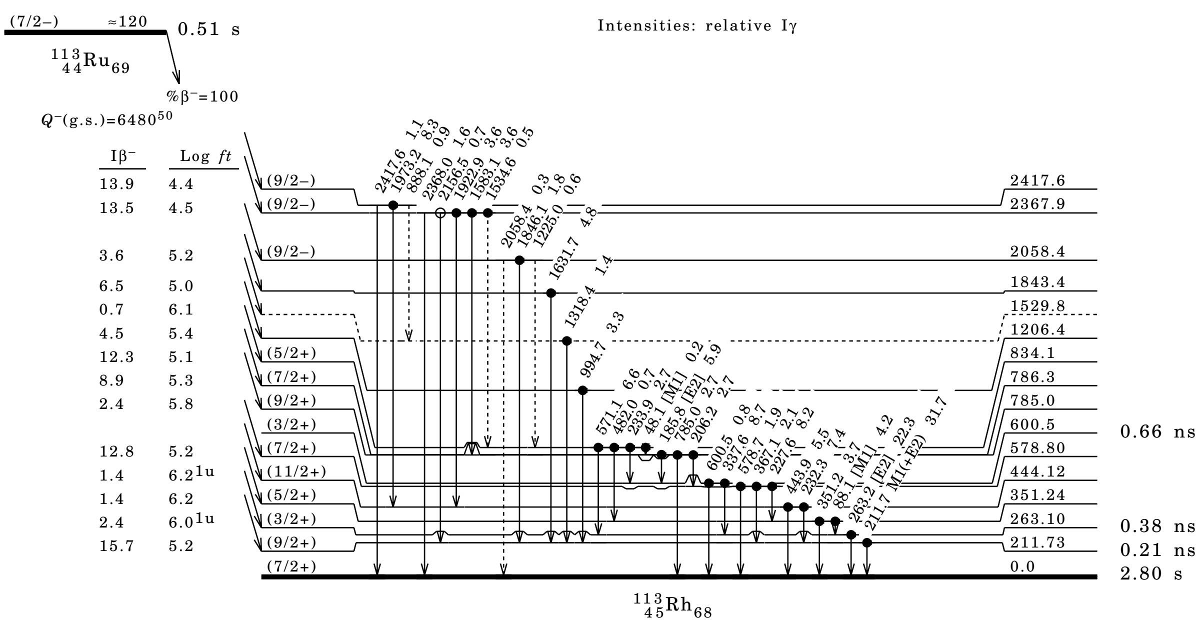
^{113}Ru β^- Decay (0.51 s) 2002Ku18,2007Ku23 (continued)

γ(^{113}Rh) (continued)

Eγ	E(level)	Iγ[#]	Comments
[x]1194.6[§] *6*		2.6 *2*	In coin with 135, 212, 263 γ's.
1225.0[@] *10*	2058.4	0.6 *4*	
1318.4 *7*	1529.8?	1.4 *1*	
1534.6[@] *11*	2367.9	0.5 *1*	
1583.1 *6*	2367.9	3.6 *2*	
1631.7 *6*	1843.4	4.8 *3*	
[x]1661.2[§] *10*		0.6 *1*	In coin with 88, 212 γ's.
1846.1 *8*	2058.4	1.8 *1*	
1922.9 *7*	2367.9	3.6 *1*	
1973.2 *6*	2417.6	8.3 *2*	
2058.4[@] *13*	2058.4	0.3 *3*	
2156.5 *11*	2367.9	0.7 *1*	
2368.0 *9*	2367.9	1.6 *1*	
2417.6 *10*	2417.6	1.1 *1*	

† Intensity divided based on β feeding proposed by 2007Ku23. Value is different in authors' earlier work (figure 2 of 2002Ku18).
‡ 2007Ku23 assign all intensity with the decay of 0.51–s activity.
§ The unplaced γ belongs to the decay of either or both the isomers.
\# For absolute intensity per 100 decays, multiply by 1.35.
@ Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

Decay Scheme



^{248}Cm SF Decay 2007Ku23

Parent ^{248}Cm: E=0; Jπ=0+; $T_{1/2}$=348×10^{3} y *6*; %SF decay=?
^{248}Cm–$T_{1/2}$: From 2003Au03.
Measured Eγ, γγ coin using EUROGAM2 array and IGISOL mass spectrometer.

^{113}Rh Levels

E(level)†	Jπ	E(level)†	Jπ	E(level)†	Jπ
0.0	(7/2+)	666.2 *11*	(1/2−)	1071.1‡ *5*	(11/2+)
211.6 *3*	(9/2+)	784.6‡ *3*	(9/2+)	1138.3 *11*	(11/2+)
263.2‡ *2*	(3/2+)	786.3 *5*	(7/2+)	1258.7 *5*	
351.1‡ *2*	(5/2+)	834.4 *3*	(5/2+)	1259.6 *11*	
578.6‡ *3*	(7/2+)	883.2 *15*			
600.7 *4*	(3/2+)	911.6 *4*			

† From least–squares fit to Eγ's, assuming an uncertainty of 0.3 keV when Eγ stated to tenth of a keV, 1 keV otherwise.
‡ (A): 3/2+ band.

γ(^{113}Rh)

Eγ	E(level)	Eγ	E(level)	Eγ	E(level)
87.9	351.1	286.5	1071.1	403†	666.2
185.6	786.3	315.3	578.6	424.3	1258.7
206.0	784.6	333.0	911.6	433.5	784.6
211.6	211.6	337.6	600.7	483.2	834.4
217†	883.2	348	1259.6	491.7†	1071.1
227.5	578.6	351.0	351.1	561	911.6
233.8	834.4	352†	1138.3	571	834.4
263.2	263.2	367.0	578.6	600.7†	600.7

† Placement of transition in the level scheme is uncertain.

^{252}Cf SF Decay 2004Lu03

Parent ^{252}Cf: E=0; Jπ=0+; $T_{1/2}$=2.645 y *8*; %SF decay=?
Measured Eγ, Iγ, γγ using GAMMASPHERE array of 102 Compton–suppressed Ge detectors.
First mass assignment from fragment–γ coin, 1970Jo20. Z assignment of 304γ from (K x–ray)γ coin, 1972Ho08. Cascade assignment from half–lives, 1970Jo20.
154.6γ and 304γ seen by 1970Jo20 and 1972Ho08 could belong to an other nuclide.

^{113}Rh Levels

E(level)†	Jπ	E(level)†	Jπ	E(level)†	Jπ
0.0‡	(7/2+)	834.36d *10*	(5/2+)	2133.19& *12*	(21/2+)
211.72§ *10*	(9/2+)	911.93b *10*	(9/2+)	2398.48@ *11*	(21/2+)
263.21b *10*	(3/2+)	936.33@ *10*	(13/2+)	2446.49a *15*	(23/2+)
351.36b *10*	(5/2+)	1075.73‡ *10*	(15/2+)	2470.32‡ *13*	(23/2+)
444.00‡ *10*	(11/2+)	1258.63d *13*	(9/2+)	2723.24§ *14*	(25/2+)
570.96# *10*	(11/2+)	1284.26# *10*	(15/2+)	2776.90& *15*	(25/2+)
578.99b *10*	(7/2+)	1320.21§ *10*	(17/2+)	3090.76‡ *14*	(27/2+)
600.72c *10*	(3/2+)	1673.62@ *10*	(17/2+)	3133.06a *18*	(27/2+)
684.66§ *10*	(13/2+)	1775.49‡ *11*	(19/2+)	3334.76§ *15*	(29/2+)
785.13e *10*	(7/2−)	2025.30# *10*	(19/2+)	3770.04‡ *16*	(31/2+)
786.54c *13*	(7/2+)	2037.97§ *12*	(21/2+)	4006.03§ *17*	(33/2+)

† From least–squares fit to Eγ's, assuming Δ(Eγ)=0.1 keV; stated by 2004Lu03 as systematic error. Minimum uncertainty in level energy is assigned as 1 keV.
‡ (A): g.s. band, α=−1/2.
§ (B): g.s. band, α=+1/2.
# (C): 11/2+ band, α=−1/2.
@ (D): 13/2+ band, α=+1/2.

Footnotes continued on next page

^{252}Cf SF Decay 2004Lu03 (continued)

^{113}Rh Levels (continued)

& (E): 21/2+ band, α=+1/2.
a (F): 23/2+ band, α=−1/2.
b (G): 3/2+ band.
c (H): π1/2[431] band, α=−1/2.
d (I): π1/2[431] band, α=+1/2.
e (J): π1/2[301] band.

γ(^{113}Rh)

Eγ	E(level)	Iγ	Comments
88.17 *10*	351.36	5.4	
185.82 *10*	786.54	4.5	
206.10 *10*	785.13	0.6	
211.70 *10*	211.72	100	Decays with half–life=5 ns *1* (1970Jo20).
227.68 *10*	578.99	0.7	
232.28 *10*	444.00	20.7	
233.69 *10*	834.36	2.2	
236.0 *1*	4006.03		
240.65 *10*	684.66	15.8	
244.0 *1*	3334.76		
244.48 *10*	1320.21	7.3	
252.95 *10*	2723.24	1.1	
262.55 *10*	2037.97	2.2	
263.17 *10*	263.21	20.3	
313.35 *10*	2446.49	2.7	
315.73 *10*	578.99		
330.45 *10*	2776.90	0.9	
332.97 *10*	911.93	0.3	
337.58 *10*	600.72	5.1	
347.84 *10*	1284.26	2.6	
351.44 *10*	351.36	6.9	
351.65 *10*	2025.30	1.3	
356.1[†]	3133.06		
357.67 *10*	2133.19	5.1	
359.26 *10*	570.96	6.2	
365.33 *10*	936.33	5.2	
367.25 *10*	578.99	0.2	
367.67 *10*	3090.76	1.0	
373.09 *10*	2398.48	0.5	Eγ: 373.2 in figure 6 of 2004Lu03.
389.36 *10*	1673.62	1.7	
391.18 *10*	1075.73	8.4	
424.26 *10*	1258.63	1.2	
432.26 *10*	2470.32	1.9	
433.82 *10*	785.13		
435.24 *10*	3770.04		
443.95 *10*	444.00	18.9	
455.34 *10*	1775.49	6.6	
472.93 *10*	684.66	19.3	
483.04 *10*	834.36	0.6	
560.54 *10*	911.93		
571.0 *1*	570.96	0.9	
571.07 *10*	834.36	1.8	
599.45 *10*	1284.26	1.2	Eγ: 599.6 in figure 6 of 2004Lu03.
600.7 *1*	600.72	0.7	
611.45 *10*	3334.76	0.5	
620.35 *10*	3090.76	0.4	Eγ: 620.5 in figure 6 of 2004Lu03.
631.65 *10*	1075.73	5.2	
635.55 *10*	1320.21	14.4	
643.66 *10*	2776.90	0.5	
671.27 *10*	4006.03	0.3	
679.33 *10*	3770.04	0.3	
685.32 *10*	2723.24	1.6	
686.57 *10*	3133.06	0.3	
694.87 *10*	2470.32	1.4	

Continued on next page (footnotes at end of table)

^{252}Cf SF Decay 2004Lu03 (continued)

γ(^{113}Rh) (continued)

Eγ	E(level)	Iγ	Comments
699.76 *10*	1775.49	2.5	
713.40 *10*	1284.26	0.6	Eγ: 713.2 in figure 6 of 2004Lu03.
717.66 *10*	2037.97	5.0	
724.60 *10*	936.33	2.2	
724.95 *10*	2398.48	0.3	
737.34 *10*	1673.62	1.1	
740.95 *10*	2025.30	0.3	
785	785.13		
813.0 *1*	2133.19		Eγ: from figure 6 of 2004Lu03.
840.3 *1*	1284.26		Eγ: 840.2 in figure 6 of 2004Lu03.
949.61 *10*	2025.30	0.9	Eγ: 949.5 in figure 6 of 2004Lu03.

† Placement of transition in the level scheme is uncertain.

^{208}Pb(^{18}O,Fγ) 2002Ve08

E=85 MeV. Measured Eγ, Iγ, γγ using the Euroball IV array comprised of 15 cluster Ge detectors, 26 clover Ge detectors and 30 tapered single–crystal Ge detectors.

^{113}Rh Levels

E(level)†	Jπ	E(level)†	Jπ	E(level)†	Jπ
0.0‡	(7/2+)	683.7§ *4*	(13/2+)	1319.3§ *5*	(17/2+)
211.7§ *3*	(9/2+)	935.1# *6*	(13/2+)	1410.8# *10*	(17/2+)
443.4‡ *3*	(11/2+)	1074.7‡ *5*	(15/2+)	1773.7‡ *7*	(19/2+)
570.1# *5*	(11/2+)	1282.7# *8*	(15/2+)	2036.9§ *10*	(21/2+)

† From least–squares fit to Eγ's.
‡ (A): $\pi g_{9/2}$, α=–1/2.
§ (B): $\pi g_{9/2}$, α=+1/2.
# (C): Band based on (11/2+).

γ(^{113}Rh)

Eγ	E(level)	Iγ	Comments
211.6 *3*	211.7	100 *15*	
231.6 *3*	443.4	31 *5*	
240.3 *3*	683.7	40 *5*	
244.5 *4*	1319.3	15 *4*	
347.5 *5*	1282.7	10 *3*	
358.4 *4*	570.1	26 *5*	
365.0 *4*	935.1	20 *4*	
390.9 *4*	1074.7	20 *4*	
443.5 *4*	443.4	25 *6*	
454.4 *6*	1773.7	15 *4*	
472.1 *4*	683.7	29 *5*	
475.7 *7*	1410.8	6 *2*	
631.4 *5*	1074.7	8 *2*	
635.7 *5*	1319.3	16 *4*	
698.9 *8*	1773.7	6 *2*	
713†	1282.7		Eγ: from figure 4 of 2002Ve08.
717.6 *8*	2036.9	6 *2*	

† Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Q(β⁻)=3340 *30*; S(n)=5410 *40*; S(p)=11230 *60*; Q(α)=–5260 *80* 2003Au03,2009AuZZ.
$T_{1/2}$(128.5γ)=0.91 s *8*, assigned either to ^{113}Pd or ^{111}Pd (1970WiZN) via ^{113}Rh (^{111}Rh) β⁻ decay, is not seen by 1988Pe13 after mass separation.

^{113}Pd Levels

Cross Reference (XREF) Flags

A ^{113}Rh β⁻ Decay
B ^{113}Pd IT Decay
C ^{208}Pb(^{18}O,Fγ)
D ^{238}U(^{12}C,Fγ)
E ^{252}Cf SF Decay

E(level)[‡]	Jπ[§]	XREF	$T_{1/2}$[†]	Comments
0.0	(5/2+)	AB	93 s *5*	%β⁻=100. E(level): tentative g.s. assignment based on $T_{1/2}$ syst. $T_{1/2}$: weighted av of 84 s *6* (1958Al90), 91 s *12* (1970Ar19), 100 s *5* (1975BrYM), 90 s (1981Me17), 90 s *3* (1974Gr29). Jπ: from syst and log *ft*=5.5 to 7/2+.
35.08 *17*	(1/2+)	A		Jπ: E2 γ to (5/2+) and syst.
81.1 *3*	(9/2–)	AB DE	0.3 s *1*	%IT=100. Jπ: M2 γ to (5/2+). Syst gives 11/2– The evaluator has accepted the arguments of 2005Fo09: The isomeric transition to the ground state has a half–life of 0.3 s. The previous assignment of 11/2 would make the transition an E3. The Weisskopf estimate of the half–life for such a transition is greater than 1 s. Assigning a J of 9/2. allows this transition to be an M2/E3, with a corresponding half–life estimate of less than 1 s. The structure of 113Pd now appears consistent with the discovery of the new 81.0–keV transition. $T_{1/2}$: from 1993Pe11.
151.89 *17*	(3/2+)	A		Jπ: M1 γ's to (5/2+) and (1/2+).
166.1[#] *5*	(11/2–)	DE		
172.55 *21*	(1/2+)	A		Jπ: M1 γ to (1/2+) and no γ to (5/2+) g.s.
189.61[a] *15*	(7/2+)	A E		Jπ: M1 γ to (5/2+) and log *ft*=5.5 from (7/2+).
252.18 *16*	(3/2+,1/2+)	A		Jπ: E2,M1 γ to (5/2+) and M1,E2 γ to (1/2)+.
349.13 *20*	(5/2+,7/2+)	A		Jπ: M1,E2 γ to (5/2+) and log *ft*=4.9 from (7/2+).
372.97 *22*	(1/2+,3/2+,5/2+)	A		Jπ: E2 γ to (1/2+,3/2+).
409.26 *18*	+	A		
409.8 *5*		A		
454.55[&] *23*		A E		
500.35 *23*		A		
538.7 *4*		A		
549.2[##]	(15/2–)	CDE		
573.1[@] *11*	(13/2–)	D		
715.9[a] *3*	(11/2+)	E		
730.6 *4*		A		
742.3 *5*		A		
861.2 *4*		A		
1031.3[&] *3*	(13/2+)	E		
1081.2 *6*		A		
1111.0 *4*		E		
1119.7[#]	(19/2–)	CDE		
1149.1[@] *15*	(17/2–)	D		
1345.6[a] *4*	(15/2+)	E		
1678.3[&] *5*	(17/2+)	E		
1841.9[#] *6*	(23/2–)	CDE		
1866.1[@] *18*	(21/2–)	DE		
2030.1[a] *5*	(19/2+)	E		
2286.5[b] *16*	(23/2+)	E		
2342.2[&] *6*	(21/2+)	E		
2671.4[#] *6*	(27/2–)	CDE		
2684.1[@] *21*	(25/2–)	CD		
2707.3[a] *6*	(23/2+)	E		
2772.4[b] *16*	(27/2+)	E		
3000.5[&] *6*	(25/2+)	E		
3408.3[b] *16*	(31/2+)	E		
3562.1[@] *23*	(29/2–)	D		
3562.6[#] *7*	(31/2–)	CDE		
4517.6[#] *19*	(35/2–)	CD		

† A isomer with $T_{1/2}$≥100 s was proposed by 1981Me17. This isomer was proposed from their half–life measurement and also because ^{107,109,111}Pd have isomeric states. This isomer is not reported by 1988FoZY in ^{113}Pd β⁻ decay and an isomer was found by 1993Pe11 with $T_{1/2}$=0.3 s 1. So this isomer is no more adopted.
‡ From least–squares fit to γ energies.
§ Jπ for levels above 482 keV are based on band assignments.
\# (A): $\nu h_{11/2}$, α=–1/2 band.
@ (B): $\nu h_{11/2}$, α=+1/2 band.
& (C): band 3.
a (D): band 4.
b (E): band 5.

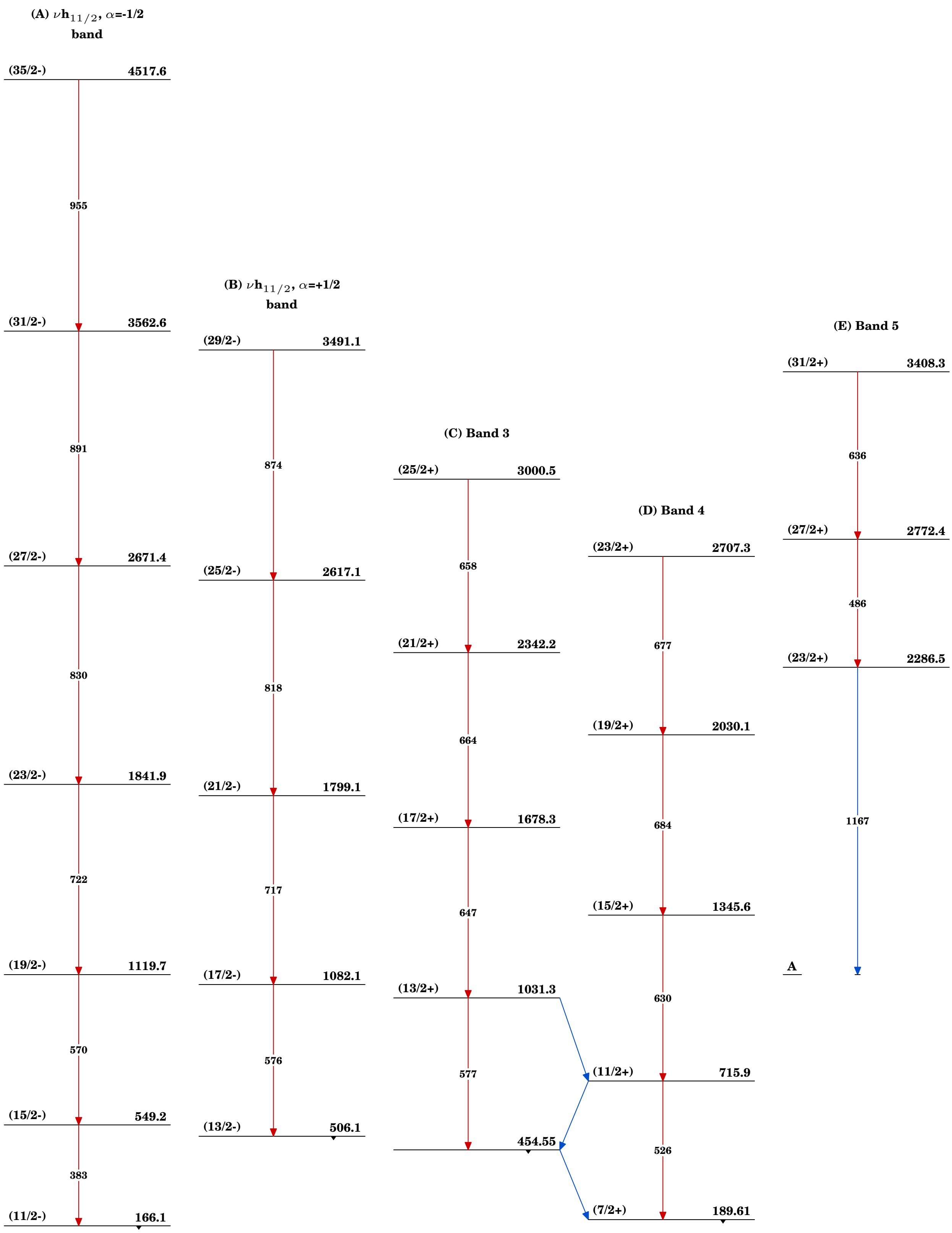
Adopted Levels, Gammas (continued)

$\gamma(^{113}Pd)$

E(level)	Eγ‡	Iγ‡	Mult.†	α	Comments
35.08	34.9 *3*	100	E2	61.0 *22*	
81.1	81.1 *3*	100	M2	8.55 *17*	B(M2)(W.u.)=0.00013 *5*.
151.89	116.8 *2*	100 *5*	M1,E2	0.5 *3*	
	151.8 *3*	76 *4*	M1	0.1194	
166.1	85.1 *3*	100			
172.55	137.5 *2*	100	M1	0.1565	
189.61	189.7 *2*	100	M1	0.0655	
252.18	79.7 *3*	30 *3*			
	100.4 *3*	8.0 *10*			
	217.0 *2*	100 *5*	M1,E2	0.068 *22*	
	252.1 *3*	75 *5*	E2,M1	0.042 *12*	
349.13	96.8 *3*	38 *6*			
	159.9 *3*	100 *10*			
	197.0 *4*	19 *6*			
	348.9 *5*	44 *10*	M1,E2	0.0158 *23*	Iγ: from γγ.
372.97	120.8 *3*	51 *7*	E2	0.711 *12*	
	221.0 *3*	100 *12*			
	373.1 *4*	42 *9*			
409.26	157.1 *3*	14.0 *10*			
	219.6 *3*	24.4 *14*			
	236.7 *4*	2.1 *7*			
	409.3 *3*	100 *3*	E2	0.01090	
409.8	257.9 *4*	100			
454.55	265.0 *3*	100 *14*			
	454.7 *4*	100 *14*			
500.35	310.8 *4*	22 *5*			
	348.5 *6*	40 *9*			Iγ: from γγ.
	500.3 *3*	100 *7*			
538.7	348.9 *5*	30 *7*			
	538.8 *4*	100 *7*			
549.2	383.1 *3*	100			
573.1	425 *1*				
715.9	261.4 *3*				
	526.1 *3*				
730.6	357.6 *3*	100			
742.3	332.7 *3*	100			
861.2	609.0 *3*	100			
1031.3	315.4 *3*				
	576.8 *3*				
1081.2	339.1 *4*	<22.0			
	671.1 *4*	100 *22*			
1111.0	656.4 *3*	100			
1119.7	570.5 *3*	100			
1149.1	576 *1*	100			
1345.6	629.7 *3*	100			
1678.3	647.0 *3*	100			
1841.9	722.2 *3*	100			
1866.1	717 *1*	100			
2030.1	684.5 *3*	100			
2286.5	1166.8 *3*	100			
2342.2	663.9 *3*	100			
2671.4	829.5 *3*	100			
2684.1	818 *1*	100			
2707.3	677.2 *3*	100			
2772.4	485.9 *3*	100			
3000.5	658.3 *3*	100			
3408.3	635.9 *3*	100			
3562.1	874	100			
3562.6	891.2 *3*	100			
4517.6	955 *1*	100			

† From α(K)exp in ^{113}Ru β^- decay.

‡ From ^{113}Ru β^- decay placed below 482 keV and from ^{252}Cf SF for the others.


(A) $\nu h_{11/2}$, α=-1/2 band
(35/2-) 4517.6
955
(31/2-) 3562.6
891
(27/2-) 2671.4
830
(23/2-) 1841.9
722
(19/2-) 1119.7
570
(15/2-) 549.2
383
(11/2-) 166.1
(B) $\nu h_{11/2}$, α=+1/2 band
(29/2-) 3491.1
874
(25/2-) 2617.1
818
(21/2-) 1799.1
717
(17/2-) 1082.1
576
(13/2-) 506.1
(C) Band 3
(25/2+) 3000.5
658
(21/2+) 2342.2
664
(17/2+) 1678.3
647
(13/2+) 1031.3
577
454.55
(D) Band 4
(23/2+) 2707.3
677
(19/2+) 2030.1
684
(15/2+) 1345.6
630
(11/2+) 715.9
526
(7/2+) 189.61
(E) Band 5
(31/2+) 3408.3
636
(27/2+) 2772.4
486
(23/2+) 2286.5
1167
A

$^{113}_{46}Pd_{67}$

^{113}Rh β^- Decay 1993Pe11

Parent ^{113}Rh: E=0.0; Jπ=(7/2+); $T_{1/2}$=2.80 s *12*; Q(g.s.)=5010 *40*; %β^- decay=100.
Preliminary results given in 1992PeZX, same author.
Activity: ^{238}U(p,f), E=20 MeV, on-line isotope separator IGISOL.
Measured: γ, γγ, γ(t), ce, Ge(Li), Ge, Si(Li), elli spectrometer.
Evaluator considers the level scheme as preliminary.

^{113}Pd Levels

E(level)†	Jπ	$T_{1/2}$	Comments
0.0	(5/2+)	93 s *5*	$T_{1/2}$: from adopted levels.
35.08 *17*	(1/2+)		
81.1 *3*	(9/2−)	0.3 s *1*	$T_{1/2}$: from 1993Pe11. Other: 0.4 s (1992PeZX), preliminary, same authors.
151.88 *17*	(3/2+)		
172.55 *21*	(1/2+)		
189.60 *15*	(5/2+,7/2+)		
252.18 *16*	(3/2+,1/2+)		
349.13 *20*	(3/2+,5/2+,7/2+)		
372.97 *22*	(1/2+,3/2+,5/2+)		
408.8 *8*			
409.26 *18*	+		
454.6 *3*			
500.34 *23*			
538.7 *4*			
730.6 *4*			
742.3 *5*			
861.2 *4*			
1081.2 *6*			

† From least-squares fit to γ energies.

β^- radiations

$E\beta^-$	E(level)	$I\beta^-$†	Log *ft*	Comments
(3930 *40*)	1081.2	1.0 *2*	6.23 *9*	av Eβ=1692 *19*.
(4150 *40*)	861.2	2.7 *3*	5.90 *6*	av Eβ=1797 *19*.
(4270 *40*)	742.3	0.7 *2*	6.54 *13*	av Eβ=1853 *19*.
(4280 *40*)	730.6	1.8 *2*	6.14 *6*	av Eβ=1859 *19*.
(4470 *40*)	538.7	3.6 *4*	5.92 *6*	av Eβ=1950 *19*.
(4510 *40*)	500.34	3.4 *4*	5.96 *6*	av Eβ=1969 *19*.
(4560 *40*)	454.6	2.2 *3*	6.17 *7*	av Eβ=1990 *19*.
(4600 *40*)	409.26	2.2 *3*	6.19 *7*	av Eβ=2012 *19*.
(4640 *40*)	372.97	2.2 *3*	6.20 *7*	av Eβ=2029 *19*.
(4660 *40*)	349.13	42.1 *24*	4.93 *4*	av Eβ=2041 *19*.
(4760 *40*)	252.18	1.3 *6*	6.48 *21*	av Eβ=2087 *19*.
(4820 *40*)	189.60	10.6 *9*	5.59 *5*	av Eβ=2117 *19*.
(4840 *40*)	172.55	1.4 *3*	6.48 *10*	av Eβ=2125 *19*.
(4860 *40*)	151.88	3.7 *6*	6.07 *8*	av Eβ=2135 *19*.

† Absolute intensity per 100 decays.

γ(^{113}Pd)

Iγ normalization: assuming no β feeding to g.s. (tentative).

Eγ	E(level)	Iγ§	Mult.†	α	Comments
34.9 *3*	35.08	1.2 *2*	E2	61.0 *22*	α(L)exp=29 *7*.
79.7 *3*	252.18	2.7 *3*	M1‡	0.722 *13*	α(K)exp=0.56 *15*. Mult.: the electron intensity taken from the beta-gated electron spectrum.
81.3 *3*	81.1	6.9 *4*	M2	8.47 *17*	α(K)exp=5.4 *9*. B(M2)(W.u.)=0.00013 *5*. Mult.: the ce(K) (79γ) (M1) is calculated and subtracted from the electron intensity.
ˣ84.9 *2*		8.2 *5*	E1	0.244	
96.8 *3*	349.13	1.8 *3*			
100.4 *3*	252.18	0.7 *1*			
116.8 *2*	151.88	9.7 *5*	M1,E2	0.5 *3*	α(K)exp=0.31 *3*.
ˣ119.4 *3*		0.5 *1*			

Continued on next page (footnotes at end of table)

^{113}Rh β^- Decay 1993Pe11 (continued)

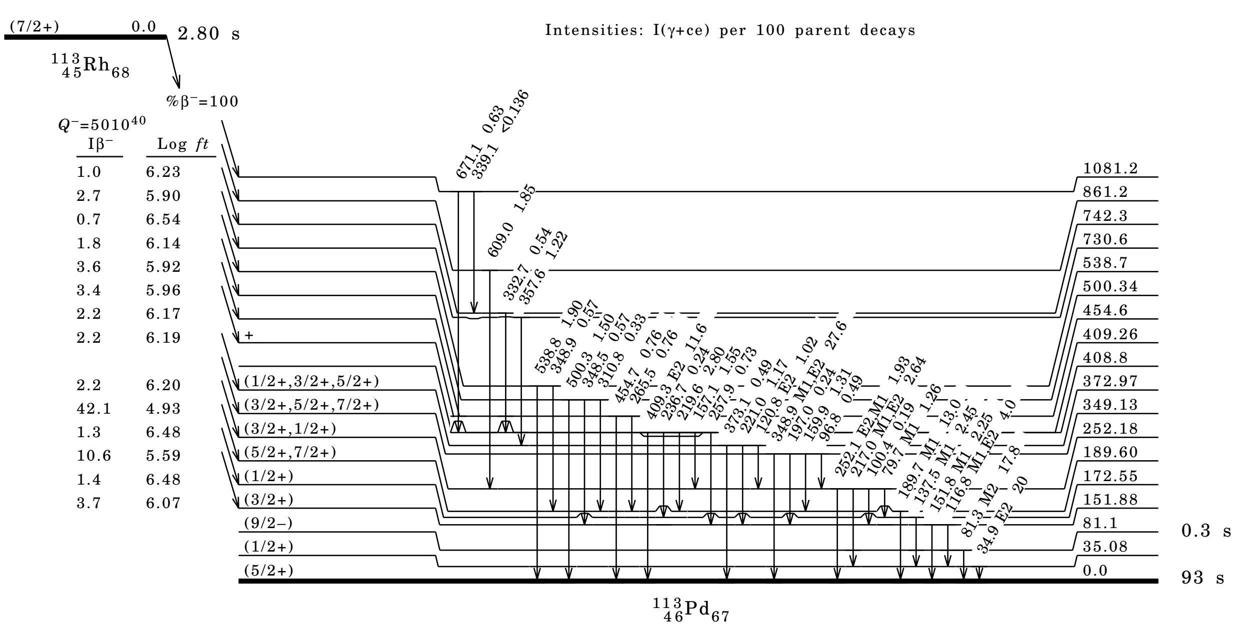
$\gamma(^{113}$Pd) (continued)

Eγ	E(level)	Iγ§	Mult.†	α	Comments
120.8 3	372.97	2.2 3	E2‡	0.711 12	α(K)exp=0.57 12.
x135.0 2		2.8 3	M1	0.1646	
137.5 2	172.55	7.8 3	M1	0.1565	α(K)exp=0.16 3.
151.8 3	151.88	7.4 4	M1	0.1194	α(K)exp=0.08 2.
157.1 3	409.26	5.7 4			
159.9 3	349.13	4.8 5			
189.7 2	189.60	45.0 8	M1	0.0655	α(K)exp=0.063 4.
197.0 4	349.13	0.9 3			
217.0 2	252.18	9.1 4	M1,E2‡	0.068 22	α(K)exp=0.05 3.
219.6 3	409.26	10.3 6			
221.0 3	372.97	4.3 5			
236.7 4	409.26	0.9 3			
252.1 3	252.18	6.8 5	E2,M1‡	0.042 12	α(K)exp=0.04 3.
257.9 4	408.8	2.7 4			
265.5 3	454.6	2.8 4			
310.8 4	500.34	1.2 3			
x332.7 3		2.0 3			
332.7 3	742.3	2.0 3			
339.1 4	1081.2	<0.5			
348.5 6	500.34	2.1 5			Iγ: from γγ.
348.9 5	349.13	100.0 9	M1,E2	0.0158 23	α(K)exp=0.0144 20. Iγ: from γγ.
	538.7	2.1 5			
357.6 3	730.6	4.5 3			
373.1 4	372.97	1.8 4			
409.3 3	409.26	42.2 8	E2‡	0.01090	α(K)exp=0.020 6.
454.7 4	454.6	2.8 4			
500.3 3	500.34	5.5 4			
538.8 4	538.7	7.0 5			
x543.0 4		3.8 4			
609.0 3	861.2	6.8 5			
671.1 4	1081.2	2.3 5			
x749.1 4		1.7 4			
x932.7 4		3.8 5			
x980.0 5		2.0 4			
x1053.0 5		1.9 4			

† Simultaneous measurement of conversion electrons and gammas.
‡ Electron and gamma intensities are deduced from single spectra taken in separated runs. Normalized to the 189.7 keV transition (M1).
§ For absolute intensity per 100 decays, multiply by 0.272 14.
x γ ray not placed in level scheme.

Decay Scheme

Intensities: I(γ+ce) per 100 parent decays



^{113}Pd IT Decay 1993Pe11,1992PeZX

Parent ^{113}Pd: E=81.3; Jπ=(9/2–); $T_{1/2}$=0.3 s *1*; %IT decay=100.
Activity: ^{238}U(p,f), E=20 MeV, on–line isotope separator IGISOL.
Measured: γ, γγ, γ(t), ce, Ge(Li), Ge, Si(Li), elli spectrometer.

^{113}Pd Levels

E(level)	Jπ	$T_{1/2}$	Comments
0.0	(5/2+)	93 s *5*	
81.3	(9/2–)	0.3 s *1*	$T_{1/2}$: from 1993Pe11. Preliminary data: 0.4 s *1* (1992PeZX), same author.

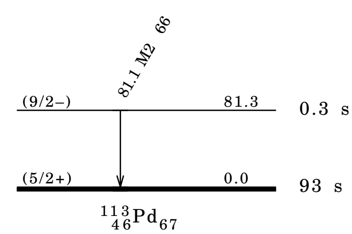
γ(^{113}Pd)

Eγ	E(level)	Iγ‡	Mult.†	α	Comments
81.1 *3*	81.3	6.9 *4*	M2	8.55 *17*	α(K)exp=5.4 *9*. B(M2)(W.u.)=0.00013 *5*.

† Simultaneous measurement of γ and ce.
‡ Absolute intensity per 100 decays.

Decay Scheme

Intensity: I(γ+ce)
per 100 parent decays
%IT=100



^{252}Cf SF Decay 2000Zh04,2005Fo09

Parent ^{252}Cf: E=0; Jπ=0+; $T_{1/2}$=2.645 y *8*; %SF decay=?
Prompt γ rays from ^{252}Cf SF decay.
2000Zh04:Measured Eγ, Iγ, γγ using gammasphere array with 72 Compton suppressed Ge detectors.
2005Fo09: Measured Eγ, Iγ, γγγ of prompt γ rays from ^{252}Cf SF decay, using gammasphere array with 102 Compton–suppresses Ge detectors. Same group.

^{113}Pd Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0	(5/2+)	1110.9 *4*		2286.5# *6*	(23/2+)
81.0 *3*	(9/2–)	1119.7§	(19/2–)	2342.2@ *6*	(21/2+)
166.1§ *5*	(11/2–)	1345.6& *5*	(15/2+)	2671.4§ *6*	(27/2–)
189.8& *3*	(7/2+)	1678.3@ *5*	(17/2+)	2707.3& *6*	(23/2+)
454.5@ *3*	(9/2+)	1836.8# *6*		2772.4# *6*	(27/2+)
549.2§	(15/2–)	1841.9§ *6*	(23/2–)	3000.5@ *7*	(25/2+)
715.9& *3*	(11/2+)	1851.3# *6*		3408.3# *7*	(31/2+)
1031.3@ *4*	(13/2+)	2030.1& *6*	(19/2+)	3562.6§ *7*	(31/2–)

† From least–squares fit to γ energies.
‡ From syst. and Band assignments.
§ (A): $\nu h_{11/2}$, α=–1/2 band.
\# (B): band 2.
@ (C): band 3.
& (D): band 4.

^{252}Cf SF Decay 2000Zh04,2005Fo09 (continued)

γ(^{113}Pd)

Eγ†	E(level)	Eγ†	E(level)	Eγ†	E(level)
81.0	81.0	570.5 *3*	1119.7	684.5 *3*	2030.1
85.1	166.1	576.8 *3*	1031.3	717.1 *3*	1836.8
189.8 *3*	189.8	629.7 *3*	1345.6	722.2 *3*	1841.9
261.4 *3*	715.9	635.9 *3*	3408.3	731.6 *3*	1851.3
315.4 *3*	1031.3	647.0 *3*	1678.3	829.5 *3*	2671.4
383.1 *3*	549.2	656.4 *3*	1110.9	891.2 *3*	3562.6
454.5 *3*	454.5	658.3 *3*	3000.5	1166.8 *3*	2286.5
485.9 *3*	2772.4	663.9 *3*	2342.2		
526.1 *3*	715.9	677.2 *3*	2707.3		

† ΔE not given in the paper, estimated 0.3 by evaluator.

^{208}Pb(^{18}O,Fγ) 1999Kr17

Prompt γ rays from heavy–ion induced fission.
E=91 MeV. Measured prompt γ, γγ using GAMMASPHERE array of 100 Compton suppressed HPGe detectors.

^{113}Pd Levels and Gammas

E(level)	Jπ
0.0	(5/2+)
0+x†	(11/2−)
383+x†	(15/2−)
954+x†	(19/2−)
1676+x†	(23/2−)
2506+x†	(27/2−)
3397+x†	(31/2−)

† (A): $\nu h_{11/2}$ band.

Eγ	E(level)
383	383+x
571	954+x
722	1676+x
830	2506+x
891	3397+x

^{238}U(^{12}C,Fγ) 1999Ho25

Prompt γ rays from heavy–ion induced fission.
E=90 MeV. Measured Eγ, Iγ, γγ using Euroball iii array with 15 Cluster Ge detectors, 26 Clover Ge detectors located in two rings around 90° and 30 tapered Ge detectors, with each Ge detector surrounded by its own BGO Compton suppression shield.

^{113}Pd Levels

E(level)	Jπ	$T_{1/2}$	Comments
0.0	5/2+		
81‡ *1*	9/2−	0.3 s	
166.1† *5*	(11/2−)		E(level): From 2005Fo09.
549.2†	(15/2−)		
573‡ *1*	(13/2−)		
1119† *1*	(19/2−)		
1149‡	(17/2−)		
1842† *1*	(23/2−)		
1866‡	(21/2−)		
2671† *1*	(27/2−)		

E(level)	Jπ
2684‡	(25/2−)
3562‡ *1*	(29/2−)
4517†	(35/2−)

† (A): $\nu h_{11/2}$, α=−1/2 band.
‡ (B): $\nu h_{11/2}$, α=+1/2 band.

^{238}U(^{12}C,Fγ) 1999Ho25 (continued)

γ(^{113}Pd)

Eγ	E(level)	Comments
81	81	Eγ: from ENSDF for ^{113}Pd.
383 *1*	549.2	
407 *1*	573	
571 *1*	1119	
576 *1*	1149	
717 *1*	1866	
722 *1*	1842	
818 *1*	2684	
830 *1*	2671	
874 *1*	3562	
890 *1*	3562	
955	4517	

Adopted Levels, Gammas

Q(β⁻)=2017 *16*; S(n)=8520 *17*; S(p)=7970 *28*; Q(α)=−4444 *20* 2003Au03,2009AuZZ.
1988KaZE suggest that the 222, 369, 476 levels could be intruder states and have tried to derive parameter sets for this collective rotational–like band with K=1/2.

^{113}Ag Levels

Cross Reference (XREF) Flags

A ^{113}Pd β⁻ Decay
B ^{113}Ag IT Decay

E(level)‡	Jπ	XREF	$T_{1/2}$	Comments
0.0	1/2−	A	5.37 h *5*	%β⁻=100; μ=0.159 *2* (1989Ra17). Jπ: atomic beam (1976Fu06), negative parity from μ. $T_{1/2}$: from 1970Tr02. Other: 5.25 h *4* (1968RoZZ).
43.5 *1*	7/2+	AB	68.7 s *16*	%IT=64 *7*; %β⁻=36 *7*. %IT: from 1990Fo07. Jπ: allowed β⁻ decay to 5/2+ level. E3 γ to 1/2−. $T_{1/2}$: weighted av of 67.8 s *21* (1974Gr29) and 70.0 s *25* (1975BrYM). Others: 72 s *9* (1958Al90), 66 s *12* (1970Ma47).
139.30 *15*	9/2+	A		Jπ: M1 γ to 7/2+ and syst.
222.08§ *13*	3/2+	A	23 ns *2*	Jπ: E1 γ to 1/2−, band assignment favors 3/2+.
270.82 *14*	(3/2−)†	A		Jπ: γ to 1/2−, not fed from (5/2)+ parent, no γ to 7/2+, syst.
273.59 *16*	(1/2)	A	≈30 ns	Jπ: γ's to 1/2− and 1/2+,3/2+, not fed from 5/2+ parent.
280.0§ *2*	1/2+	A		Jπ: member of the intruder band.
366.84 *20*	(5/2−)†	A		Jπ: γ's to 1/2− and 3/2−, syst favors 5/2−.
369.80§ *17*	7/2+	A	<0.8 ns	Jπ: E2 γ to 3/2+. γ to 9/2+.
476.70§ *14*	5/2+	A	<0.5 ns	Jπ: member of the intruder band.
526.16 *16*		A		
607.06 *23*		A		
611.31 *25*	(3/2−)†	A		Jπ: from syst.
673.35 *23*		A		
781.79 *20*	(5/2−)†	A		Jπ: γ's to 3/2− and sys.
783.16 *14*	(3/2,5/2,7/2)	A		Jπ: log *ft*≈6.1 from (5/2+).

† 1988KaZE have derived low–lying negative parity states in odd–mass Ag: A=^{107,109,111,113,115}Ag.
‡ From least–squares fit to γ energies.
§ (A): Intruder–rotational band (1990Ro16) with A=17.23, E0=228.9 keV, a=−1.92.

γ(^{113}Ag)

E(level)	Eγ†	Iγ†	Mult.‡	α	Comments
43.5	43.6 *2*	100	E3	1047	B(E3)(W.u.)=0.048 *6*.
139.30	95.74 *20*	100	M1	0.478	
222.08	222.06 *20*	100	E1	0.01660	B(E1)(W.u.)=1.13×10^{-6} *10*.
270.82	270.81 *20*	100			
273.59	51.5 *2*	25			
	273.6 *2*	100			
280.0	57.9 *3*	1.2 *6*			
	280.0 *2*	100 *4*			
366.84	96.0 *3*	76			
	366.8 *3*	100			
369.80	147.73 *20*	100	E2	0.362	B(E2)(W.u.)>110.
	230.49 *20*	77			
	326.28 *20*	60			
476.70	205.87 *20*	19			
	254.61 *20*	100			
	337.32 *20*	9			
	433.4 *2*	26			
526.16	49.6 *2*	2.3			
	386.9 *2*	16			
	482.4 *3*	100			
607.06	336.3 *3*	48			
	607.0 *3*	100			

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Adopted Levels, Gammas (continued)

$\gamma(^{113}Ag)$ (continued)

E(level)	Eγ†	Iγ†
611.31	472.1 *3*	7
	567.7 *3*	100
673.35	534.2 *3*	100
	673.2 *3*	39
781.79	414.9 *3*	67
781.79	510.9 *3*	100
	781.9 *3*	33
783.16	257.1 *3*	4.5
	643.7 *3*	100
	739.63 *3*	80

† From ^{113}Pd β^- decay.
‡ From α(K)exp in ^{113}Pd β^- decay and ^{113}Ag IT decay.

^{113}Pd β^- Decay 1988FoZY,1990Ro16

Parent ^{113}Pd: E=0.0; Jπ=(5/2+); $T_{1/2}$=93 s *5*; Q(g.s.)=3340 *30*; %β^- decay=100.
Activity: ^{235}U(n,f) on-line mass separator OSIRIS (1988FoZY).
Measured γ, Iγ, γγ, γ(t), β, βγ, ce, Ge(Li), Si detector (1988FoZY).
^{249}Cf(n,F) radiochemical separation (1990Ro16), measured: γ, γγ, γγ(t).
Others: 1958Al90, 1968Kj01, 1970Ar19, 1975BrYM, 1981Me17.
Decay mode: 81.5% *20* of ^{113}Pd decay is via 5.37–h ^{113}Ag and 18.5% *20* is via 68.7–s ^{113}Ag, from Iγ(5.37–h ^{113}Ag)/Iγ(68.7–s ^{113}Ag) (1975BrYM). Other: from Iβ(5.37–h ^{113}Ag)/Iβ(68.7–s ^{113}Ag), 90% *5* of ^{113}Pd decay is via 5.37–h ^{113}Ag (1958Al90).

^{113}Ag Levels

E(level)	Jπ†	$T_{1/2}$‡	Comments
0.0	1/2–	5.37 h *5*	
43.53 *14*	7/2+	68.7 s *16*	
139.30 *15*	9/2+		
222.08§ *13*	3/2+	23 ns *2*	Jπ: 3/2+.
270.82 *14*	(3/2–)		Jπ: 3/2–.
273.59 *16*	(1/2)	30 ns *+30–15*	Jπ: 1/2+,3/2+.
280.0§	1/2+		
366.84 *20*	(5/2–)		Jπ: 5/2–.
369.80§ *17*	7/2+	<0.8 ns	
476.70§ *14*	5/2+	<0.5 ns	
526.16 *16*			
607.06 *23*			
611.31 *25*	(3/2–)		
673.35 *23*			
781.79 *20*	(5/2–)		
783.16 *14*	(3/2,5/2,7/2)		Jπ: 5/2+,7/2+.

† Adopted values. Jπ given by 1988FoZY are shown under comments.
‡ Levels>43 keV $T_{1/2}$ are from 1988FoZY, other from adopted levels.
§ (A): Intruder rotational band (1990Ro16) with A=17.23, E0=228.9 keV a=–1.92.

β^- radiations

$E\beta^-$	E(level)	$I\beta^-$†	Log *ft*
(2560 *30*)	783.16	7.2	6.1
(2560 *30*)	781.79	0.46	7.3
(2670 *30*)	673.35	0.36	7.5
(2730 *30*)	607.06	0.41	7.5
(2860 *30*)	476.70	0.59	7.4
(2970 *30*)	369.80	0.9	7.3
(2970 *30*)	366.84	0.84	7.3
(3120 *30*)	222.08	1.14	7.3
(3200 *30*)	139.30	1.89	7.1
(3300 *30*)	43.53	86	5.5

† Absolute intensity per 100 decays.

^{113}Pd β^- Decay 1988FoZY,1990Ro16 (continued)

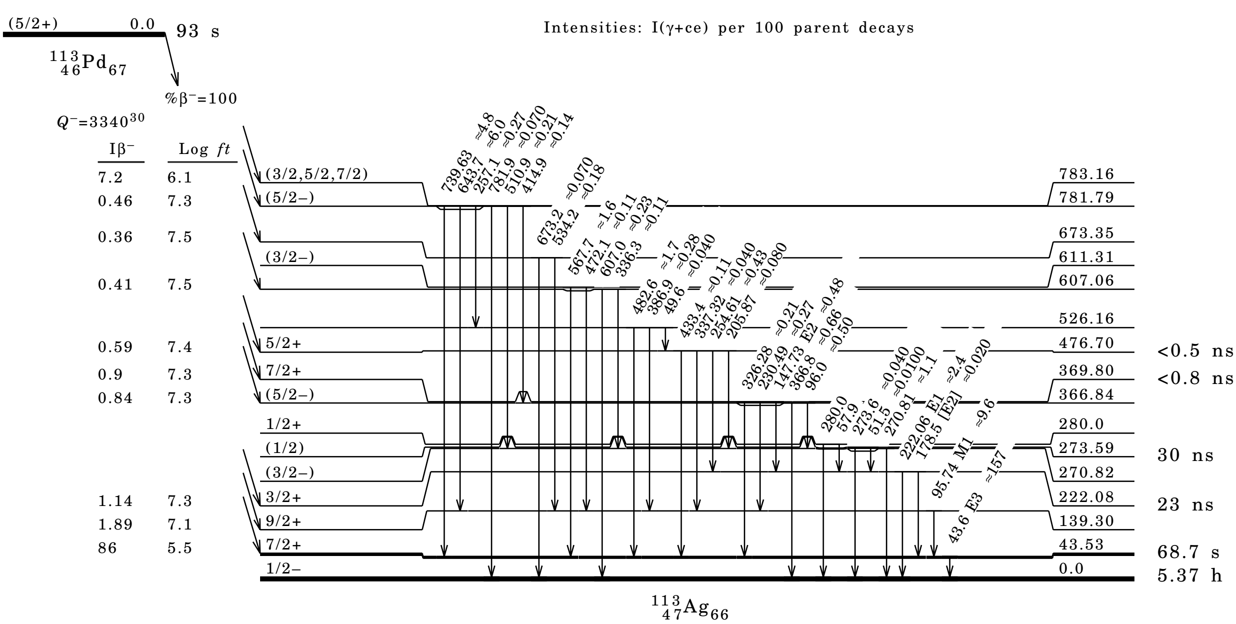
$\gamma(^{113}Ag)$

Iγ normalization: from ΣI(γ+ce) to g.s.=81.5 *20* assuming Iβ(g.s.)=0. (ΔJ=2, Δπ=–). 1990Fo07 give Iγ(222γ)=2.3%.

Eγ†	E(level)	Iγ†§	Mult.‡	α	Comments
43.6 *2*	43.53	0.15	E3	1047	α(K)exp=90 *40*; α(L)exp=700 *300*. α(K)=95.5; α(L)=745; α(M)=155.3. B(E3)(W.u.)=0.074 *4*.
49.6 *2*	526.16	0.04			
51.5 *2*	273.59	0.01			
57.9 *3*	280.0				Eγ,Iγ: from 1990Ro16. Iγ(280)=100 *4*, Iγ(57.9)=1.2 *6*.
95.74 *20*	139.30	6.5	M1	0.478	α(K)exp=0.46 *4*. α(K)=0.415; α(L)=0.0515; α(M)=0.00975; α(N+..)=0.00196.
96.0 *3*	366.84	0.50			
147.73 *20*	369.80	0.35	E2	0.362	α(K)exp=0.38 *15*. α(K)=0.294; α(L)=0.0557; α(M)=0.01075; α(N+..)=0.00200. B(E2)(W.u.)>110.
178.5	222.08	0.02	[E2]		Eγ,Iγ: from 1990Ro16. B(E2)(W.u.)=0.034 *4*.
205.87 *20*	476.70	0.08			
222.06 *20*	222.08	2.4	E1	0.0166	α(K)exp≤0.03. B(E1)(W.u.)=1.12×10^{-6} *10*.
230.49 *20*	369.80	0.27			
254.61 *20*	476.70	0.43			
257.1 *3*	783.16	0.27			
270.81 *20*	270.82	1.1			
273.6 *2*	273.59	0.04			
280.0 *2*	280.0				
326.28 *20*	369.80	0.21			
336.3 *3*	607.06	0.11			
337.32 *20*	476.70	0.04			
366.8 *3*	366.84	0.66			
386.9 *2*	526.16	0.28			
414.9 *3*	781.79	0.14			
433.4 *2*	476.70	0.11			
472.1 *3*	611.31	0.11			
482.6 *2*	526.16	1.7			
510.9 *3*	781.79	0.21			
534.2 *3*	673.35	0.18			
567.7 *3*	611.31	1.6			
607.0 *3*	607.06	0.23			
643.7 *3*	783.16	6.0			
673.2 *3*	673.35	0.07			
739.63 *3*	783.16	4.8			
781.9 *3*	781.79	0.07			

† From 1988FoZY.
‡ From α(K)exp (1988FoZY). The conversion coefficients were determined by simultaneous measurements of γ and ce.
§ For absolute intensity per 100 decays, multiply by ≈1.0.

Decay Scheme



^{113}Ag IT Decay 1990Fo07

Parent ^{113}Ag: E=43.6 *2*; Jπ=7/2+; $T_{1/2}$=68.7 s *16*; %IT decay=64 *7*.
Activity: ^{235}U(n,f) on–line mass separator OSIRIS.
Measured γ, Iγ, γγ, γ(t), β, βγ, ce, Ge(Li), Si detector (1988FoZY).
%IT: 1990Fo07 have measured %IT=64 *7*.

^{113}Ag Levels

E(level)	Jπ	$T_{1/2}$†
0.0	1/2–	5.37 h *5*
43.6 *2*	7/2+	68.7 s *16*

† From adopted levels.

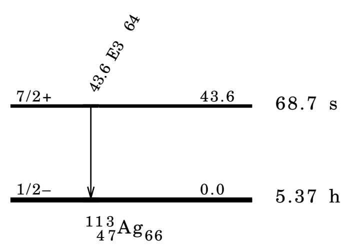
γ(^{113}Ag)

Eγ	E(level)	Iγ†	Mult.	α	I(γ+ce)†	Comments
43.6 *2*	43.6	0.64 *7*	E3	1047	100	α(K)exp=90 *40*; α(L)exp=700 *300*. B(E3)(W.u.)=0.048 *6*.

† For absolute intensity per 100 decays, multiply by 0.64 *7*.

Decay Scheme

Intensity: I(γ+ce) per 100 parent decays
%IT=64 *7*



Adopted Levels, Gammas

Q(β^-)=322 *1*; S(n)=6540.1 *6*; S(p)=9750 *3*; Q(α)=−3868 *3* 2003Au03,2009AuZZ.
Neutron resonance parameters can be found in 1981MuZQ.

^{113}Cd Levels

Cross Reference (XREF) Flags

A ^{113}Ag β^- Decay (5.37 h)	F ^{113}Cd(p,p'),(p,p'γ)	K ^{110}Pd(α,nγ)
B ^{113}Ag β^- Decay (68.7 s)	G ^{113}Cd(d,d')	L ^{176}Yb(^{28}Si,Fγ)
C ^{113}Cd IT Decay (14.1 y)	H Coulomb Excitation	M ^{173}Yb(^{24}Mg,Fγ)
D ^{112}Cd(n,γ) E=res	I ^{113}Cd(n,n'γ)	N ^{112}Cd(pol d,p)
E ^{112}Cd(d,p),^{114}Cd(d,t)	J ^{113}Cd(γ,γ')	O ^{114}Cd(pol d,t)

E(level)‡	Jπ	XREF	$T_{1/2}$	Comments
0.0	1/2+	ABCDEFGHIJKLMNO	8.04×10^{15} y *5*	%β^-=100; μ=−0.6223009 *9* (1989Ra17). μ: optical pumping, NMR. Jπ: NMR and optical spectroscopy (1976Fu06), L(d,p)=0. $T_{1/2}$: From 2007Be61 Measured in $CdWO_4$ crystal at Gran Sasso National Lab of INFN. Measured half–life of ^{113}Cd using the low–background $CdWO_4$ crystal scintillator of mass 434g. Others: 7.7×10^{15} y *3* (1996Da11) using scintillation crystals of cdw04. 9.3×10^{15} y *19* (1970Gr20) from activity measurements on enriched and natural cadmium samples. Others: 1962Wa15, 1994Al49.
263.54§ *3*	11/2−	A C E KLMNO	14.1 y *5*	%IT=0.14; %β^-=99.86 (1969De25); Q=−0.71 *7*. μ: ; μ=−1.0877842 *17* (1989Ra17) NMR. Q: optical double res, recalculated (1989Ra17). Jπ: optical double res (1976Fu06), 264γ is E5. $T_{1/2}$: unweighted av of 13.6 y *2* (1965Fl02) and 14.6 y *5* (1972Wa11), β(t) for about one half–life.
298.597 *10*	3/2+	AB E GHI K NO	29 ps *9*	μ=−0.39 *80* (1988Be45,1989Ra17). $T_{1/2}$: from B(E2) in Coul. ex. Jπ: M1+E2 γ to 1/2+, L(pol d,p)=2.
316.206 *15*	5/2+	AB EF HI K NO	10.8 ns *3*	Jπ: L(d,p)(316)=2, L(d,p)(458)=4, and M1+E2 γ from 459 to 316 gives Jπ(316)=5/2+ and Jπ(458)=7/2+. $T_{1/2}$: weighted av of 10.7 ns *4* (1980Oh01), 11.0 ns *6* (1972RaZM). Other: 4.9 ns *7* from B(E2) in Coul. ex.
458.633 *17*	7/2+	B E I K NO		Jπ: see 316 level, L(pol d,p)=4.
522.259 *24*	7/2−	A I K NO	0.322 ns *12*	Jπ: E2 γ to 11/2− and E1 γ to 5/2+, L(pol d,p)=3. $T_{1/2}$: from γγ(t) (1980Oh01).
530 *10*	7/2+,9/2+	E		Jπ: from L(d,p)=4.
583.962 *24*	5/2+	AB E HI K NO	6.9 ps *14*	μ=+0.15 *12* (1988Be45,1989Ra17). Jπ: γ(θ) in Coul. ex. for E2 γ to 1/2+, L(pol d,p)=2. $T_{1/2}$: from B(E2) in Coul. ex.
626.6 *12*	(3/2+)	N		Jπ: L(pol d,p)=2.
638.19 *3*	9/2−	A F I K N		Jπ: M1+E2 γ to 11/2−. γ to 5/2+, L(pol d,p)=5.
680.526 *20*	3/2+	A E HI K NO	12 fs *3*	$T_{1/2}$: from B(E2) in Coul. ex. Jπ: M1+E2 γ to 1/2+ and M1+E2 γ to 3/2+, L(pol d,p)=2.
708.571 *19*	5/2+	AB HI K NO		Jπ: M1+E2 γ to 3/2+ and 7/2+, L(pol d,p)=2.
760 *10*	1/2+	E		Jπ: L(d,p)=0.
815.34§ *3*	15/2−	KLM		
816.707 *22*	7/2+	E I K NO		Jπ: L(d,p)=4, and M1+E2 γ to 5/2+, L(pol d,p)=4.
855.28 *3*	5/2−	A I K		Jπ: E2 γ to 9/2−, M1+E2 γ to 7/2−.
869.81 *22*	15/2−	I		Jπ: E2 γ to 11/2−, no γ to low J.
878.54 *6*	(3/2+)	I K NO		Jπ: γ's to 1/2+,5/2+,7/2+, L(pol d,p)=(2).
883.62 *6*	1/2+	E I K NO		Jπ: L(d,p)=0.
897.53 *4*	3/2+	E I K NO		Jπ: L(d,p)=2, σ(d,p)/σ(d,t) favors 3/2+.
939.788 *19*	9/2+	I K NO		Jπ: E2 γ to 5/2+ and M1+E2 γ to 7/2+.
960 *10*		E		
988.40 *6*	1/2+	A E I K NO		Jπ: L(d,p)=0.
999.42 *7*		K		
1002.87 *4*	3/2+	A E I		Jπ: M1+E2 γ's to 1/2+ and 5/2+.
1007.20 *5*	(5/2+)	B E I K NO		Jπ: log *ft*≈5.3 from 7/2+, M1+E2 γ decay to 5/2+, L(pol d,p)=2.
1034.09 *6*	(3/2+)	I K NO		Jπ: M1+E2 γ's to 1/2+ and 5/2+, L(pol d,p)=2.

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Adopted Levels, Gammas (continued)

^{113}Cd Levels (continued)

E(level)‡	Jπ	XREF	Comments
1037.40 *3*	(7/2+)	I K	Jπ: E2 γ to 3/2+ and M1+E2 γ to 5/2+.
1047.65 *4*	7/2+	B I K	Jπ: log *ft*≈5.6 from 7/2+, γ(θ) in (n,n'γ).
1049.66 *9*	(1/2+)	NO	Jπ: M1 γ to 1/2+, and av res in (n,γ), L(pol d,p)=(0).
1049.9 *2*	(3/2+)	A I K	
1051.248 *22*	5/2,7/2–	I K	Jπ: M1+E2 γ to 9/2–, γ to 5/2–.
1109.32 *3*	13/2–	I K	
1124.636 *20*	9/2+	I K N	Jπ: L (Pol d,p)=(4).
1126.25 *6*	3/2+	A E I K O	Jπ: M1 γ to 1/2+, and av res in (n,γ).
1170 *20*		E G	
1177.723 *23*	(9/2–)	K	
1177.8 *3*	5/2+	I K NO	Jπ: M1+E2 γ to 1/2+, L(pol d,p)=2.
1181.35 *4*		K	
1190.72 *5*		K	
1192.09 *4*	–	K	
1194.6 *2*	3/2–	A I K	Jπ: M1+E2 γ to (5/2–), av res.
1195.30 *20*	5/2+	B E K NO	XREF: E(1200). Jπ: log *ft*=5.3 from 7/2+ L(pol d,p)=2.
1209.53 *15*	13/2–	I	Jπ: M1+E2 γ to 11/2–, γ to 15/2–.
1214.674 *24*	11/2+	I K	Jπ: E2 γ to 7/2+ and M1+E2 γ to 9/2+.
1261.92 *4*	(7/2+)	K O	Jπ: L(pol d,p)=4.
1268.21 *5*	3/2+	I K N	Jπ: M1+E γ's to 1/2+ and 5/2+, L(pol d,p)=2.
1279.62 *7*	3/2+	E I K	Jπ: L(d,p)=2.
1301.07 *7*	3/2+	I O	Jπ: L(pol d,t)=2.
1312.9 *12*	(11/2–)	N	Jπ: L(pol d,p)=(5).
1313.75 *3*	(9/2+)	HI K O	Jπ: L(pol d,t)=(4),5/2+ in Coul. Ex.
1322.03 *12*	(7/2–,9/2–)	E I K	Jπ: γ's to 7/2–,11/2–.
1327.6 *4*	(7/2+)	K NO	Jπ: L(pol d,p)=4.
1346.53 *4*	11/2–	K NO	E(level): 1991NeZX suggested a 1423–keV level with Jπ=11/2– based on syst, not confirmed by 1997Wa20 in (α,nγ)but given by 2005Bu20. Jπ: L(pol d,p)=5.
1351.58 *7*	5/2,7/2	I	Jπ: γ's to 5/2+,7/2–.
1364.76 *7*	5/2+	I K O	Jπ: L(pol d,t)=2.
1367.569 *24*	7/2+	K	
1387.47 *8*	5/2+,3/2+	I K	Jπ: γ's to 1/2+,5/2+.
1390.56 *9*	(1/2+,3/2+)	E I	Jπ: γ's to 1/2+,3/2+.
1395.83 *3*	9/2+	I K NO	Jπ: L(pol d,p)=4.
1405.82 *10*	3/2+	I K N	Jπ: γ's to 1/2+,3/2+.
1407.5 *3*	9/2+	I NO	Jπ: L(pol d,p)=4, analog to 1552 keV in ^{111}Cd.
1410.68 *6*		K	
1430 *10*	(3/2)+	E	Jπ: L(d,p)=2, σ(d,p)/σ(d,t) favors 3/2+.
1433.0 *14*	7/2+	O	Jπ: L(PoL d,t)=4.
1450.30 *7*	11/2–	A I K N	Jπ: L(pol d,p)=5.
1450.8 *2*	3/2+	H	
1461.67 *4*		K	
1479.08 *5*	11/2–	A E I N	Jπ: from L(d,p)=5.
1493.03 *9*	3/2+	I NO	Jπ: L(pol d,p)=2. Jπ: M1+E2 to 5/2+ and γ to 1/2+.
1504.90 *4*	7/2+	K	
1513.72 *4*	–	K	Jπ: E2 to 9/2–.
1542.28 *9*	(1/2+)	E I	Jπ: γ's to 1/2+,3/2+.
1561.69 *3*	+	I K	
1575.66 *14*	7/2–	E I	Jπ: L(d,p)=(3).
1580.0 *12*	(3/2,5/2+)	N	Jπ: L(pol d,p)=2.
1607.21 *10*	5/2+	E I NO	Jπ: L(d,p)=2, σ(d,p)/σ(d,t) favors 5/2+.
1620.43 *3*		K	
1626.41 *4*	+	K	Jπ: M1+E2 to 1/2+.
1647.23 *5*		K	
1656.6§ *3*	(19/2–)	L	
1657.41 *5*	11/2–	I KLM	
1658.51 *7*	3/2+	K NO	
1670.89 *10*	(11/2–)	K N	Jπ: L(pol d,p)=5.
1675.09 *9*	3/2+	E I	Jπ: L(d,p)=(2).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{113}Cd Levels (continued)

E(level)‡	Jπ	XREF	$T_{1/2}$	Comments
1700.1 14	(11/2−)	O		Jπ: L(pol d,t)=5.
1713.0 12	(3/2−)	NO		Jπ: L(pol d,t)=(1).
1732.84 4	11/2+	I K		
1735.0 12	11/2−	N		Jπ: L(pol d,p)=5.
1737.53 7		K		
1743.56 21	(5/2+)	K O		Jπ: L(pol d,t)=(2).
1746.00 14	(3/2−)	I		Jπ: γ's to 1/2+,5/2−.
1758† 10	(5/2−,7/2−)	FG		Jπ: L(p,p')=3. π=+ is assigned in (d,d').
1769.1 12	(3/2+)	N		Jπ: L(pol d,p)=2.
1778.92 18	9/2−	I		Jπ: E2 γ to 13/2− and M1+E2 γ to 11/2−.
1781.4 14	(3/2+)	O		Jπ: L(pol d,t)=(2).
1786.5 14	(3/2+)	O		Jπ: L(pol d,t)=(2).
1788.9 12	(1/2+)	N		Jπ: L(pol d,p)=0.
1798.89 12	(1/2,3/2)	I		Jπ: γ to 1/2+.
1813.1 14	(7/2+)	O		Jπ: L(pol d,t)=(4).
1814.5 12	(3/2+)	E J N		Jπ: L(pol d,p)=2.
1823.24 4	(13/2−)	I K		
1825.1 14	5/2+	O		Jπ: L(pol d,t)=2.
1830.8 12	(3/2+)	N		Jπ: L(pol d,p)=2.
1833.5 14	5/2+	O		Jπ: L(pol d,t)=2.
1842.74 13	(3/2−)	E I		Jπ: γ's to 7/2−,3/2−.
1848.6 12	(1/2+)	N		Jπ: L(pol d,p)=(0).
1852.3 14	1/2+	O		Jπ: L(pol d,t)=0.
1867.86 8	7/2−,9/2−	I		Jπ: γ's to 11/2−,5/2−.
1871.7 3	5/2+	K O		Jπ: L(pol d,t)=2.
1890.1 12	5/2+	NO		Jπ: L(pol d,p)=2.
1892.32† 11	7/2−	F I K		Jπ: L(p,p')=3, E2 γ to 11/2−.
1896.44 4	−	K		Jπ: E2 to 13/2−.
1900 10	(1/2+)	E		Jπ: L(d,p)=(0).
1902.41 5	+	I K		Jπ: M1+E2 to 15/2+.
1903.97 9	5/2+,7/2+	K		
1904.35 11	7/2−	I NO		Jπ: L(pol d,p)=2.
1911.4 3	(5/2+)	O		Jπ: L(pol d,t)=(2).
1923.3 3	5/2+	O		Jπ: L(pol d,t)=2.
1943.0 14	(3/2+)	J O	607 fs +90−70	$T_{1/2}$: from (γ,γ').
1970.8 12	(7/2+)	NO		Jπ: L(pol d,p)=4.
1986† 10	5/2−,7/2−	EF		Jπ: L(p,p')=3.
1998.8 3	(11/2−)	O		Jπ: L(pol d,t)=(5).
2015.6 25	1/2+	O		Jπ: L(pol d,t)=0.
2037.76 18	5/2−,7/2−	E I		Jπ: L(d,p)=3.
2042.06 6	1/2−	K NO		Jπ: L(d,p)=1.
2046.23 7	(15/2+)	K		
2072.7 25	5/2+	O		Jπ: L(pol d,t)=2.
2080 10	(1/2+)	E NO		Jπ: L(d,p)=(0).
2099.2 25	5/2+	O		Jπ: L(pol d,t)=2.
2113.04 22	7/2−	E I N		Jπ: L(d,p)=(3), preferred from shell-model syst.
2120 20		E		
2132.1 25	(1/2+)	NO		Jπ: L(pol d,p)=(0).
2140 20	(1/2+)	E		Jπ: L(d,p)=(0).
2146.81 5	(7/2−)	K NO		Jπ: L(pol d,t)=(3).
2155.7 25	5/2+	O		Jπ: L(pol d,t)=2.
2164.48 11		K		
2173.60 12	3/2−	E IJ N	90 fs 7	Jπ: L(d,p)=1, 3/2, preferred from shell-model syst. $T_{1/2}$: from (γ,γ').
2179.9 25	5/2+	O		Jπ: L(pol d,t)=2.
2195.8 25	1/2−,3/2−	E J O	228 fs +85−50	Jπ: L(d,p)=1, 3/2, preferred from shell-model syst and pol. $T_{1/2}$: from (γ,γ').
2203.5 25	7/2+	O		Jπ: L(pol d,t)=4.
2214.6 25	7/2−	E NO		Jπ: L(pol (d,p)=3.
2219.64 4		K		
2229.0 25	(3/2+)	O		Jπ: L(pol d,t)=(2).
2241.1 25	5/2+	O		Jπ: L(pol d,t)=2.

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Adopted Levels, Gammas (continued)

^{113}Cd Levels (continued)

E(level)‡	Jπ	XREF	$T_{1/2}$	Comments
2242.1 *25*	(7/2−)	E N		Jπ: L(pol (d,p)=(3).
2268.2 *25*	7/2−	E NO		Jπ: L(pol (d,p)=(3).
2278.3 *25*	1/2+	O		Jπ: L(pol d,t)=0.
2292.9 *25*	7/2+	O		Jπ: L(pol d,t)=4.
2313.0 *25*		O		Jπ: L(pol d,t)=(2).
2319.62 *18*	3/2−	E I N		Jπ: L(d,p)=(1), M1+E2 γ to 5/2−.
2324.5# *4*	(21/2+)	L		
2327.4 *25*	7/2−	E N		Jπ: L(pol (d,p)=(3).
2352.0 *25*	3/2+	O		Jπ: L(pol d,t)=2.
2354		J	3.0×10^{2} fs *+16−6*	$T_{1/2}$: from (γ,γ').
2361.9 *25*	5/2+	O		Jπ: L(pol d,t)=2.
2380.0 *25*	(3/2−)	E NO		Jπ: L(pol (d,p)=(1).
2396.6 *25*	5/2+	O		Jπ: L(pol d,t)=2.
2410 *10*	7/2+,9/2+	E		Jπ: L(d,p)=4.
2413.3 *25*	(3/2+)	NO		Jπ: L(pol d,t)=2.
2424.1 *25*	(3/2−)	E J N		Jπ: L(pol (d,p)=(1).
2438.9 *25*	(3/2+)	O		Jπ: L(pol d,t)=2.
2448.4 *25*	3/2+,5/2+	O		Jπ: L(pol d,t)=2.
2472.3 *25*	3/2+,5/2+	O		Jπ: L(pol d,t)=2.
2477.2 *25*	(3/2−)	E N		Jπ: L(pol (d,p)=(1).
2487.9 *25*	(3/2−)	E N		Jπ: L(pol (d,p)=(1).
2499.6 *25*	1/2+	O		Jπ: L(pol d,t)=0.
2533.7 *25*		O		Jπ: L(pol d,t)=(0).
2537.9 *25*	(7/2−)	E N		Jπ: L(d,p)=(3), preferred from shell−model syst.
2538.3@ *4*	(19/2+)	L		
2548.3 *25*	3/2+,5/2+	O		Jπ: L(pol d,t)=2.
2555.9 *25*	3/2−	N		Jπ: L(pol (d,p)=1.
2575.4 *25*		O		
2586.6 *25*	1/2+	O		Jπ: L(pol d,t)=0.
2591.7 *25*	(3/2−)	E J		Jπ: L(d,p)=(1), preferred from shell−model syst.
2599.1 *25*	(5/2+)	O		Jπ: L(pol d,t)=2.
2612.2 *25*	3/2+,5/2+	O		Jπ: L(pol d,t)=2.
2613.4§ *4*	(23/2−)	LM		
2627.1 *25*	1/2+	O		Jπ: L(pol d,t)=0.
2632.7 *25*	(5/2+)	E N		Jπ: L(d,p)=2.
2690 *10*		E		
2743 *5*		J		E(level): All energies not given in other reactions evaluator has assigned a ΔE=5.
2753 *5*		J		
2757.8# *4*	(25/2+)	L		
2759.33 *13*	(3/2+,5/2+)	E I		Jπ: γ's to 3/2+,7/2+.
2770 *10*	(3/2−)	E		Jπ: from L(d,p)=(1), preferred from shell−model syst.
2773 *5*		J		
2796 *5*		J		
2810 *10*	1/2+	E		Jπ: L(d,p)=0.
2817 *5*		J		
2902 *5*		J		
2913 *5*		J		
2929 *5*		J		
2943 *5*		J		
2962.6@ *4*	(23/2+)	L		
3040 *5*		J		
3058 *5*		J		
3105 *5*		J		
3222 *5*		J		
3281 *5*		J		
3301 *5*		J		
3333 *5*		J		
3378 *5*		J		
3412 *5*		J		

E(level)‡	Jπ	XREF
3448.9§ *4*	(27/2−)	LM
3473.9# *5*	(29/2+)	L
3480 *5*		J
3486 *5*		J
3526 *5*		J
3547 *5*		J
3741 *5*		J
3814 *5*		J
3850 *5*		J
3902 *5*		J
4201.5§ *5*	(31/2−)	LM

† From ^{113}Cd(p,p').

‡ From least−squares fit to Γ energies.

Footnotes continued on next page

Adopted Levels, Gammas (continued)

^{113}Cd Levels (continued)

§ (A): Member of ΔJ=2 band on 11/2− band.
# (B): Band based on 23/2−.
@ (C): Band based on (19/2).

γ(^{113}Cd)

E(level)	Eγ†	Iγ†	Mult.‡#	δ#	α	Comments
263.54	263.7 3	100	E5		4.24 7	B(E5)(W.u.)=0.0499 23. Mult.,Eγ: from ^{113}Cd IT decay (14.1 y).
298.597	298.60 1	100	M1+E2§	+0.30 +3−1	0.0248	B(E2)(W.u.)=20 8; B(M1)(W.u.)=0.025 8. δ: δ from 1987BaYW in (n,n'γ) is discrepant with δ>1.1 in β⁻ decay, but agrees with δ=0.29 1 (1958Mc02) in Coul. ex.
316.206	17.78 9	3.1 4	M1§		9.75 21	B(M1)(W.u.)=0.0082 12.
	316.21 2	100 4	E2		0.0273	B(E2)(W.u.)=0.372 25.
458.633	142.42 1	100	M1+E2	−0.04 3	0.173 3	
522.259	205.86 8	1.22 12	E1		0.0216	B(E1)(W.u.)=1.19×10^{-6} 13.
	258.72 2	100.0 19	E2§		0.0532	B(E2)(W.u.)=44.2 22.
583.962	126 1	<10				Eγ: not seen in ^{113}Cd(n,n'γ).
	267.77 6	2.5 2				
	285.3 1	1.4 2	M1,E2		0.033 6	
	583.93 7	100 1	E2		0.00431 6	B(E2)(W.u.)=34 8. Mult.: see Coul. ex.
638.19	115.6 2	12.5 19	D			
	374.64 3	100	M1+E2	−0.25 2	0.01370	
680.526	96.9 3	5.3 3	[M1,E2]		1.1 6	
	364.31 3	20.1 4	M1+E2	−0.02 7	0.01455	B(E2)(W.u.)=12 +84−12; B(M1)(W.u.)=5.0 13.
	381.95 3	20.9 4	M1+E2	+0.16 15	0.01297 23	B(E2)(W.u.)=6.×10^{2} +12−6; B(M1)(W.u.)=4.4 12.
	680.6 1	100.0 23	M1+E2	−1.8 1	0.00295 5	B(E2)(W.u.)=5.0×10^{3} 13; B(M1)(W.u.)=0.90 24.
708.571	249.95 2	11 1	M1+E2	+0.34 8	0.0404 12	
	392.36 2	100 2	M1+E2	−0.24 4	0.01217 18	
	410.11 9	11 2	M1+E2	−0.10 4	0.01084	
	708.52 5	100 2				
815.34	551.79 1	100	E2		0.00504 7	
816.707	358.09 5	35 1				
	500.47 3	100 2	M1+E2	−0.45 16	0.00664 10	
	517.67 15	3.2 2				
855.28	217.08 3	4.7 3	E2		0.0969	
	332.99 3	100 2	M1+E2§	−0.27 2	0.0186	
	539.3 1	2.7 9	E1		0.00179 3	
869.81	606.3 3	100	E2		0.00389 6	
878.54	294.52@ 21	48@ 14				
	419.8 3	9.2 23				
	562.26 9	100 15				
	878.62 9	100 15				
883.62	585 1	3.5 18				
	883.6 1	100.0 25				
897.53	313.48 6	12.4 4	M1+E2	+0.41	0.0223	
	439.7 5	22.4 7				
	581.26 9	9 4				
	598.95 5	100 2	E2		0.00402 6	
939.788	481.13 2	100 2	M1		0.00731 11	
	623.58@ 2	51@ 2	E2		0.00361 5	
988.40	279.8 2	2.5 4				
	988.43 7	100 8				
999.42	540.78 6	100				
1002.87	294.52@ 21	44@ 13				
	322.35 3	100 7	M1+E2	−0.8 2	0.0221 8	Mult.: δ=−0.8 2 or −2.2 10.
	1002.76 9	59 11	M1			
1007.20	423.3 2	6.5 12	M1		0.01001	
	548.54 5	35 7	M1		0.00533 8	
	691.00 8	100 15	M1+E2	0.35 5	0.00305 5	
1034.09	449.9 3	4.8 10	M1		0.00861 13	
	735.1 3	68 18	M1		0.00267 4	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{113}Cd) (continued)

E(level)	Eγ[†]	Iγ[†]	Mult.[‡#]	δ[#]	α	Comments
1034.09	1033.80 12	100 20	M1+E2	0.52 22	0.00120 3	
1037.40	356.7 4	9 3	E2		0.0185	
	453.44 1	14 3	M1		0.00845 12	
	721.22 8	100 28	M1+E2	0.29 1	0.00277 4	
	738.76 9	88 24	E2		0.00233 4	
	1037.2 1	55 5				
1047.65	231.0 1	2.2 9				
	463.69 13	16 2	M1		0.00800 12	
	589.02 4	42 2	M1+E2	+0.12 +17−7	0.00449 7	
	731.3 4	100 4	M1		0.00270 4	
1049.66	369.1 1	18 4	M1		0.01408	
	733.3 5	22 11				Eγ: not seen in ^{113}Cd(n,n'γ) and (α,nγ).
	1049.75 16	100 7	M1			
1051.248	370.72 1	21 4				
	412.90 6	100 2	M1+E2	−0.41 1	0.01080	
	528.81 8	49 2				
1109.32	293.79 7	24.0 8				
	471.20 5	4.3 7	E2		0.00791 11	
	845.78 1	100 2	D			
1124.636	184.83 2	6.3 8				
	307.89 2	19.1 10	D			
	416.09 4	23.9 10	E2		0.01148	
	666.1 1	100 3				
	808.48 2	41 3	E2		0.00187 3	
1126.25	242.64 4	1.2 3	M1		0.0413	
	827.6 3	12 4	M1		0.00204 3	
	1126.20 8	100 6	M1+E2	−0.02 3		Mult.: E2 is ruled out, ΔI=0.
1177.723	126.48 1	33 3	E2		0.648	
	322.36 6	60.8 23				
	655.48 1	100 4	M1+E2	−0.001 2	0.00349 5	
1177.8	879.2 3	100				
1181.35	543.20 5	11 4				
	659.08 3	100 7				
1190.72	892.12 5	100				
1192.09	553.9 4	100 6	M1+E2	0.0 1	0.00520 8	
	670.2 5	37 3				Eγ: placed as deexciting a 2094 level by 1991NeZX in (n,n'γ).
1194.6	339.33[&] 2	99[&] 5	M1+E2	−0.20 15	0.0176 4	
	611.0 5	4.0 4	E1			
	672.34 2	100 6	E2		0.00296 5	
	1194.4 1	12.9 13	E1			
1195.30	896.7 2	100				
1209.53	945.96 15	100 18	M1			
1214.674	274.89 4	7 4	M1		0.0298	
	756.03 2	100 3	E2		0.00220 3	
1261.92	444.9 5	38 8				
	677.95 4	79 10				
	803.23 5	100 11	D			
	946.0 1	67 33				
1268.21	969.59 5	58 8				
	1268.5 2	100 10	M1			
1279.62	232.6 3	0.8 6				
	291.54 25	1.7 5	M1		0.0256	
	963.25 15	2.7 8	M1			
	980.94 25	2.3 8	M1			
	1279.84 10	100 10	M1			
1301.07	174.79 9	16 5				
	717.13 11	100 19				
	1301.07 10	26 5				
1313.75	729.79 2	100 4	E2		0.00240 4	
	855.10 6	6.9 17				
1322.03	799.9 6	97 4				
	1058.48 11	100 27				

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{113}Cd) (continued)

E(level)	Eγ[†]	Iγ[†]	Mult.[‡#]	δ[#]	α	Comments
1327.6	743.6 *4*	100				
1346.53	824.27 *3*	100	E2			
1351.58	344.31 *12*	6.7 *16*				
	496.8 *3*	22 *7*				
	767.65 *13*	100 *17*				
	829.4 *3*	61 *21*				
	892.9 *3*	8 *3*				
	1052.95 *12*	39 *11*				
1364.76	780.81 *11*	36 *11*				
	906.1 *3*	17.1 *14*				
	1066.16 *8*	100 *7*				
1367.569	153.0 *1*	3.0 *13*				
	427.71 *16*	50 *3*	D			
	469.5 *5*	1.5 *15*				
	550.86 *1*	100 *15*	M1+E2	−0.006 *7*	0.00527 *8*	
	909.5 *8*	15 *10*				
1387.47	928.77 *18*	77 *23*				
	1088.89 *9*	100 *23*				
	1387.3 *5*	13 *6*				
1390.56	264.2 *4*	10 *3*				
	402.19 *13*	18 *5*				
	1092.18 *21*	11 *6*				
	1390.42 *15*	100 *29*				
1395.83	937.19 *3*	73 *7*				
	1079.63 *4*	100 *7*				
1405.82	1107.11 *18*	100 *27*				
	1405.85 *11*	86 *17*				
1407.5	823.64	100 *20*				
	948.9 *3*	7 *3*				
1410.68	952.04 *5*	100				
1450.30	171.07 *12*	46 *13*				Eγ: this γ is not seen in (α,nγ).
	770.42 *16*	100 *30*				
1461.67	606.39 *3*	100	D			
1479.08	623.59[@] *7*	100[@] *22*				
	770.42 *16*	33 *10*				
	1180.8 *3*	31 *7*				
	1479.2 *1*	67 *10*				
1493.03	224.69 *25*	2.7 *9*				
	784.6 *3*	10 *4*				
	812.7 *4*	12 *5*				
	909.12 *13*	33 *10*				
	1176.76 *15*	100 *27*	M1+E2	+0.23 *17*		
	1492.88 *25*	5.5 *18*				
1504.90	920.94 *3*	100	E2			
1513.72	335.98 *9*	100				
	875.54 *3*	100 *5*	E2			
	929.4 *2*	28 *6*				
1542.28	539.39 *22*	78 *15*				
	658.66 *8*	100 *37*				
1561.69	621.5 *2*	21 *6*				
	664.13 *5*	82 *5*	E2		0.00306 *5*	
	744.99 *2*	100 *5*				
1575.66	937.2 *3*	100 *29*				
	1312.18 *15*	54 *13*				
1607.21	926.6 *4*	48 *20*	M1			
	1023.0 *3*	100 *40*	M1			
	1308.70 *11*	57 *13*	M1			
	1606.96 *22*	13 *3*	E2			
1620.43	765.15 *1*	44 *4*	D			
	1098.06 *7*	100 *12*				
1626.41	501.77 *3*	100	M1+E2	0.00 *3*	0.00660 *10*	
1647.23	707.44 *4*	100				
1656.6	842.0 *2*	100				

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{113}Cd) (continued)

E(level)	Eγ[†]	Iγ[†]	Mult.[‡#]	δ[#]	α	Comments
1657.41	842.06 *3*	100	E2			
1658.51	1020.6 *5*	57 *7*				
	1135.8 *2*	79 *8*				
	1394.8 *1*	100 *13*				
1670.89	561.56 *9*	100				
1675.09	791.49 *15*	100 *29*	M1		0.00225 *4*	
	994.53 *11*	95 *19*	M1			
	1376.64 *25*	66 *26*	M1			
1732.84	365.4 *1*	23 *23*				
	518.15 *3*	33 *3*	D			
	793.4 *3*	100 *8*				
1737.53	1215.27 *6*	100				
1743.56	1221.3 *2*	100				
1746.00	890.84 *22*	62 *19*				
	1429.9 *4*	50 *15*				
	1746.0 *5*	100 *35*				
1778.92	569.3 *3*	21 *5*	E2		0.00462 *7*	
	1515.4 *2*	100 *19*	M1			
1798.89	765.1 *3*	14 *6*				
	1214.8 *2*	100 *14*				
	1482.9 *3*	11 *4*				
	1798.7 *3*	3.6 *7*				
1823.24	713.91 *5*	64 *7*	M1+E2	−0.01 *2*	0.00286 *4*	
	1007.90 *3*	100 *7*				
1842.74	648.26 *25*	87 *34*				
	1320.43 *15*	100 *17*				
1867.86	1012.91 *21*	73 *23*				
	1345.56 *8*	100 *7*				
	1604.23 *23*	17 *4*				
1871.7	931.9 *3*	100				
1892.32	1036.87 *15*	100 *30*	M1			
	1370.22 *15*	67.8 *7*				
	1628.8 *4*	26 *7*	E2			
1896.44	237.78 *8*	14 *3*				
	238.96 *9*	11 *3*				
	787.12 *2*	100 *8*	E2		0.00199 *3*	
	1081.38 *20*	62 *14*				
1902.41	534.87 *5*	100 *5*	M1+E2	0.00 *5*	0.00566 *8*	
	687.6 *1*	60 *5*				
1903.97	1088.63 *8*	100				
1904.35	856.73 *25*	7 *3*				
	1445.70 *11*	100 *17*				
2037.76	1097.89 *22*	69 *25*				
	1221.3 *4*	100 *8*				
	1579.1 *5*	16 *5*				
2042.06	1226.71 *5*	100				
2046.23	831.55 *6*	100	E2			
2113.04	1474.8 *3*	57 *28*	M1			
	1590.8 *3*	100 *26*	M1			
2146.81	633.08 *2*	100	(E2)		0.00347 *5*	
2164.48	949.8 *1*	100				
2173.60	427.68 *16*	76 *15*	M1		0.00976 *14*	B(M1)(W.u.)=0.87 *21*.
	979.08 *23*	38 *15*	M1			B(M1)(W.u.)=0.036 *16*.
	1289.4 *3*	59 *15*	E1			B(E1)(W.u.)=0.00032 *10*.
	2173.64 *21*	100 *18*	E1			B(E1)(W.u.)=0.00011 *3*.
2219.64	593.23 *2*	100 *1*	E2		0.00413 *6*	
2319.62	1464.32 *18*	22 *6*	M1			
	2319.7 *6*	100 *41*	E1			
2324.5	667.9 *2*	100				
2538.3	881.7 *2*	100				
2613.4	956.8 *2*	100				
2757.8	433.3					
2759.33	960.46 *15*	13 *4*				

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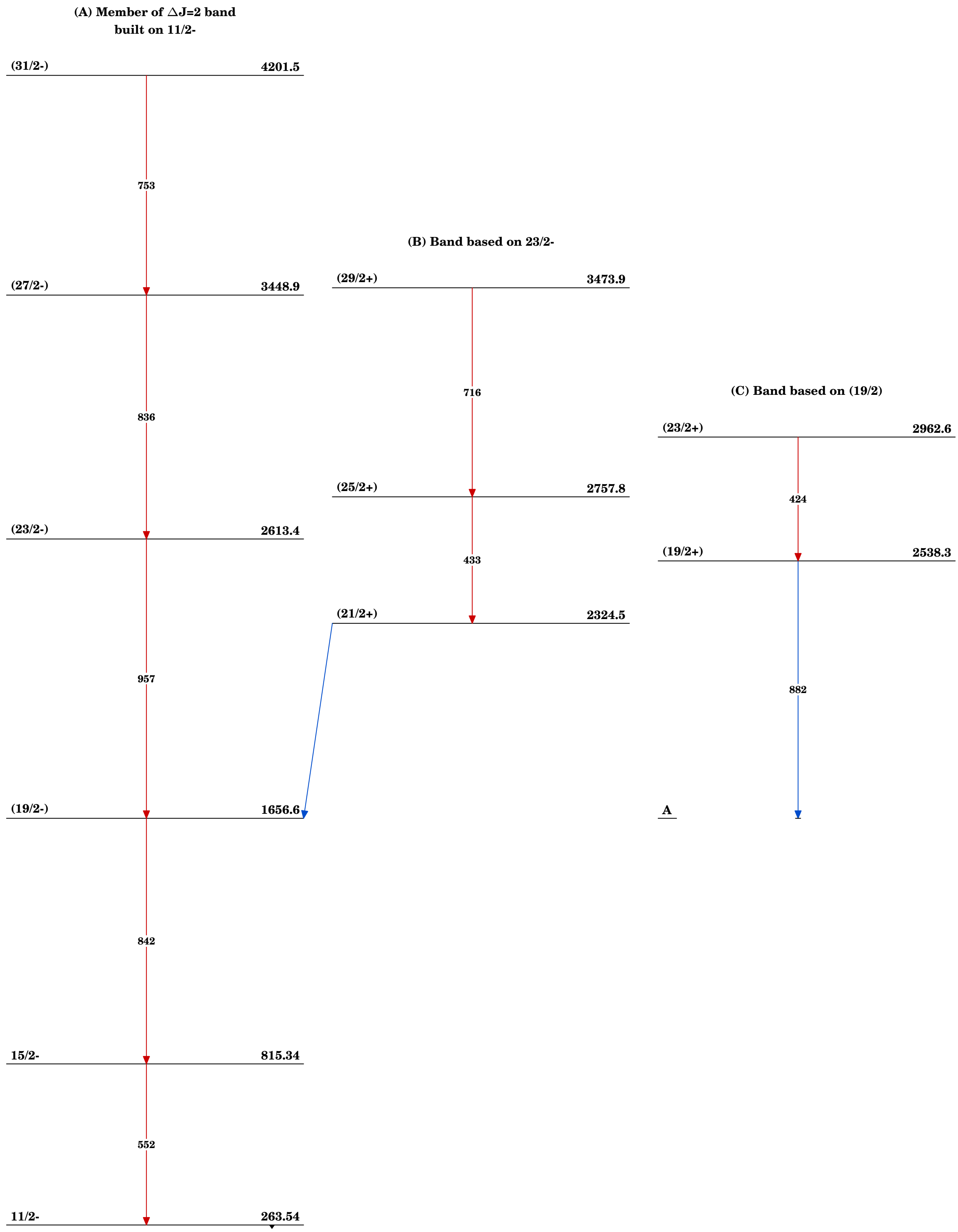
Adopted Levels, Gammas (continued)

γ(^{113}Cd) (continued)

E(level)	Eγ†	Iγ†
2759.33	1942.71 *25*	49 *15*
	2460.6 *2*	100 *20*
2962.6	424.3 *2*	100
3448.9	835.5 *2*	100
3473.9	716.1 *2*	100
4201.5	752.6 *2*	100

† From ^{113}Cd(n,n'γ) or ^{113}Ag β^- decay, except as noted. When the branching is discrepant between (n,n'γ) and decay evaluator has chosen (n,n'γ) because uncertainties are available.
‡ From ^{113}Cd(n,n'γ).
§ See ^{113}Ag β^- decay (5.37 h).
# From γ(θ) and linear polarization in ^{113}Cd(n,n'γ) and in (α,nγ), except as noted.
@ Multiply placed; undivided intensity given.
& Multiply placed; intensity suitably divided.


(A) Member of △J=2 band
built on 11/2-
(31/2-) 4201.5
753
(27/2-) 3448.9
836
(23/2-) 2613.4
957
(19/2-) 1656.6
842
15/2- 815.34
552
11/2- 263.54
(B) Band based on 23/2-
(29/2+) 3473.9
716
(25/2+) 2757.8
433
(21/2+) 2324.5
(C) Band based on (19/2)
(23/2+) 2962.6
424
(19/2+) 2538.3
882
A

$^{113}_{48}Cd_{65}$

^{113}Ag β^- Decay (5.37 h) 1978Ma17,1970Ma47

Parent ^{113}Ag: E=0; Jπ=1/2−; $T_{1/2}$=5.37 h *5*; Q(g.s.)=2016 *16*; %β^- decay=100.
Measured Eγ, Iγ, Ice, γγ coin, β endpoint, βγ coin, 1978Ma17, 1970Ma47.
Others: 1958Al90, 1960Kj01, 1969Cl11, 1969Hn01, 1969Li20, 1973BuZW.

^{113}Cd Levels

E(level)	Jπ	$T_{1/2}$ †	Comments
0.0	1/2+	8.04×10^{15} y *5*	
263.58 *13*	11/2−	14.1 y *5*	
298.53 *6*	3/2+		
316.18 *6*	5/2+	10.7 ns *4*	$T_{1/2}$: from βγ(t) with scin, 1980Oh01.
522.34 *9*	(7/2)−	0.322 ns *12*	$T_{1/2}$: from γγ(t) with scin, 1980Oh01.
584.06 *9*	5/2+		
638.06 *12*	9/2−		
680.58 *7*	3/2+		
708.58 *12*	5/2+		
855.31 *8*	5/2−		
883.60 *10*	1/2+		
988.44 *8*	1/2+		
1049.90 *10*	3/2+		
1126.09 *8*	3/2+		
1194.66 *6*	(3/2−)		
1479.29 *7*	3/2+,5/2+		

† From adopted levels, except as noted.

β^- radiations

$E\beta^-$	E(level)	$I\beta^-$ †‡	Log *ft*	Comments
(537 *16*)	1479.29	≈0.12	≈7.7	av Eβ=167.7 *62*.
(821 *16*)	1194.66	≈2.1	≈7.1	av Eβ=276.4 *68*.
(890 *16*)	1126.09	≈0.086	≈8.6	av Eβ=303.9 *69*.
(966 *16*)	1049.90	≈0.065	≈8.8	av Eβ=334.8 *70*.
(1028 *16*)	988.44	≈0.45	≈8.1	av Eβ=360.2 *71*.
(1132 *16*)	883.60	≈0.29	≈8.4	av Eβ=404.0 *72*.
(1307 *16*)	708.58	≈0.020	≈10.6[1u]	av Eβ=490.2 *71*. Log *ft*: calculated as first–forbidden unique.
(1335 *16*)	680.58	≈1.0	≈8.2	av Eβ=490.7 *74*.
(1432 *16*)	584.06	≈0.13	≈10.0[1u]	av Eβ=542.5 *72*. Log *ft*: calculated as first–forbidden unique.
(1700 *16*)	316.18	≈1.7	≈9.3[1u]	av Eβ=657.3 *74*. Log *ft*: calculated as first–forbidden unique.
(1717 *16*)	298.53	≈9.4	≈7.6	av Eβ=659.1 *77*.
(2016 *16*)	0.0	≈85	≈7.0	av Eβ=793.8 *78*. $E\beta^-$: Eβ=2020 from 1957Je07. Other: 2030 (1970Ma47). $I\beta^-$: from Iβ(total)/Iγ(299) compared with ^{198}Au Iβ(total)/Iγ(412), 1970Ma47. Other: 88% (1969Hn01).

† β branches were obtained from (γ+ce) imbalance at each level, except for the g.s.
‡ Absolute intensity per 100 decays.

γ(^{113}Cd)

α(K)exp normalized by 316γ keV to E2 theory. If 316γ is M1, δ and α will be different for 259γ and 299γ.
Iγ normalization: from ΣI(γ+ce) to g.s.+Iβ(g.s.)=100. The normalization factor is uncertain, since Iβ(g.s.) is approximate.

Eγ	E(level)	Iγ‡	Mult.	α	Comments
17.7 *2*	316.18	0.42 *5*	M1	9.9 *4*	B(M1)(W.u.)=0.0084 *14*. Iγ: obtained by low–energy photon spectrometer. I(γ+ce): from I(γ+ce)(17.7γ)/I(γ+ce)(316.3γ) in ^{113}Ag β^- decay (68.7 s). Mult.: from Iγ and I(γ+ce).
96.2 *2*	680.58	0.37 *2*			
ˣ133.5 *2*		0.66 *2*			
206.4 *2*	522.34	0.20 *2*			
217.2 *1*	855.31	0.28 *2*			

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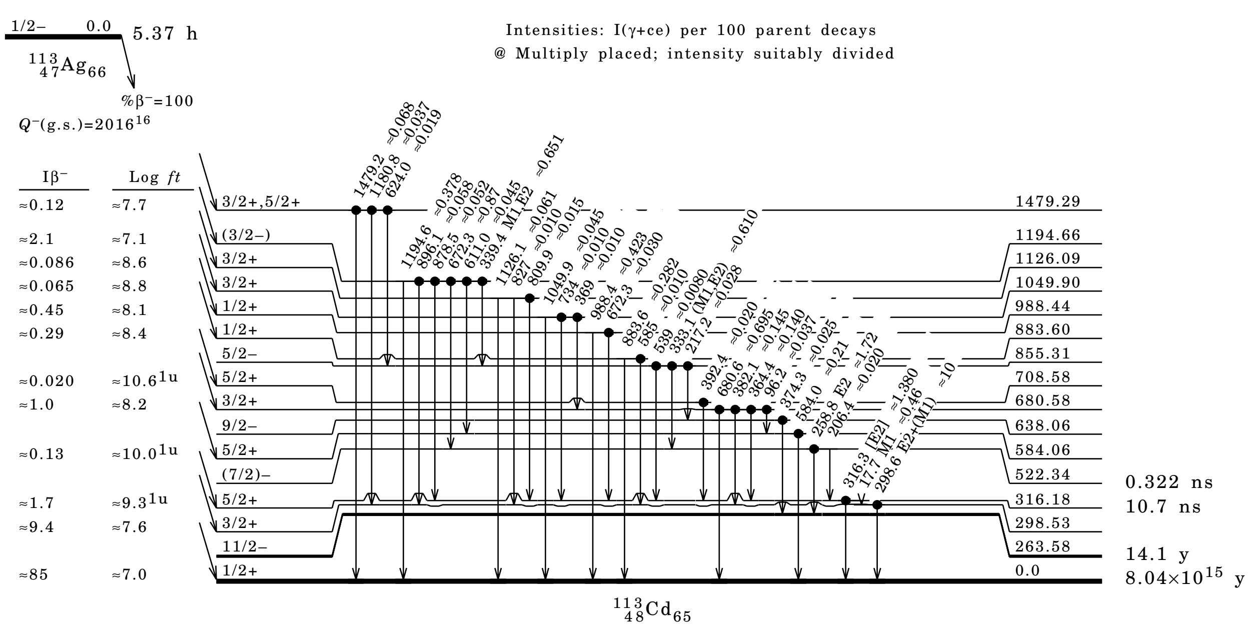
^{113}Ag β^- Decay (5.37 h) 1978Ma17,1970Ma47 (continued)

$\gamma(^{113}Cd)$ (continued)

Eγ	E(level)	Iγ[‡]	Mult.	α	Comments
258.8 *1*	522.34	16.35 *30*	E2	0.0531	B(E2)(W.u.)=44.0 *21*. Mult.: from α(K)exp=0.049 *6*. E1+M2 is not excluded.
298.6 *1*	298.53	100	E2+(M1)	0.0310 *21*	δ: >1.1. Mult.: from α(K)exp=0.027 *1*.
316.3 *1*	316.18	13.43 *20*	[E2]	0.0273	B(E2)(W.u.)=0.373 *21*. Mult.: based on Jπ values in proposed decay scheme.
333.1 *1*	855.31	5.98 *9*	(M1,E2)	0.0207 *25*	Mult.: from α(K)exp=0.021 *9*.
339.4 *1*	1194.66	6.38 *10*	M1,E2	0.0196 *22*	Mult.: from α(K)exp=0.019 *5*.
364.4 *1*	680.58	1.40 *3*			
369 *1*	1049.90	0.10 *5*			
374.3 *2*	638.06	0.25 *2*			
382.1 *1*	680.58	1.45 *3*			
392.4 *1*	708.58	0.20 *2*			
[x]410.8 *1*		0.12 *2*			
539 *1*	855.31	0.08 *3*			
584.0[§] *1*	584.06	2.1[†§] *3*			
585[§] *1*	883.60	0.10[†§] *5*			
611.0 *5*	1194.66	0.45 *10*			
624.0 *1*	1479.29	0.19 *1*			
672.3[§] *1*	988.44	0.3[†§] *1*			
	1194.66	8.7[†§] *3*			
680.6 *1*	680.58	6.95 *16*			
734 *1*	1049.90	0.10 *5*			
809.9 *1*	1126.09	0.15 *2*			
[x]816.1 *1*		0.11 *2*			
827 *1*	1126.09	0.10 *5*			
878.5 *1*	1194.66	0.52 *2*			
883.6 *1*	883.60	2.82 *7*			
896.1 *1*	1194.66	0.58 *10*			
988.4 *1*	988.44	4.23 *9*			
1049.9 *1*	1049.90	0.45 *3*			
[x]1084.5 *1*		0.16 *3*			
1126.1 *1*	1126.09	0.61 *3*			
1180.8 *1*	1479.29	0.37 *3*			
1194.6 *1*	1194.66	3.78 *10*			
1479.2 *1*	1479.29	0.68 *4*			

† Unresolved doublet. Iγ from γγ–coin results. Iγ divided into two parts on the basis of intensity balances.
‡ For absolute intensity per 100 decays, multiply by ≈0.10.
§ Multiply placed; intensity suitably divided.
x γ ray not placed in level scheme.

Decay Scheme



^{113}Ag β^- Decay (68.7 s) 1975BrYM,1990Fo07

Parent ^{113}Ag: E=43.2; Jπ=7/2+; $T_{1/2}$=68.7 s *50*; Q(g.s.)=2016 *16*; %β^- decay=36 *7*.
Measured Eγ, Iγ, γγ coin, γ(t), Eβ, βγ coin, (1975BrYM) Eγ, Iγ (1981Me17).
Eγ, branching for IT decay (1990Fo07). Others: 1969Hn01, 1970Ma47.

^{113}Cd Levels

E(level)	Jπ	$T_{1/2}$	Comments
0.0	1/2+	7.7×10^{15} y *5*	$T_{1/2}$: from adopted levels.
298.30 *8*	3/2+		
316.09 *8*	5/2+		
458.30 *16*	7/2+		
583.87 *25*	5/2+		
708.34 *17*	5/2+		
1007.1 *3*	(5/2)+		
1047.4 *4*	7/2+		
1195.3 *6*	5/2+		

β^- radiations

Eβ^-	E(level)	Iβ^-†‡	Log *ft*	Comments
(864 *16*)	1195.3	0.5 *3*	≈5.3	av Eβ=291 *8*.
(1012 *16*)	1047.4	≈0.44	≈5.6	av Eβ=351 *9*.
(1052 *16*)	1007.1	≈0.99	≈5.3	av Eβ=368 *9*.
(1351 *16*)	708.34	≈8.9	≈4.8	av Eβ=495 *9*.
(1475 *16*)	583.87	≈2.4	≈5.5	av Eβ=549 *9*.
(1601 *16*)	458.30	≈0.60	≈6.3	av Eβ=604 *9*.
(1743 *16*)	316.09	≈5.8	≈5.4	av Eβ=668 *9*.

† β^- branches were obtained from (γ+ce) imbalance at each level.
‡ For β^- intensity per 100 decays, multiply by 1.8 *4*.

γ(^{113}Cd)

Iγ normalization: assuming no β^- feeding to g.s. ΔJ=3, Δπ=no.

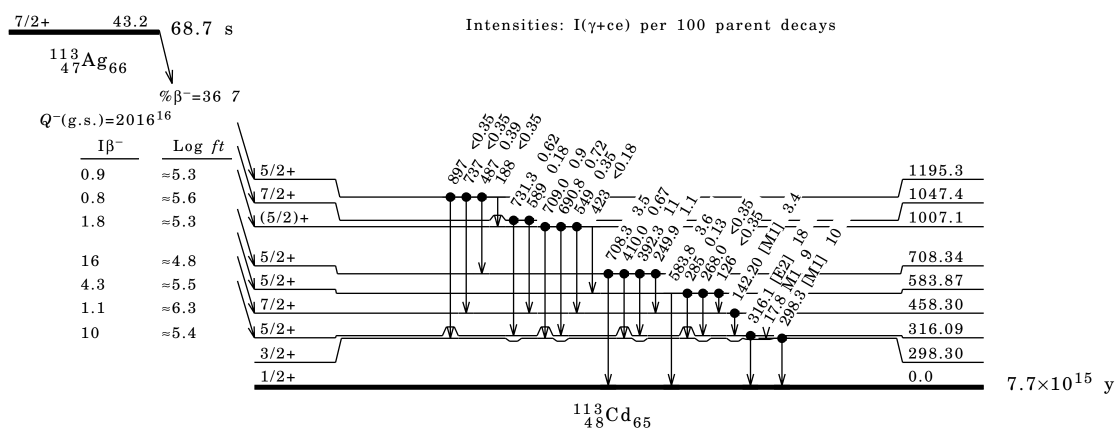
Eγ	E(level)	Iγ‡	Mult.	α	I(γ+ce)‡	Comments
17.8 *1*	316.09		M1	9.72 *22*	48.66	ce(L)/(γ+ce)=0.738 *10*; ce(M)/(γ+ce)=0.142 *4*; ce(N)/(γ+ce)=0.0252 *8*; ce(O)/(γ+ce)=0.00141 *5*; Particle normalization/$T_{1/2}$=0.0266 *8*. I(γ+ce): calculated from the decay scheme with assumption of no β^- feeding of the 298 level. Iγ: from I(γ+ce) and α. Mult.: from ^{113}Ag β^- decay (5.37 h).
126 *1*	583.87	<2				
142.20† *15*	458.30	16.5	[M1]	0.1735		
188 *1*	1195.3	<2				
249.9† *4*	708.34	6.3				
268.0 *6*	583.87	<2				
285 *1*	583.87	0.75				
298.3† *1*	298.30	57.5	[M1]	0.0242		
316.1† *1*	316.09	100	[E2]	0.0273		
392.3† *2*	708.34	63				
410.0† *6*	708.34	3.8				
423 *1*	1007.1	<1				
487 *1*	1195.3	2.2				
549 *1*	1007.1	2.0				
583.8 *3*	583.87	20.5				Iγ: 1981Me17 gives 17.7 *9*.
589 *1*	1047.4	1				
690.8 *4*	1007.1	4.1				
708.3 *4*	708.34	20				
709.0 *5*	1007.1	5				Eγ: not seen by 1981Me17 and also by 1987BaYW in (n,n'γ).
731.3 *4*	1047.4	3.5				
737 *1*	1195.3	<2				
897 *1*	1195.3	<2				

† Also seen by 1981Me17 which agrees on Iγ.
‡ For absolute intensity per 100 decays, multiply by 0.18 *4*.

^{113}Ag β^- Decay (68.7 s) 1975BrYM,1990Fo07 (continued)

Decay Scheme

Intensities: I(γ+ce) per 100 parent decays



^{113}Cd IT Decay (14.1 y) 1969De25

Parent ^{113}Cd: E=263.7 *3*; Jπ=11/2–; $T_{1/2}$=14.1 y *5*; %IT decay=0.14.
Measured Eγ, Iγ, α(K)exp from Iγ and I(K x ray).

^{113}Cd Levels

E(level)	Jπ	$T_{1/2}$†
0.0	1/2+	7.7×10^{15} y *3*
263.7 *3*	11/2–	14.1 y *5*

† From adopted levels.

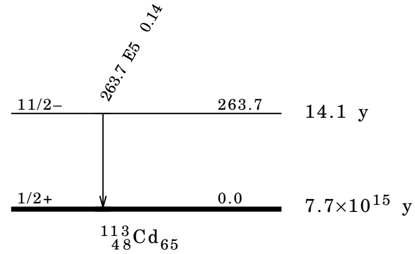
γ(^{113}Cd)

Eγ	E(level)	Iγ†	Mult.	α	I(γ+ce)†	Comments
263.7 *3*	263.7	19.08 *30*	E5	4.24 *7*	100	ce(K)/(γ+ce)=0.415 *6*; ce(L)/(γ+ce)=0.317 *5*; ce(M)/(γ+ce)=0.0666 *13*; ce(N)/(γ+ce)=0.01087 *22*; ce(O)/(γ+ce)=8.81×10^{-5} *18*. Particle normalization/$T_{1/2}$=0.01095 *23*. B(E5)(W.u.)=0.0499 *23*. Iγ: from I(γ+ce) and α. Mult.: α(K)exp=3.0 *5* yields M4,E5. ΔJ rules out M4.

† For absolute intensity per 100 decays, multiply by 0.0014.

Decay Scheme

Intensity: I(γ+ce) per
100 parent decays
%IT=0.14



^{110}Pd(α,nγ) 1997Wa20

E=12.2, 14.9, 16.2, 18.0 MeV. Enriched targets.
Measured: γ, γγ, γγ(θ), excitations functions, two Ge detectors with BGO–NaI(Tl) Compton suppression shields.

^{113}Cd Levels

E(level)	Jπ§
0.0†	1/2+
263.5‡ *5*	11/2−
298.599† *10*	3/2+
316.194† *19*	5/2+
458.620† *20*	7/2+
522.28‡ *3*	7/2−
583.975† *10*	5/2+
638.18‡ *3*	9/2−
680.533† *23*	3/2+
708.563† *22*	5/2+
815.29‡ *3*	15/2−
816.737† *24*	7/2+
855.26‡ *3*	5/2−
878.5† *2*	+
883.58† *15*	1/2+
897.63† *3*	3/2+
939.766† *21*	9/2+
988.29† *3*	1/2+
999.40 *7*	
1007.43† *7*	(5/2+)
1033.801† *22*	(3/2+)
1037.437† *14*	(7/2+)
1047.654† *24*	7/2+
1049.71† *10*	(3/2,5/2+)
1051.243‡ *25*	5/2−
1109.28‡ *3*	13/2−
1124.640† *23*	9/2+
1126.22† *15*	3/2+
1177.74‡ *3*	(9/2−)
1177.8† *3*	(5/2+)
1181.35 *4*	
1190.72 *5*	
1192.07‡ *4*	−
1194.58 *3*	
1195.22† *5*	+
1214.651† *22*	11/2+
1261.92 *4*	7/2+
1268.21 *5*	
1279.85 *6*	(3/2)
1313.763† *21*	9/2+
1321.84 *9*	
1327.6 *4*	
1346.54‡ *4*	11/2−
1364.70† *7*	(5/2+)
1367.60† *3*	7/2+
1387.51 *4*	
1395.82† *3*	(9/2+)
1405.69 *7*	
1410.66 *6*	
1451.03 *7*	
1461.65 *5*	
1504.92† *4*	7/2+
1513.71 *4*	−
1561.73 *3*	+
1620.42 *3*	
1626.40 *4*	+
1647.21 *5*	
1657.37‡ *5*	11/2−
1658.47 *7*	
1670.85 *10*	
1732.83† *4*	11/2+
1737.54 *7*	
1743.58 *21*	
1823.20‡ *4*	(13/2−)
1871.7 *3*	
1892.36 *6*	
1896.40 *4*	−
1902.43 *5*	+
1903.93 *9*	
2042.01 *6*	
2046.21† *7*	(15/2+)
2146.80 *5*	
2164.46 *11*	
2219.64 *5*	

† (A): Positive parity levels.
‡ (B): Negative parity levels.
§ From the authors based on previous known Jπ and γ multipolarities.

γ(^{113}Cd)

Eγ	E(level)	Iγ	Mult.§	δ§	α
115.6 *2*	638.18	6.0 *9*	D		
126.48 *1*	1177.74	8.6 *8*	E2		
142.42 *1*	458.620	540	M1+E2	−0.020 *2*	
153.0 *1*	1367.60	1.2 *5*			
184.83 *2*	1124.640	4.5 *6*			
205.9† *1*	522.28	6.4 *7*			
217.08 *2*	855.26	4.7 *5*			
231.0 *1*	1047.654	1.0 *4*			
237.78 *8*	1896.40	1.8 *5*			
238.96 *9*	1896.40	1.4 *6*			
242.64 *4*	1126.22	2.5 *4*			
249.95 *2*	708.563	7.4 *5*	D		
258.77 *1*	522.28	493 *8*			
267.77‡ *6*	583.975	7.5 *5*	M1+E2	+0.10 *4*	
274.89 *2*	1214.651	9.8 *5*	M1+E2	−0.02 *1*	
285.3 *1*	583.975	4 *1*			
293.79 *7*	1109.28	30 *1*			
298.60 *1*	298.599	860 *11*	M1+E2	+0.40 *1*	
307.89 *2*	1124.640	13.6 *7*	D		
313.48‡ *6*	897.63	18.3 *6*	M1+E2	+0.41	
316.22‡ *6*	316.194	1000 *10*	E2		0.0274
322.36 *6*	1177.74	15.8 *6*			
332.99 *1*	855.26	111 *2*	M1+E2	−0.21 *7*	
335.98 *9*	1513.71	1.4 *6*			
339.33 *1*	1194.58	16.9 *8*			

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^{110}Pd(α,nγ) 1997Wa20 (continued)

γ(^{113}Cd) (continued)

Eγ	E(level)	Iγ	Mult.§	δ§	Comments
358.09‡ 5	816.737	50 1	M1+E2	+0.003 3	
364.31 3	680.533	17 8			
365.4 1	1732.83	6 9			
370.72 1	1051.243	12 2			
374.64 3	638.18	48 2			
381.95 3	680.533	16.1 6	M1+E2		Mult.: δ=+0.02 1 or +4.7 2.
392.36 2	708.563	72 1	M1+E2	−0.05 2	
410.11 9	708.563	8.7 6	M1+E2	−0.08 4	
412.90 6	1051.243	57 1	E2		
416.09 4	1124.640	17.0 7	E2		
427.71 16	1367.60	20 1	D		
439.74‡ 22	897.63	33 1			
444.9 5	1261.92	3.4 7			
453.4 1	1037.437	4.3 7			
463.84 13	1047.654	7 1	M1+E2	−0.02 3	
469.5 5	1367.60	0.6 8			
471.20 5	1109.28	5.4 9	E2		
481.13 1	939.766	153 2	M1+E2	−0.04 5	
500.50 3	816.737	147 3	M1+E2	+0.04 5	
501.77 3	1626.40	35 2	M1+E2	0.00 3	
518.15 3	1732.83	9.1 7	D		
528.81‡ 8	1051.243	27.8 9	D		
534.87 5	1902.43	20 1	M1+E2	0.00 5	
539.3 1	855.26	3 1	E1		
540.78 6	999.40	6 1			
543.20 5	1181.35	3 1			
550.86 1	1367.60	40 6	M1+E2	−0.006 7	
551.79 1	815.29	343 6	E2		
553.90 1	1192.07	35 2	M1+E2	0.0 1	
561.56 9	1670.85	9.1 9			
579.8 1	878.5	6 1			
581.26 9	897.63	13 6			
583.97 1	583.975	301 3	E2		
589.02 2	1047.654	19 1	M1+E2	+0.005 10	
593.23 2	2219.64	11 1	E2		
598.95‡ 5	897.63	147 2	E2		
606.39 3	1461.65	4 1	D		
621.5 2	1561.73	8 2			
623.58 2	939.766	77 2			
633.08 2	2146.80	22 2	(E2)		
655.48 1	1177.74	26 1	M1+E2	−0.001 2	
659.08 3	1181.35	27 2			
664.13‡ 5	1561.73	32 1	E2		
666.1† 1	1124.640	71 2			
670.2† 5	1192.07	13 1			
672.34 2	1194.58	17 1			
677.95 4	1261.92	7.1 9			
680.6 1	680.533	78 2	M1+E2		Mult.: δ=+1.34 5 or −0.13 2.
687.6 1	1902.43	12 1			
691.23 6	1007.43	25 2			
696.5 5	1405.69	<1.0			
707.44 4	1647.21	24 4			
708.58 6	708.563	62 5			
713.91 5	1823.20	9 1	M1+E2	−0.01 2	
721.24 4	1037.437	22 1	D		
729.79 2	1313.763	58 2	E2		
731.47 2	1047.654	45 2	M1+E2	−0.03 4	
735.20 2	1033.801	12.6 9			
738.84 1	1037.437	21 1	M1+E2	+1.1 5	
743.6 4	1327.6	<3			
744.99 2	1561.73	19 1			
756.03 1	1214.651	140 4	E2		
765.15 1	1620.42	7.4 9	D		

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^{110}Pd(α,nγ) 1997Wa20 (continued)

γ(^{113}Cd) (continued)

Eγ	E(level)	Iγ	Mult.§	Comments
770.50 6	1451.03	14 4		
787.12 2	1896.40	13 1	E2	
793.4† 3	1732.83	28 2		
799.57 8	1321.84	48 5	D	
803.23 5	1261.92	9 1	D	
808.48 2	1124.640	29 2	E2	
824.27 3	1346.54	31 4	E2	
831.55 6	2046.21	18 2	E2	
842.06 3	1657.37	53 2	E2	
845.78 1	1109.28	125 2	D	
855.10 6	1313.763	4 1		
875.54 3	1513.71	18.1 9	E2	
878.4 2	878.5	4 1		
879.2 3	1177.8	2 2		
883.43 9	1405.69	29 1		
883.6 2	883.58			Eγ: not observed in this work, but 1997Wa20 do not rule its existence.
892.12 5	1190.72	6 1		
896.62 4	1195.22	22 2		
906.0 2	1364.70	3.3 9		
909.5‡ 8	1367.60	6 4		
920.94 3	1504.92	9.0 9	E2	
929.4 2	1513.71	5 1		
931.9 3	1871.7	5 1		
937.19 3	1395.82	19 2		
946.0† 1	1261.92	6 3		
949.8 1	2164.46	2.4 8		
952.04 5	1410.66	10 1		
969.59 5	1268.21	5.8 8		
988.29 3	988.29	24 1		
1007.90 3	1823.20	14 1		
1020.6† 5	1658.47	8 1		
1033.9 5	1033.801	12 1		
1037.2† 1	1037.437	12 1		
1049.7 1	1049.71	12.4 1		
1066.11 7	1364.70	9.1 1	D	
1079.63 4	1395.82	26 2		
1081.38‡ 20	1896.40	8 2		
1088.63 8	1903.93	12 1		
1098.06 7	1620.42	17 2		
1107.1 1	1405.69	8.0 9		
1126.2‡ 2	1126.22	18 1		
1135.8‡ 2	1658.47	11 1		
1215.27 6	1737.54	14 2		
1221.3 2	1743.58	2.9 9		
1226.71 5	2042.01	10 1		
1268.5† 2	1268.21	10 1		
1279.84 6	1279.85	6 1		
1370.08 5	1892.36	34 1		
1387.50 4	1387.51	34 2		
1394.8 1	1658.47	14 2		

† γ ray placed by coincidence relations. ΔE fixed to at least 0.1 keV to allow a fit with the other gammas.
‡ ΔE increased by evaluator to allow fit with levels.
§ From γ(θ) and excitation functions (five energies).

^{112}Cd(n,γ) E=res 1969Ju01

E=4–2000 eV. Measured cross section; neutron time of flight. For deduced resonance parameters for resonances with E=66.7 eV and E=83.3 eV, see 1981MuZQ.

^{112}Cd(d,p),^{114}Cd(d,t) 1969Go03

^{112}Cd(d,p): E=13 MeV.
Other: 1964Ro17.

^{113}Cd Levels

E(level)	Jπ‡	L†	C^2S
0.0	1/2+	0	0.34
270 10	11/2−	5	0.40
300 10	3/2+	2	0.40
320 10	5/2+	2	0.14

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^{112}Cd(d,p),^{114}Cd(d,t) 1969Go03 (continued)

^{113}Cd Levels (continued)

E(level)	Jπ‡	L†	C^2S	Comments
460 *10*	7/2+	4	0.26	
530 *10*	7/2+	4	0.36	
590 *10*	(5/2+)	2	0.05	
680 *10*	(3/2+)	2	0.27	
760 *10*	1/2+	0	0.14	
820 *10*	7/2+	4	0.12	
880 *10*	1/2+	0	0.07	
900 *10*	3/2+	2	0.21	
960 *10*				
980 *10*	1/2+	0	0.04	
1010 *10*				
1130 *20*				
1170 *20*				
1200 *10*		2,3		Jπ: authors assign Jπ=7/2+ but it is not compatible with given L. A level at 1195.4 has been adopted with Jπ=5/2+,7/2+,9/2+.
1280 *10*	(3/2+)	2	0.03	
1320 *10*				
1390 *20*				
1430 *10*	(3/2+)	2	0.06	
1450 *20*				
1490 *15*	(3/2+)	2	0.06	
1540 *10*				
1580 *10*	(7/2−)	(3)	0.02	
1610 *10*	(5/2+)	2	0.02	
1670 *10*	(3/2+)	(2)	0.02	
1810 *10*				
1840 *10*		1,2		
1880 *10*				
1900 *10*	(1/2+)	(0)	0.02	
1990 *10*				
2040 *10*	7/2−	3	0.04	
2080 *10*	(1/2+)	(0)	0.01	
2110 *10*	(7/2−)	(3)	0.02	
2120 *20*				
2140 *20*	(1/2+)	(0)		
2170 *10*	3/2−	1	0.04	
2180 *10*	3/2−	1	0.03	
2240 *10*		(3)		
2270 *10*				
2310 *10*	(3/2−)	(1)	0.01	
2330 *10*				
2370 *10*				
2410 *10*		(4)		
2440 *10*				
2540 *10*	(7/2−)	(3)	0.03	
2580 *10*	(3/2−)	(1)	0.02	
2630 *10*	(1/2+)	(0)	0.04	
2690 *10*				
2750 *10*				
2770 *10*	(3/2−)	(1)	0.02	
2810 *10*	1/2+	0	0.03	

† Deduced from proton angular distributions at 16 angles, θ=5°–115° compared with DWBA calculations. For L≥3 the agreement with DWBA is rather poor.

‡ Determined from L by use of the shell model. The d5/2 shell–model state is almost full, while the d3/2 state is almost empty. For L=2, J was therefore assigned 5/2 or 3/2 from a comparison of σ(d,t) and σ(d,p).

^{112}Cd(pol d,p) 2005Bu20

E=22.0 MeV. Measured ΔE–E_{rest}, σ(θ), dσ/dΩ with the Munich Q3D spectrograph, a 1.8–meter long focal plane detector and a Faraday cup placed behind the ^{112}Cd target. FWHM≈5 keV. Spectra measured twice at 11 angles from 17°–55° for antiparallel spin orientations of the polarized deuteron projectile beam and covered an energy range of ≈2.7 MeV for one magnetic setting of the spectrograph. DWBA analysis.

^{113}Cd Levels

dσ/dΩ=[(dσ/dΩ)$^+$+(dσ/dΩ)$^-$]/2, where (dσ/dΩ)$^+$ and (dσ/dΩ)$^-$ are the differential cross sections measured for the two antiparallel spin orientations. Quoted values in 2005Bu20 represent maximum differential cross sections.

for detailed configurations of levels in ^{113}Cd, refer to discussion by 2005Bu20.

E(level)†	Jπ‡	L	10(s_{lj})	Comments
0.0	1/2+	0	2.53	dσ/dΩ=703 μb/sr.
263.9 *12*	11/2−	5	4.30	dσ/dΩ=1.069 mb/sr.
298.3 *12*	3/2+	2	2.37	dσ/dΩ=1.994 mb/sr.
316.3 *12*	5/2+	2	0.67	dσ/dΩ=875 μb/sr.
458.7 *12*	7/2+	4	1.92	dσ/dΩ=376 μb/sr.
522.6 *12*	7/2−	3	0.30	dσ/dΩ=416 μb/sr.
583.8 *12*	5/2+	2	0.29	dσ/dΩ=345 μb/sr.
626.6 *12*	(3/2+)	2	0.020	dσ/dΩ=23 μb/sr.
637.8 *12*	9/2−	5	0.11	dσ/dΩ=12 μb/sr.
680.6 *12*	3/2+	2	1.48	dσ/dΩ=1.228 mb/sr.

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^{112}Cd(pol d,p) 2005Bu20 (continued)

^{113}Cd Levels (continued)

E(level)†	Jπ‡	L	10(s$_{lj}$)	Comments
709.5 *12*	5/2+	2	0.019	dσ/dΩ=23 μb/sr.
816.4 *12*	7/2+	4	0.58	dσ/dΩ=124 μb/sr.
877.7 *12*	(3/2+)	(2)	≈0.078#	dσ/dΩ=64 μb/sr.
883.3 *12*	1/2+	0	0.55	dσ/dΩ=190 μb/sr.
899.1 *12*		(2)	≈0.027#	dσ/dΩ=14 μb/sr.
939.5 *12*		§		dσ/dΩ=2 μb/sr.
989.1 *12*	1/2+	0	0.32	dσ/dΩ=93 μb/sr.
1007.1 *12*	5/2+	2	0.026	dσ/dΩ=33 μb/sr.
1035.9 *12*	(3/2+)	2	0.025	dσ/dΩ=20 μb/sr.
1048.9 *12*	(1/2+)	(0)	≈0.11#	dσ/dΩ=43 μb/sr.
1108.9 *12*		§		dσ/dΩ=1 μb/sr.
1124.9 *12*		(4)	≈0.017#	dσ/dΩ=8 μb/sr.
1178.1 *12*	5/2+	2	0.0087	dσ/dΩ=14 μb/sr.
1194.6 *12*	5/2+	2	0.33	dσ/dΩ=401 μb/sr.
1269.1 *12*	3/2+	2	0.13	dσ/dΩ=142 μb/sr.
1312.9 *12*	(11/2−)	(5)	0.047	dσ/dΩ=12 μb/sr.
1329.4 *12*	(7/2+)	(4)	0.013	dσ/dΩ=4 μb/sr.
1346.4 *12*	11/2−	5	0.068	dσ/dΩ=18 μb/sr.
1394.8 *12*	(9/2+)	(4)	0.019	dσ/dΩ=12 μb/sr.
1404.6 *12*	5/2+	2	0.043	dσ/dΩ=55 μb/sr.
1449.2 *12*	11/2−	5	0.10	dσ/dΩ=32 μb/sr.
1477.9 *12*	11/2−	5	0.19	dσ/dΩ=55 μb/sr.
1493.7 *12*	3/2+	2	0.23	dσ/dΩ=215 μb/sr.
1580.0 *12*	(3/2+)	2	0.23	dσ/dΩ=115 μb/sr.
1606.9 *12*	5/2+	2	0.081	dσ/dΩ=109 μb/sr.
1661.2 *12*	3/2+	2	0.034	dσ/dΩ=28 μb/sr.
1670.4 *12*	(11/2−)	5	0.48	dσ/dΩ=154 μb/sr.
1711.0 *12*		(2)	0.009	dσ/dΩ=10 μb/sr.
1735.0 *12*	11/2−	5	0.128	dσ/dΩ=42 μb/sr.
1769.1 *12*	(3/2+)	2	0.033	dσ/dΩ=21 μb/sr.
1788.9 *12*	(1/2+)	(0)	0.016	dσ/dΩ=3 μb/sr.
1814.5 *12*		(2)	0.028	dσ/dΩ=53 μb/sr.
1830.8 *12*	3/2+	2	0.012	dσ/dΩ=96 μb/sr.
1848.6 *12*	(1/2+)	(0)	0.023	dσ/dΩ=8 μb/sr.
1890.1 *12*	5/2+	2	0.053	dσ/dΩ=99 μb/sr.
1906.9 *12*	7/2−	3	0.089	dσ/dΩ=208 μb/sr.
1940.2 *12*		§		dσ/dΩ=20 μb/sr.
1970.8 *12*		(4)	0.034	dσ/dΩ=23 μb/sr.
1999.7 *12*		§		dσ/dΩ=34 μb/sr.
2044.1 *12*	1/2−	1	0.14	dσ/dΩ=59 μb/sr.
2080.4 *12*	(1/2+)	(0)	0.029	dσ/dΩ=15 μb/sr.
2110.2 *25*	(7/2−)	(3)	0.0044	dσ/dΩ=11 μb/sr.
2132.1 *25*	(1/2+)	(0)	0.025	dσ/dΩ=2 μb/sr.
2144.9 *25*		(2)	0.08	dσ/dΩ=134 μb/sr.
2172.4 *25*	(3/2−)	(1)	0.098	dσ/dΩ=166 μb/sr.
2195.8 *25*	(3/2−)	(1)	0.037	dσ/dΩ=71 μb/sr.
2214.6 *25*	7/2−	3	0.045	dσ/dΩ=112 μb/sr.
2242.1 *25*	(7/2−)	(3)	0.095	dσ/dΩ=251 μb/sr.
2252.9 *25*		(3)	0.063	dσ/dΩ=93 μb/sr.
2268.2 *25*	7/2−	3	0.054	dσ/dΩ=122 μb/sr.
2288.7 *25*		§		dσ/dΩ=34 μb/sr.
2316.9 *25*	(3/2−)	(1)	0.034	dσ/dΩ=36 μb/sr.
2327.4 *25*	(3/2−)	(1)	0.014	dσ/dΩ=23 μb/sr.
2349.2 *25*		§		dσ/dΩ=11 μb/sr.
2365.2 *25*		§		dσ/dΩ=22 μb/sr.
2380.0 *25*	(3/2−)	(1)	0.029	dσ/dΩ=31 μb/sr.
2409.0 *25*		(2)	0.047	dσ/dΩ=69 μb/sr.
2424.1 *25*	(3/2−)	(1)	0.13	dσ/dΩ=273 μb/sr.
2450.6 *25*		(1,2)		dσ/dΩ=103 μb/sr.
2477.2 *25*	(3/2−)	(1)	0.046	dσ/dΩ=56 μb/sr.
2487.9 *25*	(3/2−)	(1)	0.027	dσ/dΩ=19 μb/sr.
2500.4 *25*		§		dσ/dΩ=8 μb/sr.
2537.9 *25*		(3)	0.012	dσ/dΩ=25 μb/sr.

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^{112}Cd(pol d,p) 2005Bu20 (continued)

^{113}Cd Levels (continued)

E(level)†	Jπ‡	L	10(s_{lj})	Comments
2555.9 *25*	3/2−	1	0.046	dσ/dΩ=56 μb/sr.
2591.7 *25*	(3/2−)	(1)	0.004	dσ/dΩ=41 μb/sr.
2632.7 *25*	(5/2+)	2	0.11	dσ/dΩ=245 μb/sr.

† Comparison of sum rules for spectroscopic strengths from experiment with ibfm and qpm calculations indicate that not all states up to 2.5 MeV associated with the $3s_{1/2}$ and $2d_{3/2}$ shells were observed by 2005Bu20.
‡ Assignments based upon comparison of σ(θ) data with DWBA calculations. The distinction between two possible *j*–values for any given level (i.e. j=l+1/2 or j=l−1/2) were made on basis of deduced analyzing power for level.
§ σ(θ) data not characteristic of an L–value; level may be populated by multi–step processes or part of an unresolved doublet.
\# Upper limit based on population of level by multi–step processes.

^{113}Cd(γ,γ') 1994Ge07

Bremsstrahlung at the Stuttgart Dynamitron Facility.
Bremsstrahlung endpoint energy: 4.20 Mev 5.
Enriched Cd (94.6%). Scattered photons were detected by three Ge detectors under angles of 88°, 125°, 149° with respect to the incoming photon beams.

^{113}Cd Levels

E(level)	Jπ‡	$T_{1/2}$†	E(level)
0.0	1/2+	stable	2796
1813	(3/2+)		2817
1855			2902
1873			2913
1942		607 fs *+90−70*	2929
2044	3/2+,(3/2−,1/2−)		2943
2128			3040
2173	3/2−	90 fs *7*	3058
2182	(3/2−)	228 fs *+86−50*	3105
2318			3222
2335			3281
2354		3.0×10^2 fs *+16−6*	3301
2409			3333
2428	3/2−,1/2−		3378
2449			3412
2535	(3/2)		3480
2545			3486
2556			3526
2578			3547
2588	3/2−		3741
2743			3814
2753			3850
2773			3902

† From nuclear resonance fluorescence, assuming J=3/2.
‡ The spins of the excited levels have been determined for few levels.

^{113}Cd(n,n'γ) 1987BaYW,1991NeZX

Enriched≈96% target.
Measured: γ, γγ, γ(θ), linear polarization.
Also measurement ^{112}Cd(n,γ) E=res.
1991NeZX has reanalyzed the data of 1987BaYW and placed many new gammas.

^{113}Cd Levels

E(level)	Jπ†	E(level)	Jπ†	E(level)	Jπ†
0.0	1/2+	1051.2 5	7/2−	1542.28 9	(1/2)+
263.68 6	11/2−	1109.5 6		1561.5 5	
298.567 17	3/2+	1124.5 6		1575.8 5	7/2−
316.207 16	5/2+	1126.22 6	3/2+	1605.7 3	
458.578 24	7/2+	1177.26 8	3/2+	1607.17 9	5/2+
522.1 6	7/2−	1195.0 3	3/2−	1658.5 5	
583.89 4	5/2+	1209.56 13	13/2−	1675.11 9	3/2+
638.35 6	9/2−	1214.31 13	11/2+	1732.5 5	
680.550 21	3/2+	1268.13 6	3/2+	1746.09 14	3/2−
708.556 22	5/2+	1279.55 7	3/2+	1779.02 18	9/2−
816.62 4	7/2+	1301.03 7	3/2+,5/2+	1798.9 5	(1/2,3/2,5/2)+
855.4 3	5/2−	1313.74 12	5/2+	1823.5 5	
870.20 14	15/2−	1322.17 13	7/2−	1842.94 14	(3/2−)
878.5 5	3/2+	1351.6 5	5/2,7/2	1867.99 9	7/2−,9/2−
883.62 5	1/2+	1364.71 7		1892.44 12	7/2−
897.3 5	3/2+	1387.44 8	5/2+,3/2+	1902.5 5	
939.72 5	9/2+	1390.56 9	1/2+,3/2+	1904.28 11	5/2+,7/2+
988.40 6	1/2+	1395.5 5		2037.69 19	5/2,7/2,9/2
1002.89 4	3/2+	1405.81 10	1/2+,3/2+	2094.3 4	7/2−
1007.16 5	7/2+	1407.44 25	(9/2)+	2113.18 22	7/2−
1034.1 5	3/2+	1423.85 12	‡	2173.71 12	1/2−,3/2−
1037.4 2	7/2+	1450.3 5		2219.5 5	
1047.49 10	7/2+	1479.1 5	1/2,3/2	2319.70 18	3/2−
1049.68 10	3/2+	1492.99 9	1/2+,3/2+	2759.32 12	3/2+,5/2+

† As given by 1991NeZX, see adopted levels for comments.
‡ 1991NeZX suggested a 11/2− from syst, not adopted in (α,2nγ) 1997Wa20.

γ(^{113}Cd)

Eγ	E(level)	Iγ	Mult.†	δ
96.9 2	680.550	1.6 3		
142.35 2	458.578	34 3	M1+E2	−0.04 3
x162.32 5		0.23 5		
171.07 12	1450.3	0.27 8		
174.79 9	1301.03	0.25 8		
184.62‡ 25	1124.5	0.24 8		
x186.17 12		0.09 2		
x196.90 26		0.28 8		
x198.27 13		0.47 14		
205.86 8	522.1	0.42 4	E1	
217.00 3	855.4	0.56 6	E2	
224.69 25	1492.99	0.03 1		
x228.7 3		0.05 2		
x230.34 25		0.16 5		
x232.6 3		0.05 3		
242.6 3	1126.22	0.04 1	M1	
x244.73 11		0.26 5		
249.93 6	708.556	1.2 1	M1+E2	+0.24 8
258.72 2	522.1	34 2	E2	
264.2 4	1390.56	0.14 4		
267.68 6	583.89	0.82 16	M1	
x271.04 19		0.06 2		
x273.05 19		0.09 3		
274.67 18	1214.31	0.14 4	M1	

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^{113}Cd(n,n'γ) 1987BaYW,1991NeZX (continued)

γ(^{113}Cd) (continued)

Eγ	E(level)	Iγ	Mult.†	δ	Comments
279.80# 15	988.40	0.12# 2			
	1405.81	0.12# 2			
285.19 8	583.89	0.46 4	M1		
x288.53 30		0.05 3			
291.54 25	1279.55	0.10 3	M1		
294.52# 21	878.5	0.62# 18			
	1002.89	0.62# 18			
298.58 2	298.567	100	M1+E2	+0.30 +3−1	
307.9 20	988.40	0.05 2			
313.66 30	897.3	0.71 5			
316.21 2	316.207	73 4	E2		
322.35 3	1002.89	1.4 1	M1+E2	−0.8 2	Mult.: δ=−0.8 2 or −2.2 10.
332.97 3	855.4	12.2 11	M1+E2	−0.27 2	
339.30§ 10	1195.0	1.6§ 3	M1+E2	−0.20 15	
	1209.56	0.1§			
x341.89 8					
344.31 12	1351.6	0.08 2			
356.7# 4	1037.4	0.23# 7	E2		
	1390.56	0.23# 7			
358.03 21	816.62	2.2 6			
364.37 3	680.550	3.2 3	M1+E2	−0.02 7	
369.10 11	1049.68	0.55 11	M1		
374.64 3	638.35	13.6 14	M1+E2	−0.25 2	
x378.21 23		0.14 4			
381.96 3	680.550	3.0 3	M1+E2	+0.16 15	Mult.: δ=+0.16 15 or 2.3 7.
x389.3 3		0.43 8			
392.36 2	708.556	10 1	M1+E2	−0.24 4	
x398.08 15		0.19 3			
402.19 13	1390.56	0.25 7			
409.97 9	708.556	1.0 2	M1+E2	−0.10 4	
412.85 6	1051.2	3.3 6	M1+E2	−0.41 1	
416.11 4	1450.3	0.31 4			
	1542.28	0.31 4			
417.4# 3	1126.22	0.44# 8	M1		
	1301.03	0.44# 8			
	1405.81	0.44# 8			
419.8 3	878.5	0.12 3			
423.34 18	1007.16	0.22 6	M1		
427.68 16	2173.71	0.26 5	M1		
438.95 25	897.3	0.16 3			
445.2 3	1479.1	0.18 4			
449.9 3	1034.1	0.19 4	M1		
453.44 11	1037.4	0.36 7	M1		
463.69 13	1047.49	0.23 4	M1		
481.10 5	939.72	3.3 3	M1		
496.8 3	1351.6	0.26 8			
	1904.28	0.26 8			
500.43 3	816.62	6.2 7			Eγ: from private communication to 1991NeZX.
x500.47 3		6.2 7	M1+E2	+0.47	δ: +0.47<δ<3.0.
517.67 15	816.62	0.20 4			
528.78 5	1051.2	1.6 3	M1+E2	−2.25 115	
539.39 22	1542.28	0.53 10			
542.4 3	1126.22	0.32 6	M1		
548.54 5	1007.16	1.2 2	M1		
551.50 21	1746.09	1.3 3			
553.9 3	1423.85	0.38 11	E2		Eγ: placed from a 1192 level in (α,2nγ).
562.26 9	878.5	1.3 2			
x565.7 3		0.16 3			
x567.2 3		0.16 3			
569.3 3	1779.02	0.17 4	E2		
580.0# 5	878.5	2.5# 7			
	897.3	2.5# 7			
583.93 7	583.89	33 3	E2		

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$^{113}Cd(n,n'\gamma)$ 1987BaYW,1991NeZX (continued)

$\gamma(^{113}Cd)$ (continued)

Eγ	E(level)	Iγ	Mult.†	δ	Comments
588.92 *16*	1047.49	1.1 *2*	M1		
ˣ593.45 *25*		0.31 *9*			
598.88§ *15*	897.3	6.0§ *8*			
	1279.55	6.0§ *8*	M1		
606.33 *25*	870.20	1.04 *13*	E2		
ˣ608.8 *4*		0.19 *6*			
611.0 *3*	1195.0	0.34 *4*	E1		
620.76‡ *8*	1561.5	1.1 *3*			
623.59 *7*	939.72	1.8 *4*	E2		
624.2 *3*	1479.1				
643.1 *3*	1351.6	0.14 *3*			
648.26 *25*	1842.94	0.41 *16*			
658.66 *8*	1542.28	0.68 *25*			
ˣ661.57 *25*		0.10 *3*			
663.96 *12*	1561.5	0.13 *6*			
ˣ665.98 *25*		0.79 *15*			
665.98 *25*	1605.7	0.79 *15*			
670.4 *4*	2094.3	0.37 *15*	E2		
672.25# *15*	988.40	0.1#			
	1195.0	2.5# *6*	E2		
678.9	1387.44				
680.59 *5*	680.550	14.1 *9*	M1+E2	−1.8 *1*	
684.10# *11*	1268.13	0.72# *15*	M1		
	1322.17	0.72# *15*			
687.4‡ *3*	1902.5	0.12 *4*			
691.00 *8*	1007.16	3.4 *6*	M1+E2	0.35 *5*	
ˣ703.82 *25*		0.08 *3*			
708.52§ *5*	708.556	4.9§ *5*	E2		
	1007.16	≈1.6§	E2		
717.13 *11*	1301.03	1.6 *3*			
721.22 *8*	1037.4	2.5 *7*	M1+E2	0.29 *1*	
731.37	1047.49	2.8 *7*	M1		
733.3	1049.68	0.6			Eγ: from 1978Ma17.
735.10 *10*	1034.1	2.7 *7*	M1		
738.76 *9*	1037.4	2.2 *6*	E2		
745.00 *17*	1561.5	0.53 *16*			
ˣ751.95 *21*		0.62 *18*			
755.67 *16*	1214.31	1.4 *3*	E2		
ˣ760.39 *25*		0.10 *2*			
ˣ763.6 *3*		0.25 *7*			
765.1 *3*	1798.9	0.20 *8*			
767.65 *13*	1351.6	1.2 *2*			
770.4 *3*	1450.3	0.59 *18*			
ˣ777.43 *25*		0.18 *5*			
780.81 *11*	1364.71	0.51 *16*			
784.6 *3*	1492.99	0.11 *4*			
788.0 *3*	1051.2	0.08 *2*			
791.49 *15*	1675.11	0.42 *12*	M1		
794.75‡ *18*	1732.5	0.56 *16*			
799.9 *6*	1322.17	0.68 *3*			
808.3 *5*	1124.5	0.45 *20*			
809.96 *25*	1126.22	1.2 *5*	M1		
812.7 *4*	1492.99	0.13 *6*			
823.64	1407.44	1.5 *3*			
827.65 *25*	1126.22	0.40 *12*	M1		
829.4 *3*	1351.6	0.73 *25*			
ˣ838.64 *22*		0.20 *10*			
845.80‡ *9*	1109.5	0.88 *17*			
855.05 *19*	1313.74	0.08 *3*			
856.73 *25*	1904.28	0.08 *3*			
861.24 *15*	1177.26	1.5 *2*			
ˣ870.10 *25*		0.09 *4*			
878.62# *9*	878.5	8.4# *8*			

Continued on next page (footnotes at end of table)

^{113}Cd(n,n'γ) 1987BaYW,1991NeZX (continued)

γ(^{113}Cd) (continued)

Eγ	E(level)	Iγ	Mult.†	δ	Comments
878.62# 9	1177.26	8.4# 8			
	1195.0	8.4# 8			
883.60 5	883.62	6.5 6			
x888.02 11		0.28 8			
890.84 22	1746.09	0.16 5			
892.9 3	1351.6	0.09 3			
896.7 2	1195.0	2.7 3	E1		
x903.2 4		0.20 8			
906.08 25	1364.71	0.24 2			
909.12 13	1492.99	0.36 12			
x917.81 5		1.2 2			
926.6 4	1607.17	0.29 12	M1		
928.77 18	1387.44	1.0 3			
x933.6 3		0.06 2			
937.2 3	1575.8	0.24 7			
x938.98 25		0.22 6			
x942.52 25		0.10 3			
945.96 15	1209.56	1.1 2			
948.85 25	1407.44	0.11 5			
951.95 13	1268.13	1.5 3	M1+E2	−0.8 3	
x957.70 22		0.13 4			
960.46 15	2759.32	0.07 2			
963.25 15	1279.55	0.16 5	M1		
969.55 10	1268.13	1.1 2	M1		
x974.06 11		0.16 2			
979.08 23	2173.71	0.13 5	M1		
980.94 25	1279.55	0.14 5	M1		
987.5	1842.94				
988.43 7	988.40	4.8 3			
994.53 11	1675.11	0.40 8	M1		
997.58 14	1313.74	0.25 5			
1002.76 9	1002.89	0.82 16	M1		
x1007.50 25		0.12 4			
1007.50‡ 25	1823.5	0.12 4			
1012.91 21	1867.99	0.52 16			
1023.00 25	1607.17	0.60 24	M1		
x1027.0 3		0.06 2			
1033.80 12	1034.1	4.0 8	M1+E2	0.52 22	
1036.87 15	1892.44	0.90 27	M1		
1049.75 16	1049.68	3.1 3	M1+E2	−0.49 8	Mult.: δ=−0.49 8 or −30 +60−20.
1052.95 12	1351.6	0.47 14			
1053.0 3	1575.8	0.47 14			
1058.48 11	1322.17	0.70 19			
1066.16 8	1364.71	1.4 1			
x1076.08 10		0.18 5			
1079.46‡ 11	1395.5	0.53 10			
1088.89 9	1387.44	1.3 3			
1092.18 21	1390.56	0.16 8			
1097.89 22	2037.69	0.52 19			
1107.11 18	1405.81	1.1 3			
x1116.51 17		0.16 3			
1126.20 8	1126.22	3.4 3	M1+E2	−0.02 3	
1135.45‡	1658.5	0.45 9			
x1144.0 4		0.35 11			
x1147.2 4		0.35 14			
1147.2 4	1605.7	0.35 14			
1160.12 11	1423.85	0.64 19	M1		
x1165.49 11		0.55 11			
1176.76# 24	1177.26	<1.1#			
1176.76# 15	1492.99	1.1# 3	M1+E2	+0.23 17	
1180.70 18	1479.1	0.56 11			
1194.43 10	1195.0	1.08 11	E1		
1214.8 5	1798.9	1.4 2			

Continued on next page (footnotes at end of table)

^{113}Cd(n,n'γ) 1987BaYW,1991NeZX (continued)

γ(^{113}Cd) (continued)

Eγ	E(level)	Iγ	Mult.†
^{x}1218.4 4		0.09 4	
1221.3 4	2037.69	0.75 6	
^{x}1230.74 21		0.20 8	
^{x}1240.8 5		0.29 12	
^{x}1248.3 5		0.21 6	
^{x}1253.2 3		0.31 6	
^{x}1261.93 10		0.40 11	
1268.32 15	1268.13	0.44 6	M1
^{x}1273.23 17		0.12 4	
1279.81 11	1279.55	0.09 2	M1
1289.4 3	2173.71	0.20 5	E1
^{x}1293.46 12		0.45 8	
1301.07 10	1301.03	0.41 8	
1308.70 11	1607.17	0.34 8	M1
1312.18 15	1575.8	0.13 3	
^{x}1315.84 16		0.08 3	
1320.43 15	1842.94	0.47 8	
	1904.28	0.47 8	
^{x}1325.46 22		0.17 5	
^{x}1326.95 15		0.21 6	
^{x}1332.94 21		0.06 2	
1345.56 8	1867.99	0.71 5	
^{x}1354.34 25		0.04 1	
1370.22 15	1892.44	0.610 6	
1376.64 25	1675.11	0.28 11	M1
1387.3 5	1387.44	0.17 8	
1390.42 15	1390.56	1.4 4	
1394.7 4	2759.32	0.37 14	
1405.85 11	1405.81	0.95 19	
^{x}1413.11 25		0.34 14	
^{x}1417.21 25		0.09 2	
^{x}1423.7 4		0.9 2	
1429.9 4	1746.09	0.13 4	
^{x}1433.6		0.2 1	
1445.70 11	1904.28	1.2 2	
^{x}1452.96 14		0.04 1	
^{x}1460.41 25		0.04 1	
1464.32 18	2319.70	0.12 3	M1
^{x}1468.79 25		0.20 8	
^{x}1472.0 3		0.64 9	
1474.8 3	2113.18	0.2 1	M1
1479.19 15	1479.1	1.2 2	
1482.85 25	1798.9	0.16 5	
^{x}1484.80 25		0.05 2	
1492.88# 25	1492.99	0.06# 2	
	2173.71	0.06# 2	E1
^{x}1496.66 15		0.29 5	
^{x}1504.05 21		0.07 2	
^{x}1507.83 21		0.06 2	
1515.4 2	1779.02	0.82 16	M1
^{x}1525.71 17		0.37 7	
^{x}1534.46 25		0.05 2	
^{x}1538.06 25		0.06 2	
^{x}1541.23 25		0.05 2	
^{x}1545.17 25		0.08 3	
^{x}1549.05 25		0.05 2	
^{x}1552.68 14		0.19 6	
^{x}1571.3 5		0.15 5	
^{x}1574.16 25		0.41 12	
1579.1 5	2037.69	0.12 4	
^{x}1585.74 25		0.11 3	
1590.8 3	2113.18	0.35 9	M1
1604.23 23	1867.99	0.12 3	
1606.96 22	1607.17	0.08 2	E2
^{x}1609.91 25		0.08 2	
^{x}1612.30 25		0.10 2	
^{x}1622.30 25		0.10 2	
^{x}1626.7 4		0.13 3	
1628.8 4	1892.44	0.23 6	E2
^{x}1645.33 20		0.24 4	
^{x}1656.6 5		0.10 4	
^{x}1666.37 22		0.04 1	
^{x}1670.3 3		0.04 1	
^{x}1675.7 4		0.03 1	
^{x}1678.97 22		0.15 6	
^{x}1682.79 25		0.022 4	
^{x}1689.34 15		0.20 4	
^{x}1694.06 18		0.06 1	
^{x}1698.18 16		0.19 3	
^{x}1705.48		0.37 7	
^{x}1717.40 15		0.16 3	
^{x}1721.06 16		0.049 15	
^{x}1743.2 5		0.064 22	
1746.0 5	1746.09	0.26 9	
^{x}1758.8 4		0.092 23	
^{x}1764.4 4		0.036 6	
^{x}1767.7 4		0.15 4	
^{x}1781.8 5		0.26 7	
^{x}1785.83 25		0.46 11	
^{x}1791.2 3		0.051 13	
^{x}1792.7 4		0.015 4	
^{x}1794.7 3		0.015 4	
1798.65 25	1798.9	0.051 10	
^{x}1803.7 4		0.14 4	
^{x}1806.1 4		0.17 5	
^{x}1812.96		0.72 14	
^{x}1820.8 4		0.09 2	
^{x}1826.12 20		0.34 8	
1830.7 5	2094.3	0.17 5	E2
^{x}1837.45 23		0.032 8	
^{x}1855.18		0.13 3	
^{x}1867.6 4		0.15 4	
^{x}1873.02 25		0.030 7	
^{x}1881.5 4		0.040 10	
^{x}1888.7 4		0.032 8	
^{x}1895.4 4		0.032 8	
^{x}1923.8 4		0.031 9	
^{x}1926.7 5		0.029 9	
^{x}1930.29 25		0.05 2	
^{x}1937.8 4		0.08 2	
1942.71 25	2759.32	0.27 8	
^{x}1952.9 3		0.11 4	
^{x}1969.0 3		0.028 8	
^{x}1970.9 3		0.048 14	
^{x}1974.2 3		0.036 11	
^{x}1976.1 4		0.015 6	
^{x}1995.7 4		0.06 2	
^{x}2044.43 22		0.16 3	
^{x}2053.9 4		0.18 4	
^{x}2091.2 4		0.14 4	
^{x}2112.2 3		0.041 10	
^{x}2135.6 3		0.14 3	
2173.64 21	2173.71	0.34 6	E1
^{x}2182.5 4		0.14 2	
^{x}2209.0 4		0.032 8	
^{x}2230.5 3		0.17 4	

Continued on next page (footnotes at end of table)

^{113}Cd(n,n'γ) 1987BaYW,1991NeZX (continued)

γ(^{113}Cd) (continued)

Eγ	E(level)	Iγ	Mult.†
x2278.8 *4*		0.07 *2*	
x2313.7 *6*		0.14 *4*	
2319.7 *6*	2319.70	0.54 *22*	E1
x2336.0 *4*		0.12 *2*	
x2353.0		0.13 *3*	
x2383.7 *4*		0.10 *3*	
x2394.9 *6*		0.16 *7*	
x2409.0 *4*		0.13 *5*	
x2413.0 *4*		0.13 *5*	
x2428.9 *5*		0.11 *4*	
x2450.4 *4*		0.04 *1*	
2460.6 *2*	2759.32	0.55 *11*	
x2506.5 *7*		0.08 *2*	
x2525.6 *4*		0.11 *3*	
x2535.4 *4*		0.12 *3*	
x2545.6 *5*		0.10 *4*	
x2557.5 *5*		0.08 *2*	
x2588.6 *5*		0.216	
x2598.8 *6*		0.16 *4*	
x2674.6 *8*		0.6 *3*	
x2767.8 *6*		0.14 *5*	
x2800.3 *4*		0.14 *4*	
x3213.6 *8*		0.04 *2*	

† From 1987BaYW, with new results from 1991NeZX.
‡ γ placed by evaluator using the (α,nγ) of 1997Wa20.
§ Multiply placed; intensity suitably divided.
# Multiply placed; undivided intensity given.
x γ ray not placed in level scheme.

^{113}Cd(p,p'),(p,p'γ) 1967Ko07

E=14 MeV. σ(θ), θ=30°–145° with magnetic spectrograph, FWHM≈40 keV, 1967Ko07.

^{113}Cd Levels

E(level)	Jπ‡	$T_{1/2}$	L†	β_L	Comments
0.0	1/2+				Jπ: from adopted levels.
292 *10*	3/2+		2	0.19	
316		11.0 ns *6*			$T_{1/2}$: from pulsed–beam γ(t) with semi, 1972RaZM looking at 316γ.
576 *10*	5/2+		2	0.22	
670 *10*	3/2+,5/2+		2	0.11,0.99	
879 *10*	3/2+,5/2+		2	0.098,0.08	
1758 *10*	5/2−,7/2−		3	0.20,0.17	
1887 *10*	5/2−,7/2−		3	0.15,0.13	
1986 *10*	5/2−,7/2−		3	0.12,0.10	

† From comparison with DWBA calculations.
‡ Assumed for β_L calculation.

^{113}Cd(d,d') 1962Jo05

E=15 MeV. Magnetic spectrograph, resolution≈40 keV.

^{113}Cd Levels

E(level)	Jπ†	Comments
0.0		
300	+	
580	+	
690	+	
1160		
1760	+	Jπ: note that π=− for the 1758 level seen in (p,p').
2010?		

† From σ(42)/σ(59).

Coulomb Excitation 1991KrZR,1958Mc02,1972An28

1991KrZR: ^{113}Cd(^{197}Au,^{197}Au',γ) E=approximately 4.5 MeV/u.
Enriched ^{113}Cd target with thick lead–backing to stop the recoils 3 HPGe detectors at 0°, 54°, and 90°.
γ–intensities, γ–γ–coincidences and angular distributions. Spins and multipole mixing ratios deduced from angular distributions.
1958Mc02: ^{113}Cd(p,p'γ) E=2.1–3.3 MeV, scin. Measured Eγ, Iγ, γ(θ), linear pol.
1972An28: ^{113}Cd(α,α'γ) E=12.4 MeV. ^{113}Cd(^{12}C,^{12}C'γ) E=35.3, 41.1 MeV, semi. Measured Eγ, Iγ.
Other: 1971GeZW.

^{113}Cd Levels

E(level)	Jπ†	$T_{1/2}$‡	Comments
0.0	1/2+		
298.59 *7*	3/2+	29 ps *9*	B(E2)↑=0.13 *2* (1972An28).
316.18 *7*	5/2+	4.9 ns *7*	B(E2)↑=0.0080 *10* (1972An28).
583.95 *7*	5/2+	6.9 ps *14*	B(E2)↑=0.32 *6* (1972An28).
680.41 *8*	3/2+	<12 fs	B(E2)↑=0.070 *15* (1972An28).
708.49 *7*	5/2+		
897.49 *9*	3/2+		
1006.88 *12*	7/2+		
1313.77 *9*	5/2+		
1450.81 *13*	3/2+		
1513.05 *12*	7/2+		

† As given by 1991KrZR.
‡ From B(E2).

γ(^{113}Cd)

Eγ†	E(level)	Iγ‡	Mult.	δ	α	Comments
17.7	316.18	3.1 *4*	M1		10.2 *3*	Iγ: from 1972An28. B(M1)(W.u.)=0.019 *5*.
96.2 *1*	680.41	147.2	[M1,E2]		1.1 *6*	
267.7 *1*	583.95	>0.0				
285.2 *1*	583.95	>0.0				
298.6 *1*	298.59	100	M1+E2	+0.30 *+3−1*	0.029 *5*	δ: from 1972An28. δ=0.29 (1958Mc02) from γ(θ) and linear polarization. δ=0.26 +5−5 or −3.6 +6−10 (1991KrZR). B(M1)(W.u.)=0.025 *8*; B(E2)(W.u.)=20 *8*.
316.2 *1*	316.18	100	[E2]		0.0080 *10*	B(E2)(W.u.)=0.83 *13*.
364.3 *1*	680.41	30.2	M1+E2	−0.02 *7*		δ: from 1972An28. δ=−0.17 +7−6 or 2.7 +6−4 (1991KrZR). B(M1)(W.u.)>2.5.
382.0 *1*	680.41	26.6 *4*	M1+E2	+0.16 *15*		δ: from 1972An28. δ=0.16 +5−5 or −11 +7−5 (1991KrZR). B(M1)(W.u.)>1.7.
392.3 *1*	708.49	36.5	M1+E2			δ: δ=−0.17 +12−17 or −2.7 +8−16 (1991KrZR).
409.9 *1*	708.49	4.9	M1+E2			δ: δ=+7 +14−3 or −0.17 +17−20 (1991KrZR).
581.3 *1*	897.49	>0.0				
583.9 *1*	583.95	100	E2			B(E2)(W.u.)=37 *8*.
598.9 *1*	897.49	64.1	M1+E2			δ: δ=+5.9 +87−18 or −0.09 +7−8 (1991KrZR).
680.6	680.41	100 *23*	M1+E2	+0.02 *+2−6*		δ: from 1972An28. δ=0.15 +5−6 or −2.4 +3−4 (1991KrZR). B(M1)(W.u.)>1.2.
690.7 *1*	1006.88		M1+E2	3.7 *+63−17*		δ: from 1991KrZR.
708.5 *1*	708.49	14.7	M1+E2			δ: δ=+0.29 +9−9 or −4 +1−3 (1991KrZR).
729.8 *1*	1313.77	23.5	M1+E2	−0.18 *+11−12*		δ: from 1991KrZR.
770.4 *1*	1450.81		M1+E2			δ: δ=+0.01 +25−25 or 4.1 −23 (1991KrZR).
929.1 *1*	1513.05		M1+E2	0.26 *+10−10*		δ: from 1991KrZR.
997.6 *1*	1313.77	7	M1+E2	1.6 *+11−11*		δ: from 1991KrZR.

† From 1991KrZR.
‡ % photon branching from each level (1991KrZR).

^{114}Cd(pol d,t) 2005Bu20

Vector polarization P_3 of beam was ≈60% and obtained with an atomic beam source.
E=25.0 MeV. Measured ΔE–E_{rest}, $\sigma(\theta)$, $d\sigma/d\Omega$ with the Munich Q3D spectrograph, a 1.8–meter long focal plane detector and a Faraday cup placed behind the ^{114}Cd target. FWHM≈5 keV. Spectra measured twice at 11 angles from 8°–45° for antiparallel spin orientations of the polarized deuteron projectile beam and covered an energy range of ≈2.7 MeV for one magnetic setting of the spectrograph. DWBA analysis.

^{113}Cd Levels

$d\sigma/d\Omega=[(d\sigma/d\Omega)^{+}+(d\sigma/d\Omega)^{-}]/2$, where $(d\sigma/d\Omega)^{+}$ and $(d\sigma/d\Omega)^{-}$ are the differential cross sections measured for the two antiparallel spin orientations. Quoted values in 2005Bu20 represent maximum differential cross sections.
for detailed configurations of levels in ^{113}Cd, refer to discussion by 2005Bu20.

E(level)†	Jπ‡	L	10(γ_{lj})	Comments
0.0	1/2+	0	2.45	dσ/dΩ=3.135 mb/sr.
262.5 *14*	11/2−	5	9.46	dσ/dΩ=563 μb/sr.
297.7 *14*	3/2+	2	2.51	dσ/dΩ=2.304 mb/sr.
315.5 *14*	5/2+	2	6.18	dσ/dΩ=6.153 mb/sr.
458.6 *14*	7/2+	4	11.96	dσ/dΩ=783 μb/sr.
522.3 *14*	7/2−	3	1.36	dσ/dΩ=314 μb/sr.
584.8 *14*	5/2+	2	1.01	dσ/dΩ=1090 μb/sr.
638.2 *14*	(9/2−)	(5)	0.15	dσ/dΩ=5 μb/sr.
681.5 *14*	3/2+	2	0.77	dσ/dΩ=748 μb/sr.
709.5 *14*	5/2+	2	0.33	dσ/dΩ=346 μb/sr.
817.4 *14*	7/2+	4	2.98	dσ/dΩ=195 μb/sr.
879.8 *14*	3/2+	2	0.38	dσ/dΩ=374 μb/sr.
884.8 *14*	1/2+	0	0.063	dσ/dΩ=98 μb/sr.
898.4 *14*	(3/2+)	(2)	0.031	dσ/dΩ=19 μb/sr.
940.4 *14*	9/2+	4	0.20	dσ/dΩ=21 μb/sr.
989.0 *14*	1/2+	0	0.28	dσ/dΩ=665 μb/sr.
1008.2 *14*	5/2+	2	0.41	dσ/dΩ=534 μb/sr.
1033.5 *14*	(3/2+)	2	0.015	dσ/dΩ=187 μb/sr.
1050.7 *14*	1/2+	0	0.033	dσ/dΩ=67 μb/sr.
1108.4 *14*		§		dσ/dΩ=1 μb/sr.
1125.9 *14*	(3/2+)	2	0.04	dσ/dΩ=14 μb/sr.
1178.3 *14*	5/2+	2	0.077	dσ/dΩ=114 μb/sr.
1196.1 *14*	5/2+	2	1.75	dσ/dΩ=2560 μb/sr.
1262.5 *14*	7/2+	4	0.72	dσ/dΩ=59 μb/sr.
1302.2 *14*	3/2+	2	0.014	dσ/dΩ=16 μb/sr.
1314.4 *14*	(9/2+)	(4)	0.36	dσ/dΩ=26 μb/sr.
1329.8 *14*	7/2+	4	0.12	dσ/dΩ=8 μb/sr.
1348.3 *14*	11/2−	5	0.044	dσ/dΩ=4 μb/sr.
1366.2 *14*	5/2+	2	0.0067	dσ/dΩ=9 μb/sr.
1396.5 *14*	9/2+	4	0.26	dσ/dΩ=31 μb/sr.
1406.0 *14*	5/2+	2	0.18	dσ/dΩ=262 μb/sr.
1433.0 *14*	7/2+	4	0.18	dσ/dΩ=14 μb/sr.
1452.3 *14*		§		dσ/dΩ=2 μb/sr.
1473.4 *14*		§		dσ/dΩ=10 μb/sr.
1493.9 *14*	3/2+	2	0.057	dσ/dΩ=80 μb/sr.
1579.2 *14*	(5/2+)	2	0.164	dσ/dΩ=267 μb/sr.
1607.6 *14*	5/2+	2	0.36	dσ/dΩ=571 μb/sr.
1662.2 *14*	(3/2+)	(2)	0.033	dσ/dΩ=69 μb/sr.
1689.6 *14*		§		dσ/dΩ=39 μb/sr.
1700.1 *14*	(11/2−)	(5)	0.34	dσ/dΩ=18 μb/sr.
1713.0 *14*	(3/2−)	(1)	0.010	dσ/dΩ=35 μb/sr.
1744.1 *14*	(5/2+)	2	0.032	dσ/dΩ=66 μb/sr.
1769.4 *14*	(3/2+)	2	0.010	dσ/dΩ=13 μb/sr.
1781.4 *14*	(3/2+)	2	0.088	dσ/dΩ=95 μb/sr.
1786.5 *14*	(3/2+)	2	0.079	dσ/dΩ=66 μb/sr.
1813.1 *14*	(7/2+)	4	0.54	dσ/dΩ=46 μb/sr.
1825.1 *14*	5/2+	2	0.057	dσ/dΩ=90 μb/sr.
1833.5 *14*	3/2+	2	0.050	dσ/dΩ=61 μb/sr.
1852.3 *14*	1/2+	0	0.094	dσ/dΩ=243 μb/sr.
1873.4 *14*	3/2+	2	0.13	dσ/dΩ=164 μb/sr.
1889.0 *14*	5/2+	2	0.154	dσ/dΩ=250 μb/sr.
1905.0 *14*	(7/2−)	(3)	0.042	dσ/dΩ=12 μb/sr.
1911.4 *14*	(5/2+)	(2)	0.011	dσ/dΩ=11 μb/sr.
1923.3 *14*	5/2+	2	0.016	dσ/dΩ=25 μb/sr.

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^{114}Cd(pol d,t) 2005Bu20 (continued)

^{113}Cd Levels (continued)

E(level)†	Jπ‡	L	10(γ_{lj})	Comments
1943.0 *14*	(3/2+)	2	0.026	dσ/dΩ=32 μb/sr.
1969.8 *14*	7/2+	4	0.22	dσ/dΩ=18 μb/sr.
1998.8 *14*	(11/2−)	(5)	0.28	dσ/dΩ=15 μb/sr.
2005.3 *25*		§		dσ/dΩ=7 μb/sr.
2015.6 *25*	1/2+	0	0.007	dσ/dΩ=22 μb/sr.
2027.7 *25*		§		dσ/dΩ=2 μb/sr.
2044.9 *25*	1/2−	1	0.089	dσ/dΩ=225 μb/sr.
2062.9 *25*		§		dσ/dΩ=2 μb/sr.
2072.7 *25*	5/2+	2	0.056	dσ/dΩ=38 μb/sr.
2080.9 *25*	1/2+	0	0.023	dσ/dΩ=64 μb/sr.
2099.2 *25*	5/2+	2	0.017	dσ/dΩ=28 μb/sr.
2127.6 *25*		§		dσ/dΩ=9 μb/sr.
2135.0 *25*	1/2+	0	0.013	dσ/dΩ=42 μb/sr.
2145.1 *25*	(7/2−)	(3)	0.0058	dσ/dΩ=5 μb/sr.
2155.7 *25*	3/2+	2	0.032	dσ/dΩ=46 μb/sr.
2172.2 *25*	3/2−	1	0.028	dσ/dΩ=83 μb/sr.
2179.9 *25*	5/2+	2	0.017	dσ/dΩ=31 μb/sr.
2195.6 *25*	1/2−,3/2−	1	0.019	dσ/dΩ=43 μb/sr.
2203.5 *25*	7/2+	4	0.10	dσ/dΩ=9 μb/sr.
2213.8 *25*	(7/2−)	(3)	0.020	dσ/dΩ=5 μb/sr.
2229.0 *25*	(3/2+)	(2)	0.028	dσ/dΩ=49 μb/sr.
2241.1 *25*	5/2+	2	0.062	dσ/dΩ=115 μb/sr.
2267.6 *25*	5/2−,7/2−	3	0.019	dσ/dΩ=4 μb/sr.
2278.3 *25*	1/2+	0	0.014	dσ/dΩ=49 μb/sr.
2292.9 *25*	7/2+	4	0.159	dσ/dΩ=12 μb/sr.
2313.5 *25*		(2)		dσ/dΩ=12 μb/sr.
2336.4 *25*		§		dσ/dΩ=13 μb/sr.
2352.0 *25*	3/2+	2	0.012	dσ/dΩ=16 μb/sr.
2361.9 *25*	5/2+	2	0.045	dσ/dΩ=13 μb/sr.
2381.1 *25*	(3/2−)	1	0.020	dσ/dΩ=48 μb/sr.
2396.6 *25*	5/2+	2	0.049	dσ/dΩ=91 μb/sr.
2413.3 *25*	(3/2+)	2	0.024	dσ/dΩ=37 μb/sr.
2425.1 *25*		§		dσ/dΩ=5 μb/sr.
2438.9 *25*	(3/2+)	2	0.017	dσ/dΩ=27 μb/sr.
2448.4 *25*	3/2+,5/2	2	0.027	dσ/dΩ=39 μb/sr.
2472.3 *25*	3/2+,5/2	2	0.017	dσ/dΩ=27 μb/sr.
2480.8 *25*		§		dσ/dΩ=14 μb/sr.
2499.6 *25*	1/2+	0	0.0029	dσ/dΩ=15 μb/sr.
2533.7 *25*		(2)	0.022	dσ/dΩ=44 μb/sr.
2548.3 *25*	3/2+,5/2	2	0.015	dσ/dΩ=26 μb/sr.
2575.4 *25*		§		dσ/dΩ=17 μb/sr.
2586.6 *25*	1/2+	0	0.024	dσ/dΩ=94 μb/sr.
2599.1 *25*	(5/2+)	2	0.017	dσ/dΩ=34 μb/sr.
2612.2 *25*	3/2+,5/2	2	0.039	dσ/dΩ=69 μb/sr.
2627.1 *25*	1/2+	0	0.0041	dσ/dΩ=19 μb/sr.

† Comparison of sum rules for spectroscopic strengths from experiment with IBFM and QPM calculations indicate that not all states up to 2.5 MeV associated with the $3s_{1/2}$, $2d_{3/2}$, $2d_{5/2}$ and $1g_{7/2}$ shells were observed by 2005Bu20.

‡ Assignments based upon comparison of t(θ) data with DWBA calculations. The distinction between two possible *j*–values for any given level (i.e. j=l+1/2 or j=l−1/2) were made on basis of deduced analyzing power for level.

§ σ(θ) data not characteristic of an L–value; level may be populated by multi-step processes or part of an unresolved doublet.

$^{173}Yb(^{24}Mg,F\gamma)$ 2000Fo10

E=134.5 MeV. Measured Eγ, and Iγ using the GAMMASPHERE with 92 Compton–suppressed large volume HPGe detectors.

^{113}Cd Levels

E(level)†	Jπ	Comments
0.0	1/2+	
263.54‡ *3*	11/2–	E(level): from Adopted Levels, Gammas.
815.09‡ *20*	15/2–	
1657.0‡ *3*	19/2–	
2613.7‡ *5*	(23/2–)	
3448.8‡ *8*	(27/2–)	
4201.3‡ *12*	(31/2–)	

† From least–squares fit to Eγ's.
‡ (A): $\nu h_{11/2}$ sequence.

γ(^{113}Cd)

Eγ	E(level)	Iγ
551.5 *2*	815.09	100
752.5 *8*	4201.3	7.4 *8*
835.1 *6*	3448.8	14.6 *10*
841.9 *2*	1657.0	77 *5*
956.7 *4*	2613.7	20 *3*

$^{176}Yb(^{28}Si,F\gamma)$ 2000Bu06

E=145 MeV.
Measured: γ, γγ, γ(θ), eurogam2 array.

^{113}Cd Levels

E(level)†	Jπ
0.0	1/2+
263.0	11/2–
814.60‡ *20*	15/2–
1656.6‡ *3*	(19/2–)
2324.5§ *4*	(21/2+)
2538.3# *4*	(19/2+)
2613.4‡ *4*	(23/2–)
2757.8§ *4*	(25/2+)
2962.6# *4*	(23/2+)
3448.9‡ *4*	(27/2–)
3473.9§ *5*	(29/2+)
4201.5‡ *5*	(31/2–)

† From least–squares fit to Eγ's.
‡ (A): 11/2– band.
§ (B): band based on 23/2–.
\# (C): band 3.

γ(^{113}Cd)

Eγ†	E(level)	Iγ†
424.3 *2*	2962.6	100
433.3 *2*	2757.8	100
551.6 *2*	814.60	100
667.9 *2*	2324.5	100
716.1 *2*	3473.9	100
752.6 *2*	4201.5	
835.5 *2*	3448.9	100
842.0 *2*	1656.6	100
881.7 *2*	2538.3	100
956.8 *2*	2613.4	100

† ΔEγ assumed to be 0.2 keV by evaluator no Iγ given in the paper.

Adopted Levels, Gammas

Q(β$^-$)=–1036.6 *27*; S(n)=9445 *5*; S(p)=6080 *1*; Q(α)=–3074 *2* 2003Au03,2009AuZZ.

^{113}In Levels

Cross Reference (XREF) Flags

A ^{113}Cd β$^-$ Decay (8.04e15 Y)
B ^{113}Cd β$^-$ Decay (14.1 y)
C ^{113}In IT Decay (99.476 min)
D ^{113}Sn ε Decay (115.09 d)
E ^{113}Sn ε Decay (21.4 min)
F ^{110}Pd(^{7}Li,4nγ)
G ^{110}Pd(^{6}Li,3nγ)
H ^{112}Cd(^{3}He,d)
I ^{112}Cd(α,t)
J ^{113}Cd(p,nγ)
K ^{113}In(γ,γ')
L ^{113}In(d,d')
M ^{113}In(α,α')
N Coulomb Excitation
O Others:
^{114}Sn(d,^{3}He)
^{115}In(p,t)
^{116}Sn(p,α)
^{112}Cd(p,p) IAR
^{100}Mo(^{18}O,p4nγ)

E(level)[§]	Jπ[†]	XREF	$T_{1/2}$	Comments
0.0	9/2+	ABCDEFGHIJKL NO	stable	Q=+0.799 (1989Ra17). μ: μ=+5.5289 (1989Ra17), NMR. Q: atomic beam. Value includes pol correction. Jπ: atomic beam (1976Fu06), L(^{3}He,d)=4.
391.699 *3*	1/2–	CD GHIJK NO	99.476 min *23*	%IT=100; μ=–0.21074 *2* (1989Ra17). %IT: K–electron capture <0.0036% (1970De22). μ: atomic beam. Jπ: atomic beam (1976Fu06), M4 γ to 9/2+. $T_{1/2}$: From weighted average of 99.3 min *2* (1967Ok02), 99.2 min *6* (1969Va04), 99.48 min *3* (1970Go48), 99.48 min *8* (1970Le07), 99.8 min *2* (1970Ro29), 99.47 min *7* (1971Ha18), 99.2 min *6* (1971Oo01), 99.78 (18) (1971Em01), 102 M 2 (1975Bu24), 99.21 min *13* (1982HoZJ), 99.49 min *6* (1982RuZV), 99.45 min 7 (1984Iw06), and 99.6 min *3* (1987Ne01). In the Limited Relative Statistical Weight method, the uncertainty for the 1970Go48 value is increased from 0.03 to 0.0316 to reduce its relative weight from 53% to 50%. For either weighting, the results are the same, with the internal uncertainty of 0.022 and the reduced–χ^2=1.07. Since these data are consistent, the Rajeval and Normalized Residual methods give the same result. Others: 105 min *10* (1939Ba03), 104 min *2* (1940La07), 102 min *2* (1958Gi06), 114 min (1965Ca13), 102.4 min (1975Ku10), and 99.8 min *7* (1997We13).
646.830 *7*	3/2–	D GHIJ O		Jπ: L(^{3}He,d)=1, γ(θ) of 255γ in (p,nγ).
1024.28 *5*	5/2+	GHIJK NO	3.6 ps *3*	Jπ: L(^{3}He,d)=2, level excited in Coul. ex., E2 γ to 9/2+.
1029.65 *5*	1/2+,3/2+	D J	0.33 ns *3*	Jπ: 638γ is E1, 1/2+ preferred from syst. $T_{1/2}$: from ^{113}Cd(p,nγ).
1063.93 *6*	3/2+	HIJ	0.58 ns *3*	Jπ: L(^{3}He,d)=2, E1 γ to 1/2–. $T_{1/2}$: from ^{113}Cd(p,nγ).
1106.46 *7*	3/2–,5/2–	J		Jπ: M1,E2 γ to 1/2–, γ(θ) of 714γ in (p,nγ).
1131.48 *5*	5/2+	F HIJKL NO	0.97 ps *7*	Jπ: L(^{3}He,d)=2, level excited in Coul. ex., E2 γ to 9/2+. $T_{1/2}$: from ^{113}In Coul. ex.
1173.06 *9*	11/2+	FG JK MNO	60 fs *6*	Jπ: γ(θ) of 1173γ and 171γ in Coul. ex., L(p,t)=2 from 9/2+. $T_{1/2}$: from ^{113}In(γ,γ').
1191.12[#] *9*	7/2+	FGHIJ L O		Jπ: L(^{3}He,d)=4, M1 γ's to 5/2+.
1344.89 *10*	13/2+	FG J NO	0.33 ps *3*	Jπ: γ(θ) of E2 1344γ. $T_{1/2}$: from ^{113}In Coul. ex.
1351.01 *20*		J LM		
1380.79 *6*	1/2–,3/2–,5/2–	J		Jπ: E1 γ to 1/2+,3/2+ level.
1453.0 *3*		J		
1471.93 *8*	3/2–,5/2–,7/2–	G J		Jπ: M1,E2 γ to 3/2–, γ(θ) of 825γ in (p,nγ).
1496.39 *7*		J		
1504.0 *5*		JK		

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Adopted Levels, Gammas (continued)

^{113}In Levels (continued)

E(level)[§]	Jπ[†]	XREF	$T_{1/2}$	Comments
1509.01 *15*	7/2+,9/2+	G J L NO	≤0.2 ps	Jπ: γ(θ) of 1509γ in Coul. ex., L(p,t)=2, 7/2+ preferred in analogy with ^{115}In. $T_{1/2}$: from ^{113}In Coul. ex.
1535.96 *9*	1/2−,3/2−,5/2−	G J		Jπ: E1 γ to 3/2+.
1552.0 *4*		J M O		
1567.05 *9*	7/2+,9/2+	GHIJ NO	0.24 ps *10*	XREF: H(1571)I(1571)O(1569). Jπ: γ(θ) of 1567γ in Coul. ex., 9/2+ preferred in analogy with ^{115}In, L(^{3}He,d)=4. $T_{1/2}$: from ^{113}In Coul. ex.
1569.58 *7*	−	G J		Jπ: M1,E2 γ to 3/2−.
1618.95 *8*		J		
1630.57 *9*	(7/2+,9/2+)	G JK NO		Jπ: γ's to 5/2+,11/2+.
1634 *5*		HI L O		XREF: L(1648). Jπ: L(p,t)=(3) from 9/2+.
1675.49 *7*		J		
1684.17 *8*		J		
1688.62[#] *22*	11/2+	FG J O		Jπ: E2 γ to 7/2+.
1700 *5*	1/2+	H		Jπ: L(^{3}He,d)=0. E(level): probably not the same as 1706.99 level, since E(levels) from (^{3}He,d) in the range 393 to 1567 appear to be about 1–4 keV too high.
1707.38 *8*	+	J		Jπ: M1,E2 γ to 5/2+.
≈1758	9/2+	O		E(level): from (p,t). Jπ: L(p,t)=0+2 from 9/2+.
1760.27 *13*		J		
1768.07 *8*	3/2+,5/2+	HIJ L		XREF: H(1774)I(1774). Jπ: L(^{3}He,d)=2 at 1774 *8*.
1802.32 *8*		J		
1822.55 *10*	‡	J		
1835.72 *18*	1/2+	GH J		XREF: H(1831). Jπ: L(^{3}He,d)=0 at 1831.
1865.36 *21*	−	J		Jπ: M1,E2 γ to 3/2−,5/2− level.
1914.13 *9*		J		
1920.81 *9*		J		
1937.94 *9*		J O		
1947.64 *9*		J		
1980? *15*		L		
1999.15 *12*		J		
2032.76 *21*		J		
2039.72 *13*		J		
2048 *10*	7/2+,9/2+	HI		Jπ: L(^{3}He,d)=4.
2051.44 *8*		J		
2064.04 *21*		J		
2070.14 *13*		J		
≈2094?		O		E(level): from (p,t), possibly same as 2104 level. L(p,t)=(3).
2095.41 *7*		J		
2104 *10*	9/2−,11/2−	I		Jπ: L(α,t)=5, 11/2− preferred from shell-model syst.
≈2116?		L O		E(level): from (p,t), possibly same as 2104 level, 2120 level (d,d') could also correspond to 2104 or 2116 level, L(p,t)=(3).
2118.35 *18*		J		
2144.56 *11*		J		
2153 *10*	1/2+	H		Jπ: L(^{3}He,d)=0.
2164.9 *10*		G LM O		E(level): a level with L=3 observed in (α,α') at 2170 which gives parity=(−).
2170.32 *13*		J		
2180.8 *4*		J		
2183.26 *10*		J		
2190 *10*	3/2+,5/2+	H		Jπ: L(^{3}He,d)=2.
2224.8 *10*		G L O		
2233.6[@] *3*	(15/2−)	F O		Jπ: (E1) γ to 13/2+ and systematics.
2253.44 *9*		J O		

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Adopted Levels, Gammas (continued)

^{113}In Levels (continued)

E(level)[§]	Jπ[†]	XREF	Comments
2281.08 *17*		J	
2283.5 *3*	17/2+	FG L	E(level): 2283 level seems different from 2298 level because γ to 13/2+ limits Jπ to 9/2+.
2295.29 *13*		J	
2298 *10*	3/2+,5/2+	H	Jπ: L(^{3}He,d)=2.
2331.28 *21*		J	
2339.51 *16*		J	
2346 *10*	3/2+,5/2+	H	Jπ: L(^{3}He,d)=2.
2371.68 *11*		J O	
2376 *10*	9/2−,11/2−	I	Jπ: L(α,t)=5, 11/2− preferred from shell-model syst. E(level): a 2380 level (d,d') could be 2376, 2391, or 2396 level.
2378.22 *14*		J	
2383.86 *15*		J	
2389.0?[#] *4*	15/2+	F	
2391? *10*	3/2+,5/2+	H	Jπ: L(^{3}He,d)=2.
x+2396.15[a]	(15/2−)	O	E(level): Possible decays to 2395, 2232 and 1688 levels.
2396.9[@] *4*	(17/2−)	F O	
2442.4 *5*		F L O	
2475.33 *20*		G J M	
2515.6 *3*		J	
2540 *15*		L	
2557.06 *17*		J	
2559 *10*	9/2−,11/2−	I	Jπ: L(α,t)=5, 11/2− preferred from shell-model syst.
2560.64 *22*		J	
2586 *5*		O	E(level): from (p,α).
2654.1 *4*		FG	
2664.7[@] *4*	(19/2−)	FG	
2665.0 *4*		J	
2669.6[c] *3*	17/2+	F	
2728.04 *22*		J	
2783.88 *10*		J	
2785.8 *4*		FG	
2854.4[@] *4*	(21/2−)	FG O	
2880.9 *5*		F	
x+2903.9[a] *11*	(19/2−)	O	
2904.85 *25*		J	
3023.9[@] *5*	(23/2−)	FG O	
3051.1 *5*		F	
3071.5[&] *3*	(19/2+)	F O	
3120.1[&] *10*	(21/2+)	O	
3192.2[#] *5*	19/2+	F	
3211.9[&] *11*	(23/2+)	F O	
3250.2 *5*		F	
3280.7[@] *6*	(25/2−)	F O	
3305.8 *5*		F	
3350.8 *5*		F	
3395.2[&] *11*	(25/2+)	F O	
x+3476.0[a] *15*	(23/2−)	O	
3599.0 *5*		F	
3786.0[&] *11*	(27/2+)	F O	
3867.4 *6*		F	
3965.1[#] *6*	23/2+	F O	
3973.0[@] *6*	(27/2−)	F O	
x+4172.0[a] *18*	(27/2−)	O	
4375.4[&] *11*	(29/2+)	F O	
4430.7 *6*	(27/2−)	F	
4432.2 *6*		F	
4602.9[#] *6*	27/2+	F O	
4715.4[@] *6*	(29/2−)	F O	
4799.3 *6*		F	
x+4990.0[a] *20*	(31/2−)	O	
5060.1[&] *11*	(31/2+)	F O	
5125.3 *6*	−	F	Jπ: M1+E2 γ to (29/2−).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{113}In Levels (continued)

E(level)§	Jπ†	XREF	Comments
5310.9# *12*	(31/2+)	O	
5392.3@ *6*	(31/2−)	FO	
5447.0 *7*		F	
5730.0 *7*		F	
5788.3& *12*	(33/2+)	FO	
x+5918.0a *23*	(35/2−)	FO	
6226.9# *16*	(35/2+)	O	
6346.3& *15*	35/2(+)	O	
x+6946.7a *21*	(39/2−)	FO	
7287.9# *18*	(39/2+)	O	
x+8068a *3*	(43/2−)	O	
8434.9# *21*	(43/2+)	O	
x+9280a *3*	(47/2−)	O	
x+10574a *3*	(51/2−)	O	
x+11960a *3*	(55/2−)	O	
y			
12883		GO	IAS of 1/2+ ^{113}Cd g.s.
13190		G	IAS of 299-keV, (3/2+) ^{113}Cd excitation.
13427		G	IAS of 584-keV, 5/2+ ^{113}Cd excitation.
13541		G	IAS of 681-keV, (3/2+) ^{113}Cd excitation.
13748		G	IAS of 884-keV, 1/2+ ^{113}Cd excitation.
13867		G	IAS of 988-keV, 1/2+ ^{113}Cd excitation.
14074		G	
14389		G	
14488		G	
14683?		G	
15043		G	
15096?		G	
15141		G	
15335?		G	
15476		G	
15518		G	
15610?		G	
15639		G	
15684?		G	
15758		G	
15801?		G	
15880?		G	
15934?		G	
15971?		G	
16038		G	
16146		G	
16236		G	
16344?		G	
16503?		G	
16597		G	
y+5868.0b *10*		O	
y+6208.0b *14*		O	
y+6587.0b *17*		O	
y+6949.0b *20*		O	

† J for levels greater than 13738 were not adopted because most of these levels are questionable, see ^{112}Cd(p,p) IAR. Jπ without comments are tentative and based on γ multipolarities and band consideration.
‡ Jπ=1/2+ from L(^{3}He,d)=0 for E=1831 *5*.
§ From least-squares fit to γ energies.
# (A): ΔJ=2 intruder rotational band. Configuration=$\pi(g_{7/2},d_{5/2})\otimes\pi g_{9/2}^{-2}\otimes\nu h_{11/2}^{2}$.
@ (B): Dipole magnetic-rotational band 1.
& (C): Dipole magnetic-rotational band 2.
a (D): ΔJ=2 intruder rotational band. Configuration=$\pi h_{11/2}\otimes\pi g_{9/2}^{-2}\otimes\nu h_{11/2}^{2}$, at higher frequencies small alignment due to $g_{9/2}$ protons may be involved.
b (E): γ sequence.
c (F): γ sequence.

Adopted Levels, Gammas (continued)

γ(^{113}In)

E(level)	Eγ[†]	Iγ[‡]	Mult.[§]	δ	α	Comments
391.699	391.698 3	100	M4		0.551	B(M4)(W.u.)=8.31 9. Mult.,Eγ: from ^{113}In IT decay. A weak E5 admixture could not be excluded from α(K)exp (1985HaZA), not adopted.
646.830	255.134 10	100 3	M1+E2	0.7 6	0.046 6	Mult.,Eγ: from ^{113}In IT decay. δ: from ^{113}Sn ε decay (115.09 d).
	646.830 10	0.00018 9	[E3]		0.00865 13	Mult.,Eγ: from ^{113}Sn IT decay.
1024.28	377.59 10	10.3 5	[E1]		0.00449 7	B(E1)(W.u.)=0.000139 14.
	1024.30 10	100.0 7	E2[@]			B(E2)(W.u.)=3.9 4.
1029.65	382.90 8	6.7 3	[E1]		0.00433 6	B(E1)(W.u.)=9.8×10^{-7} 11.
	638.03 8	100 3	E1[#]			B(E1)(W.u.)=3.2×10^{-6} 4. Mult.: from ^{113}Cd(p,nγ). Eγ: from ^{113}Sn IT decay.
1063.93	416.9 1	2.0 5	[#]			
	672.4 2	100 5	E1[#]			B(E1)(W.u.)=1.61×10^{-6} 14.
1106.46	459.8 2	11.0 10	M1,E2[#]		0.00893 13	
	714.9 2	100 5	M1,E2[#]		0.00289 22	
1131.48	107.21 20	1.32 20	[M1,E2]		0.8 4	
	484.90 10	16.5 3	E1(+M2)[@]	−0.03 5	0.00245 14	B(E1)(W.u.)=(0.00037 3); B(M2)(W.u.)=(6 +22−6). δ: from B(E2) (see Coul. ex.) and T$_{1/2}$.
	1131.5 1	100.0 6	E2[@]			B(E2)(W.u.)=8.2 6.
1173.06	1173.1 1	100	M1+E2[#]	0.47 5		B(E2)(W.u.)=24 5; B(M1)(W.u.)=0.186 20. δ: from B(E2) (see Coul. ex.) and T$_{1/2}$.
1191.12	167.1 3	2.2 4	M1(+E2)[#]	<0.89	0.15 3	δ: from Coul. ex.
	1191.1 1	100 4	M1,E2[#]		0.00091 8	
1344.89	171.4 7	2.14 10	M1+E2[@]	+0.03 3	0.1147 21	B(E2)(W.u.)=7 +14−7; B(M1)(W.u.)=0.28 3.
	1344.89 10	100 2	E2[@]			B(E2)(W.u.)=11.7 12.
1351.01	1351.0 2	100				
1380.79	316.7 1	77 4				
	351.4 1	100 5	E1[#]		0.00539 8	
	734.1 2	12.3 18				
	989.0 1	36.8 18				
1453.0	1453.0 3	100				
1471.93	825.01 10	100 45	M1,E2[#]		0.00206 18	
	1080.1 2	45 4				
1496.39	472.1 1	100 5				
	1496.4 1	10.0 25				
1504.0	1504.0 5	100				
1509.01	377.8 10	7 3				
	1509.04 19	100 3				
1535.96	345.0 3	15.0 25				
	429.5 2	15.0 25				
	472.1 1	100 5	E1[#]		0.00259 4	
	889.3 10					
	1144.5 4	17.5 25	M1,E2[#]		0.00099 9	
1552.0	1552.0 4	100				
1567.05	394.0 5	14.2 10	[M1,E2]		0.0137 7	
	1567.0 1	100 1	[M1,E2]		0.00061 3	
1569.58	922.71 10	100 6	M1,E2[#]		0.00159 14	
	1177.8 1	31 4	[#]			
1618.95	972.1 1	22 2				
	1619.0 2	100 10				
1630.57	457.7 2	35 6				
	606.4 3	76 5				
	1630.5 1	100 4				
1675.49	544.0 1	30.1 14				
	651.1 3	8.2 14				
	1675.5 1	100 6				
1684.17	1037.6 1	100				
1688.62	497.5 2	100	E2[#]		0.00712 10	
1707.38	576.0 1	81 6	M1,E2[#]		0.00494 24	
	677.5 5	44 3	[#]			

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{113}In) (continued)

E(level)	Eγ[†]	Iγ[‡]	Mult.[§]	α
1707.38	683.2 *2*	100 *6*	M1,E2[#]	0.00323 *23*
	1060.4 *10*			
	1315.3 *2*	25 *3*		
1760.27	587.2 *1*	100		
1768.07	738.4 *1*	19.6 *18*		
	743.8 *1*	100 *5*		
1802.32	266.8 *2*	15.4 *19*		
	330.2 *2*	3.8 *19*		
	696.0 *2*	30.8 *19*		
	1155.5 *4*	5.8 *19*		
	1802.2 *1*	100 *6*		
1822.55	792.9 *1*	100 *4*		
	1430.8 *2*	6.7 *22*		
1835.72	160.3 *4*	17 *4*		
	326.7 *1*	100 *4*		
1865.36	758.9 *2*	100	M1,E2[#]	0.00251 *20*
1914.13	347.0 *3*	2.9 *19*		
	782.9 *2*	8.6 *10*		
	889.8 *1*	100 *5*		
1920.81	789.3 *2*	21.7 *22*		
	856.6 *2*	34.8 *22*		
	896.6 *1*	100 *4*		
1937.94	831.3 *8*	3.1 *15*		
	1291.1 *1*	100 *6*		
	1546.3 *3*	12.3 *15*		
1947.64	841.2 *5*	33 *4*		
	1300.8 *1*	100 *7*		
	1555.9 *3*	15 *4*		
1999.15	291.8 *1*	100 *7*		
	808.0 *3*	36 *7*		
	1352.0 *4*	29 *7*		
2032.76	1003.1 *2*	100		
2039.72	848.6 *1*	100		
2051.44	945.0 *1*	100 *8*		
	2051.4 *1*	33 *8*		
2064.04	1000.1 *2*	100		
2070.14	598.1 *2*	100 *5*		
	689.5 *2*	18.9 *13*		
	1040.5 *5*	6.8 *14*		
	1423.2 *3*	8.1 *14*		
2095.41	388.1 *3*	8 *3*		
	411.5 *1*	39 *3*		
	528.1 *3*	14 *3*		
	963.7 *2*	42 *6*		
	2095.2 *1*	100 *6*		
2118.35	548.7 *2*	9.5 *16*		
	609.5 *3*	100 *6*		
2144.56	1114.9 *1*	100		
2164.9	991.8	100		
2170.32	979.2 *1*	100		
2180.8	835.9 *4*	100		
2183.26	613.3 *2*	24 *6*		
	711.0 *3*	18 *6*		
	1052.1 *2*	100 *6*		
	1076.5 *3*	47 *6*		
	1159.5 *2*	53 *6*		
	1536.0 *3*	88 *6*		
2224.8	1051.7	100		
2233.6	888.7 *3*	100	(E1)	
2253.44	1147.1 *4*	17 *4*		
	1606.6 *1*	91 *4*		
	1861.7 *2*	100 *9*		
2281.08	1149.8 *3*	19 *9*		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{113}In) (continued)

E(level)	Eγ[†]	Iγ[‡]	Mult.[§]	α
2281.08	1256.7 *2*	100 *6*		
2283.5	938.7 *3*	100	E2	
2295.29	1164.3 *3*	60 *10*		
	1648.6 *2*	100 *10*		
	1903.2 *2*	90 *10*		
2331.28	1307.0 *2*	100		
2339.51	1233.1 *2*	100 *5*		
	1692.6 *3*	36 *5*		
	1947.6 *5*	18 *5*		
2371.68	1347.4 *1*	100		
2378.22	759.3 *2*	100 *12*		
	1271.9 *2*	56 *4*		
	1731.0 *3*	32 *4*		
2383.86	1359.6 *2*	42 *7*		
	1737.0 *3*	14 *7*		
	1992.1 *3*	100 *7*		
2389.0?	700.4 *3*	100	E2	0.00282 *4*
2396.9	163.3 *3*	100		
2442.4	1097.9	100		
2475.33	1451.0 *2*	100 *8*		
	2476.3 *10*			
2515.6	1409.1 *3*	100		
2557.06	1532.8 *3*	100 *11*		
	1910.2 *2*	56 *11*		
2560.64	646.5 *2*	100		
2654.1	211.7[&] *3*	40 *5*		
	420.4 *3*	100 *10*		
2664.7	267.7 *3*	100		
2665.0	1034.4 *4*	100		
2669.6	1324.6 *3*	100	E2	
2728.04	813.9 *2*	100		
2783.88	1759.6 *1*	100 *6*		
	2137.0 *2*	22 *3*		
2785.8	131.8 *3*	52.4 *16*		
	388.9 *3*	100 *3*		
2854.4	68.6 *3*	100		
	189.7 *3*	100	(M1,E2)	0.12 *4*
2880.9	483.9 *3*	100		
x+2903.9	507			
2904.85	1136.5 *5*	67 *17*		
	1274.4 *4*	100 *17*		
	1773.4 *4*	83 *17*		
3023.9	169.5 *3*	100	(M1,E2)	0.18 *6*
3051.1	170.2 *3*	100		
	386.5 *3*	100		
3071.5	401.8 *3*	56 *2*	(M1,E2)	0.0129 *6*
	788.2 *3*	100 *3*	(M1,E2)	0.00229 *19*
3120.1	839 *1*			
3192.2	803.2 *3*	100	E2	0.00201 *3*
3211.9	91.8 *3*	100	(M1,E2)	1.4 *8*
3250.2	199.1 *3*	100		
	395.8 *3*	100		
3280.7	256.9 *3*	100	(M1,E2)	0.048 *9*
3305.8	641.1 *3*	100		
3350.8	686.1 *3*	100		
3395.2	183.3 *3*	100	(M1,E2)	0.14 *5*
x+3476.0	572			
3599.0	744.6 *3*	100		
3786.0	390.9 *3*	100	(M1,E2)	0.0140 *7*
3867.4	617.2 *3*	100		
3965.1	772.9 *3*	100	E2	0.00221 *4*
3973.0	692.6 *3*	100	(M1,E2)	0.00312 *23*
x+4172.0	696 *1*			

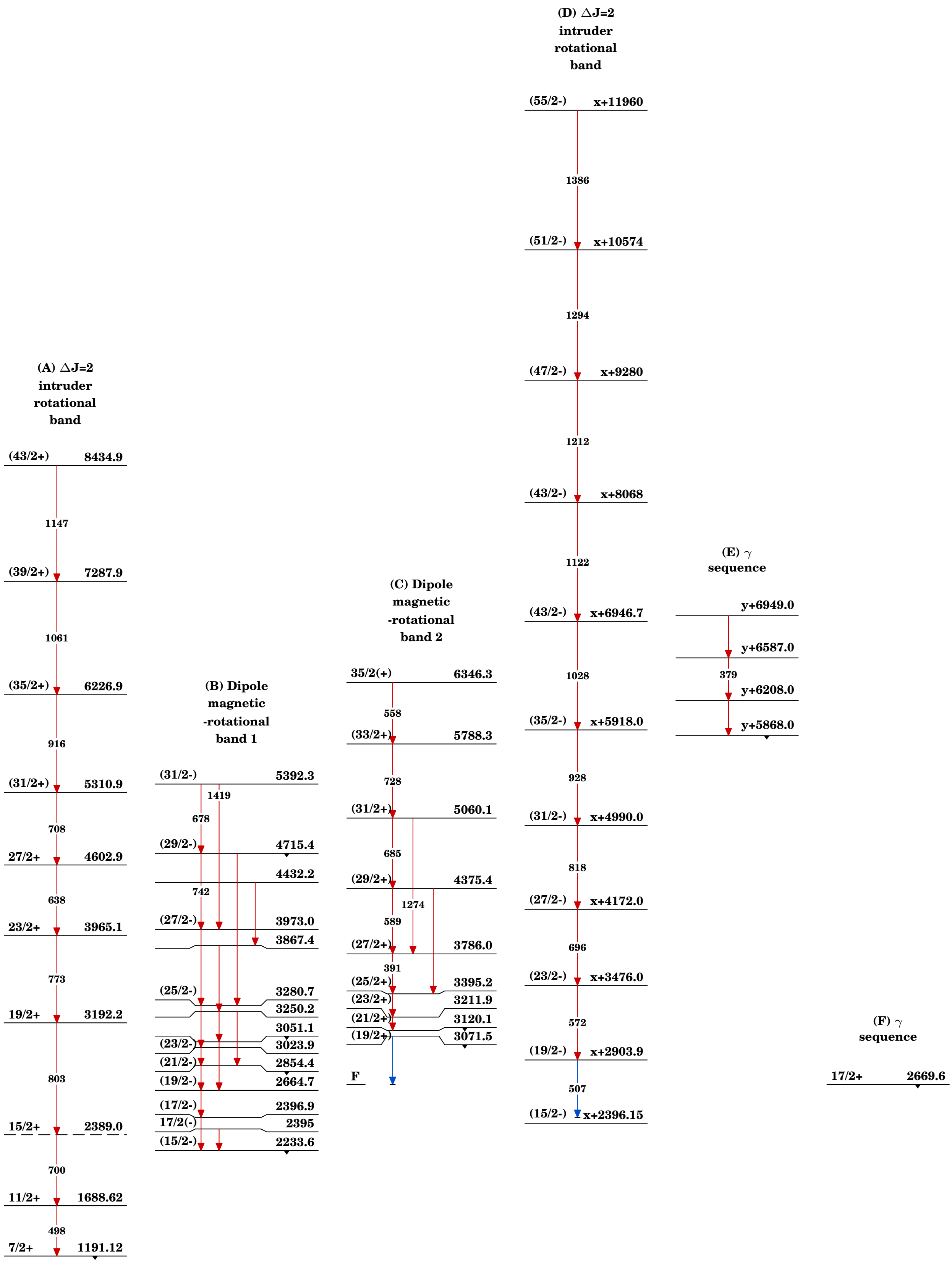
Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{113}In) (continued)

E(level)	Eγ†	Iγ‡	Mult.§	α
4375.4	589.4 *3*	100 *3*	(M1,E2)	0.00466 *24*
	980.2 *3*	<14	(E2)	
4430.7	1406.7 *3*	100	E2	
4432.2	564.8 *3*			
4602.9	637.8 *3*	100	(E2)	0.00360 *5*
4715.4	284.5 *3*	100	(M1,E2)	0.035 *6*
	742.40 *3*	78 *6*	(M1,E2)	0.00264 *21*
	1434.9 *3*	100 *9*	E2	
4799.3	826.30 *3*	<71		
	1518.3 *3*	100 *21*		
x+4990.0	818			
5060.1	684.6 *3*	100	(M1,E2)	0.00321 *23*
	1274.2 *3*	<10		
5125.3	326.2 *3*	<40		
	409.7 *3*	100 *8*	(M1,E2)	0.0123 *5*
5310.9	708 *1*	100		
5392.3	677.7 *3*	100 *12*	(M1,E2)	0.00329 *23*
	1418.6 *3*	82 *17*	(E2)	
5447.0	731.6 *3*	100		
5730.0	1014.6 *3*	100		
5788.3	728.2 *3*	100	(M1,E2)	0.00277 *21*
x+5918.0	928.4 *3*	100	(E2)	
6226.9	916 *1*	100		
6346.3	558			
x+6946.7	1028.3 *6*	100	(E2)	
7287.9	1061 *1*	100		
x+8068	1122			
8434.9	1147 *1*	100		
x+9280	1212			
x+10574	1294			
x+11960	1386			
y+5868.0	474			
y+6208.0	340			
y+6587.0	379			
y+6949.0	362			

† From ^{113}Cd(p,nγ), except as noted and when possible.
‡ Relative branchings are given.
§ From DCO ratios in ^{110}Pd(^{7}Li,4n).
# From α(K)exp in ^{113}Cd(p,nγ).
@ Mult and δ from ^{113}In Coul. ex.
& Placement of transition in the level scheme is uncertain.


(A) △J=2
intruder
rotational
band
(43/2+) 8434.9
1147
(39/2+) 7287.9
1061
(35/2+) 6226.9
916
(31/2+) 5310.9
708
27/2+ 4602.9
638
23/2+ 3965.1
773
19/2+ 3192.2
803
15/2+ 2389.0
700
11/2+ 1688.62
498
7/2+ 1191.12
(B) Dipole
magnetic
-rotational
band 1
(31/2-) 5392.3
1419
678
(29/2-) 4715.4
4432.2
742
(27/2-) 3973.0
3867.4
(25/2-) 3280.7
3250.2
3051.1
(23/2-) 3023.9
(21/2-) 2854.4
(19/2-) 2664.7
(17/2-) 2396.9
17/2(-) 2395
(15/2-) 2233.6
(C) Dipole
magnetic
-rotational
band 2
35/2(+) 6346.3
558
(33/2+) 5788.3
728
(31/2+) 5060.1
685
(29/2+) 4375.4
1274
589
(27/2+) 3786.0
391
(25/2+) 3395.2
(23/2+) 3211.9
(21/2+) 3120.1
(19/2+) 3071.5
F
(D) △J=2
intruder
rotational
band
(55/2-) x+11960
1386
(51/2-) x+10574
1294
(47/2-) x+9280
1212
(43/2-) x+8068
1122
(43/2-) x+6946.7
1028
(35/2-) x+5918.0
928
(31/2-) x+4990.0
818
(27/2-) x+4172.0
696
(23/2-) x+3476.0
572
(19/2-) x+2903.9
507
(15/2-) x+2396.15
(E) γ
sequence
y+6949.0
y+6587.0
379
y+6208.0
y+5868.0
(F) γ
sequence
17/2+ 2669.6

$^{113}_{49}In_{64}$

^{113}Cd β^- Decay (8.04e15 Y) 2007Be61

Parent ^{113}Cd: E=0; Jπ=1/2+; $T_{1/2}$=8.04×10^{15} y *5*; Q(g.s.)=322 *1*; %β^- decay=100.
^{113}Cd–$T_{1/2}$: from measurement by 2007Be61.
^{113}Cd measured in $CdWO_4$ crystal at Gran Sasso National Lab of INFN. Measured half–life of ^{113}Cd using the low–background $CdWO_4$ crystal scintillator of mass 434g.
1996Da11: measured scintillation crystals of CDW04.
1970Gr20: measured β^- activity of enriched and natural cadmium samples.
Others: 1962Wa15, 1969De25, 1994Al49.

^{113}In Levels

E(level)	Jπ
0.0	9/2+

β^- radiations

log *ft* deduced by the evaluator.

Eβ^-	E(level)	Iβ^-†	Log *ft*	Comments
(322.0 *10*)	0.0	100	23.127 *14*	Eβ^-: 1996Da11 give endpoint energy=337.4 keV with error of 0.3 (statistical) and 22 (syst).

† Absolute intensity per 100 decays.

^{113}Cd β^- Decay (14.1 y) 1969De25

Parent ^{113}Cd: E=263.7 *3*; Jπ=11/2–; $T_{1/2}$=14.1 y *5*; Q(g.s.)=322 *1*; %β^- decay=99.86.
Measured Eβ, βγ coin. No βγ coin were observed, 1969De25.

^{113}In Levels

E(level)	Jπ	$T_{1/2}$†
0.0	9/2+	stable

† From adopted levels.

β^- radiations

Eβ^-	E(level)	Iβ^-†	Log *ft*	Comments
580 *4*	0.0	99.977	9.25 *5*	av Eβ=185.4 *19*.

† Absolute intensity per 100 decays.

^{113}In IT Decay (99.476 min) 1971Ha18

Parent ^{113}In: E=391.691 *8*; Jπ=1/2–; $T_{1/2}$=99.476 min *23*; %IT decay=100.
^{113}In–%IT decay: From the presence of Cd K x rays from a ^{113}In (99 min) source, 1970Ra05 (and 1969RaZP) reported ε decay of this level with I_ε= 0.07% *1*. Such a transition to ^{113}Cd would be 1st forbidden, 1/2– to 1/2+, and would have a log *ft* of 5.1. which is possible but unlikely since the log *ft* systematics (1998Si17) indicate that is the lower limit of the observed values. Also, 1970De22 (see also 1969De25) repeated the experiment and placed a limit of <0.0036% on this ε transition for which the log *ft* is >6.5. Such an electron capture branch is therefore negligible and has not been included in this scheme.
Evaluation by M.–M. Be, March 1999 This evaluation was done as part of a collaboration of evaluators from Laboratoire National Henri Becquerel (LNHB) in France; Physikalisch–Technische Bundesanstalt (PTB) in Germany; HMS Sultan and AEA Technology in the United Kingdom; Khlopin Radium Institute (KRI) in Russia; Centro de Investigaciones Energeticas, Medioambientales, y Tecnologicas (CIEMAT) and Universidad Nacional a Distancia (UNED) in Spain; and Brookhaven National Laboratory (BNL), Lawrence Berkeley National Laboratory (LBNL), and Idaho National Engineering and Environmental Laboratory (INEEL) in the United States.
Measured Ice, Ice(K) from (ce)(K x ray)–coin, Iγ, 1971Ha18.

^{113}In IT Decay (99.476 min) 1971Ha18 (continued)

^{113}In Levels

E(level)	Jπ	$T_{1/2}$†
0.0	9/2+	stable
391.699 *3*	1/2−	1.6579 h *4*

† See ^{113}In Adopted Levels.

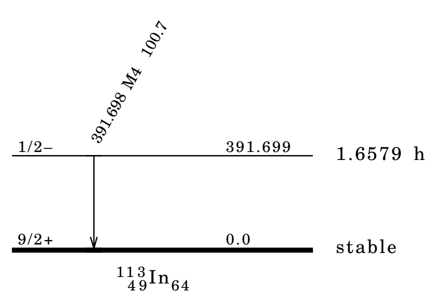
γ(^{113}In)

Eγ	E(level)	Iγ†	Mult.	α	Comments
391.698 *3*	391.699	64.94 *17*	M4	0.551	B(M4)(W.u.)=8.31 *9*. Eγ: from 2000He14 evaluation. Iγ: From Iγ(391)=[100.0 − I(γ+ce)(646)] / [1 + α(391)]; the uncertainty is all from the 0.26% uncertainty in (1 + α). Mult.: from α(K)exp=0.437 *7*, α(exp)=0.540 *7*, α(K)exp/α(L+...)exp=4.21 *8* (1971Ha18); α(L)exp/α(M)exp, α(L)exp/α(n)exp, α(M)exp/α(n)exp (1972Ko38). Others: 1970Go48, 1970Le07, 1971GoYM, 1985HaZA. α: α and α_K are from 1985HaZA evaluation of measured values; these values average 3% lower than the theoretical values of 1978Ro21. The α_L and α_M were then computed as 3% lower than the corresponding theoretical values.

† Absolute intensity per 100 decays.

Decay Scheme

Intensity: I(γ+ce) per
100 parent decays
%IT=100



^{113}Sn ε Decay (115.09 d)

Parent ^{113}Sn: E=0; Jπ=1/2+; $T_{1/2}$=115.09 d *3*; Q(g.s.)=1036.6 *27*; %ε+%β$^+$ decay=100.

^{113}Sn–J: From 1998Bl04 evaluation.

^{113}Sn–$T_{1/2}$: 115.09 d *3* from weighted average of 115.2 d *8* (1972Em01), 115.07 d 10 (1972La14), 115.09 d *4* (1980Ho17), 115.12 d *13* (1982RuZV), and 115.08 d *8* (1992Un01). The reduced–χ^2=0.03. Because this set of values is consistent, the Limited Relative Statistical Weight method does not increase the uncertainty for the 1980Ho17 value even though it contributes 66% of the relative weight. If the 1980Ho17 uncertainty were increased from 0.04 to 0.056 in order decrease its relative weight to 50%, the weighted average average would still be 115.09 with an uncertainty of 0.04. The very small reduced–χ^2 value suggests that the reported uncertainties are overestimated. It also means that the Rajeval and Normalized Residual methods give the same result. Others: 107 d (1959Bu08) and 115.06 d *7* (1982HoZJ, replaced by 1992Un01).

In addition to the 3 excited levels populated in this decay scheme, there is a level below the decay energy in ^{113}In at 1024 (Jπ=5/2+). The β$^-$ decay to this level will be negligible.

Decay data evaluated by R. γ. Helmer, August 1996 with minor editing done in July 1998. This evaluation was done under the collaboration which includes evaluators from Laboratoire Primaire des Rayonnments Ionisants (LPRI) in France; Physikalisch–Technische Bundesanstalt (PTB) in Germany; Imperial College in the United Kingdom; and Brookhaven National Laboratory (BNL), Lawrence Berkeley National Laboratory (LBNL), and Idaho National Engineering Laboratory (INEL) in the United States. This evaluation was reviewed and accepted by evaluators in this collaboration.

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^{113}Sn ε Decay (115.09 d) (continued)

The main γ ray of 391 keV depopulates a level with a $T_{1/2}$ of 99 min, so the ratio of its emission rate to the ^{113}Sn decay rate will vary with time. After a sufficient time, about five half–lives for the level, the ratio of the ^{113}In (99 min) and ^{113}Sn activities remains constant and is $T_{1/2}(^{113}Sn)/[T_{1/2}(^{113}Sn)-T_{1/2}(113min)]=1.0006$.

The total average radiation energy released by 113Sn is 1035.5 keV *5* (calculated by evaluators using the computer program radlst). This value agrees remarkably well with Q(ε)=1036.6 keV *27* (2003Au03) and confirms the quality of the decay scheme.

^{113}In Levels

E(level)	Jπ†	$T_{1/2}$	Comments
0.0	9/2+	stable	
391.699 *3*	1/2−	99.476 min *23*	$T_{1/2}$: From weighted average of 99.3 min *2* (1967Ok02), 99.2 min *6* (1969Va04), 99.48 min *3* (1970Go48), 99.48 min *8* (1970Le07), 99.8 min *2* (1970Ro29), 99.47 min *7* (1971Ha18), 99.2 min *6* (1971Oo01), 99.78 (18) (1971Em01), 102 M 2 (1975Bu24), 99.21 min *13* (1982HoZJ), 99.49 min *6* (1982RuZV), 99.45 min 7 (1984Iw06), and 99.6 min *3* (1987Ne01). In the Limited Relative Statistical Weight method, the uncertainty for the 1970Go48 value is increased from 0.03 to 0.0316 to reduce its relative weight from 53% to 50%. For either weighting, the results are the same, with the internal uncertainty of 0.022 and the reduced−χ^2=1.07. Since these data are consistent, the Rajeval and Normalized Residual methods give the same result. Others: 105 min *10* (1939Ba03), 104 min *2* (1940La07), 102 min *2* (1958Gi06), 114 min (1965Ca13), 102.4 min (1975Ku10), and 99.8 min *7* (1997We13). From the presence of Cd K x rays from a ^{113}In (99 min) source, 1970Ra05 (and 1969RaZP) reported ε decay of this level with I(ε)=0.07% *1*. Such a transition to ^{113}Cd would be 1st forbidden, 1/2− to 1/2+, and would have a log *ft* of 5.1. This ε intensity is unlikely since the log *ft* systematics (1973Ra10) indicate that such transitions have log *ft*'s of >5.9. Also, 1970De22 (see also 1969De25) repeated the experiment and placed a limit of <0.0036% on this ε transition for which the log *ft* is >6.5. Such an electron capture branch is therefore negligible and has not been included in this scheme.
646.833 *10*	3/2−		
1029.73 *8*	1/2+,3/2+	0.33 ns *3*	$T_{1/2}$: From Adopted Level data in 1998Bl04 evaluation.

† From 1998Bl04 evaluation.

β^+,ε Data

The electron–capture decay from the 1/2+ parent to the ground state (9/2+) is 4th forbidden. From log *ft* systematics (1973Ra10), one expects this log *ft* value to be ≥22, with a corresponding I(ε)≤ $1.\times10^{-12}$%. For the unpopulated level at 1024 keV, the decay is 2nd forbidden, with an expected log *ft* value of >11.0. The corresponding I(ε) is <$2.\times10^{-7}$%; so this branch is also completely negligible.

εK,εL,εM Calculated from tables of 1995ScZY.

Eε	E(level)	Iε†	Log *ft*	I(ε+β⁺)†
(7 *3*)	1029.73	0.00103 *4*	6.5 *8*	0.00103 *4*
(390 *3*)	646.833	2.21 *8*	8.20 *2*	2.21 *8*
(645 *3*)	391.699	97.79 *8*	7.010 *4*	97.79 *8*

† Absolute intensity per 100 decays.

γ(^{113}In)

Eγ	E(level)	Iγ†‡#	Mult.§	δ§	α	Comments
255.134 *10*	646.833	2.11 *8*	M1+E2	0.7 *6*	0.046 *6*	Eγ: Based on value of 255.126 *10* (1973In06) scaled by the evaluator by the ratio Eγ(391,here)/Eγ(391,1973In06). Iγ: From Iγ(255)/Iγ(392)=0.0325 *12* from Limited Relative Statistical Weight analysis of 0.0333 *13* (1973In06), 0.0285 *9* (1978He08), 0.0337 8 (1993Mu14), and 0.0327 *8* (1994DeZX). Others: 0.030 *3* (1958Gi06), 0.027 *2* (1959Bu08), 0.028 *1* (1961Gr11), 0.029 *3* (1967Bo18), 0.0322 (1968Fo07), and 0.0285 *7* (1976De35 from same data as 1978He08).

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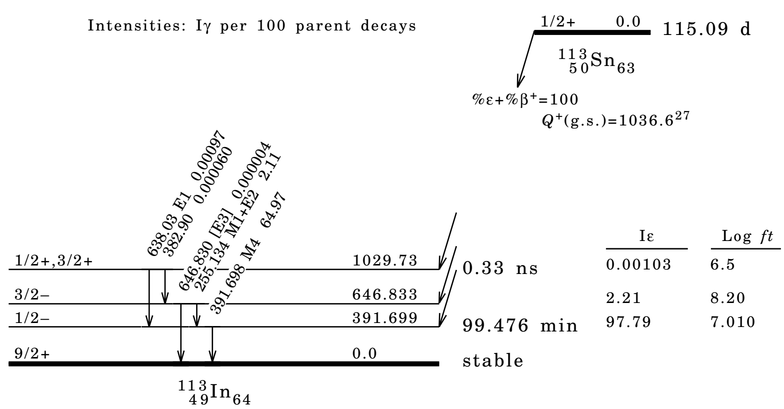
^{113}Sn ε Decay (115.09 d) (continued)

γ(^{113}In) (continued)

Eγ	E(level)	Iγ†‡#	Mult.§	α	Comments
382.90 *8*	1029.73	0.000060 *3*			Eγ: Calculated from level energies; γ not observed in this decay. Iγ: From Iγ(382)/Iγ(638)=6.2/100 from Adopted γ data in 1998Bl04 evaluation and based on observed decay of this level in ^{113}Cd(p,nγ) (1976Di03,1974Ki02).
391.698 *3*	391.699	64.97 *17*	M4	0.551	B(M4)(W.u.)=8.31 *9*. Eγ: From 1997HeZZ. Iγ: From Iγ(391)=[100.0 − I(γ+ce)(646)] / [1 + α(391)]; the uncertainty is all from the 0.26% uncertainty in (1 + α). α: α(K) and α are from 1985HaZA evaluation of measured values; these values average 3% lower than the theoretical values of 1978Ro21. The α(L) and α(M) were then computed as 3% lower than the corresponding theoretical values.
638.03 *8*	1029.73	0.00097 *4*	E1		B(E1)(W.u.)=3.2×10^{-6} *4*. Eγ,Iγ: From 1978He08. Mult.: from ^{113}Cd(p,nγ). α: Theoretical value from 1968Ha54.
646.830 *10*	646.833	4×10^{-6} *2*	[E3]	0.00865 *13*	Eγ: Calculated from level energy. Iγ: From 1978He08.

† Values are with ^{113}In in equilibrium (i.e., at long decay times).
‡ I(Kα_2 x ray)=27.85 *22*, I(Kα_1 x ray)=52.2 *4*, I(Kβ x ray)=17.44 *14* calculated by radlst.
§ From 1998Bl04 evaluation.
# Absolute intensity per 100 decays.

Decay Scheme



^{113}Sn ε Decay (21.4 min) 1961Sc12

Parent ^{113}Sn: E=77.38 *2*; Jπ=7/2+; $T_{1/2}$=21.4 min *4*; Q(g.s.)=1036.6 *27*; %ε+%β$^+$ decay=8.9 *23*.
Measured I(K x ray), 1961Sc12.

^{113}In Levels

E(level)	Jπ	$T_{1/2}$†
0.0	9/2+	stable

† From adopted levels.

^{113}Sn ε Decay (21.4 min) 1961Sc12 (continued)

β^+,ε Data

Eε	E(level)	Iε†	Log *ft*	I(ε+β+)†
(1114 *3*)	0.0	100 *25*	4.65 *16*	100 *25*

† For intensity per 100 decays, multiply by 0.089 *23*.

^{100}Mo(^{18}O,p4nγ) 2005Na37

Includes ^{110}Pd(^{7}Li,4nγ) also from 2005Na37.

^{100}Mo(^{18}O,p4nγ): E=95 MeV. Measured Eγ, Iγ, γγ, pγ coin, γγ(θ) (DCO) with the 8π spectrometer of 20 Compton–suppressed HPGe detectors and a 4π spherical shell consisting of 71 BGO detectors along with a 96–element CsI charged particle detector array.

^{110}Pd(^{7}Li,4nγ): E=36 MeV. Measured Eγ, Iγ, γγ with an array of five Compton–suppressed HPGe detectors.

^{113}In Levels

E(level)	Jπ	E(level)	Jπ	E(level)	Jπ
0.0	9/2+	3191†	19/2+	5916+x#	(35/2−)
1173	11/2+	3213§	23/2(+)	6226†	(35/2+)
1191†	7/2+	3277‡	25/2(−)	6346§	35/2(+)
1344	13/2+	3396§	25/2(+)	6944+x#	(39/2−)
1688†	11/2+	3474+x#	(23/2−)	7287†	(39/2+)
2232‡	15/2(−)	3787§	27/2(+)	8066+x#	(43/2−)
2282	17/2+	3964†	23/2+	8434†	(43/2+)
2388†	15/2+	3969‡	27/2(−)	9278+x#	(47/2−)
2395‡	17/2(−)	4170+x#	(27/2−)	10572+x#	(51/2−)
2395+x#&	(15/2−)	4376§	29/2(+)	11958+x#	(55/2−)
2662‡	19/2(−)	4602†	27/2+	y@a	
2668	17/2+	4711‡	29/2(−)	y+474@	
2851‡	21/2(−)	4988+x#	(31/2−)	y+814@	
2902+x#	(19/2−)	5061§	31/2(+)	y+1193@	
3020‡	23/2(−)	5310†	(31/2+)	y+1555@	
3069§	19/2+	5388‡	31/2(−)		
3121§	21/2+	5788§	33/2(+)		

† (A): ΔJ=2 intruder rotational band. Configuration=$\pi(g_{7/2},d_{5/2})\otimes\pi g_{9/2}^{-2}\otimes\nu h_{11/2}^{2}$.
‡ (B): Dipole magnetic–rotational band #1.
§ (C): Dipole magnetic–rotational band #2.
# (D): ΔJ=2 intruder rotational band. Configuration=$\pi h_{11/2}\otimes\pi g_{9/2}^{-2}\otimes\nu h_{11/2}^{2}$, at higher frequencies small alignment due to $g_{9/2}$ protons may be involved.
@ (E): γ sequence.
& Possible decays to 2395, 2232 and 1688 levels.
a From level scheme of figure 1 in 2005Na37, y ≈ 6 MeV.

γ(^{113}In)

Eγ	E(level)	Eγ	E(level)	Eγ	E(level)	Eγ	E(level)
92	3213	474	y+474	727	5788	1122	8066+x
163	2395	497	1688	742	4711	1147	8434
169	3020	507	2902+x	773	3964	1173	1173
171	1344	558	6346	788	3069	1191	1191
183	3396	572	3474+x	803	3191	1212	9278+x
189	2851	589	4376	818	4988+x	1294	10572+x
257	3277	638	4602	839	3121	1324	2668
267	2662	677	5388	888	2232	1344	1344
340	y+814	685	5061	916	6226	1386	11958+x
362	y+1555	692	3969	928	5916+x	1419	5388
379	y+1193	696	4170+x	938	2282	1434	4711
391	3787	700	2388	1028	6944+x		
401	3069	708	5310	1061	7287		

$^{110}Pd(^{6}Li,3n\gamma)$ 1976TuZX

E=24 MeV. Measured Eγ, Iγ, γγ–coin, γ(θ), 1976TuZX.
For information on coin relations for unplaced γ's, see 1976TuZX.

^{113}In Levels

E(level)	Jπ†	$T_{1/2}$‡	E(level)	Jπ†	E(level)	Jπ†
0.0	9/2+	stable	1566.7		2389.7§	(13/2+)
391.7	1/2−	1.6582 h *6*	1570.7		2396.4	(17/2−)
646.9	3/2−		1630.7		2442.3	(11/2,15/2)
1024.2	5/2+		1688.8§	(11/2+)	2466.7	
1131.7	5/2+		1836.2		2654.2	(17/2)
1173.0	11/2+		2164.8		2664.0	(19/2−)
1191.3§	(7/2+)		2224.7		2786.2	(19/2)
1344.4	13/2+		2233.1	(15/2−)	2853.6	(21/2−)
1472.9			2264.1	(11/2,15/2)	3023.2	(23/2−)
1509.5			2282.7	(17/2+)		
1536.2?			2358.8?	(15/2+)		

† Jπ for levels below 1400 keV are from adopted levels. Jπ for higher levels are suggested on the basis of directional correlation of oriented nuclei.
‡ From adopted levels.
§ (A): Suggested members of rotational band with Nilsson Orbit 1/2+(431).

γ(^{113}In)

Eγ	E(level)	Iγ†	Eγ	E(level)	Iγ†	Eγ	E(level)	Iγ†
x91			377.3	1024.2	2.1	923.8	1570.7	1.0
x123.0			391.7	391.7		938.3	2282.7	20.5
132.0	2786.2	2.3	x414			991.8	2164.8	4.9
163.3	2396.4	18.0	421.1	2654.2	3.8	1024.2	1024.2	21
169.6	3023.2	5.9	484.8	1131.7	1.5	1051.7	2224.7	6.2
171.4	1344.4	2.1	497.5	1688.8	20.4	1097.9	2442.3	7.4
184.0	2466.7	4.6	670.0§	2358.8?	3.1	1131.7	1131.7	10
189.5	2853.6	9.8	x673.5			1173.0	1173.0	53.4
x198.7			700.9	2389.7	18.0	1191.3	1191.3	36.4
212§	2654.2	3.0	826.0	1472.9	1.7	1344.4	1344.4	100
255.3	646.9	17.6	888.7	2233.1	39.5	1509.5	1509.5	7.9
267.7	2664.0	14.7	889.3‡§	1536.2?	3.5	1566.7	1566.7	9
326.7	1836.2	4.7	919.7	2264.1	8.1	1630.7	1630.7	8

† Measured at 55°.
‡ From coin data in ^{113}Cd(p,nγ), this γ deexcites the 1914–keV level and not the 1536–keV level.
§ Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

$^{110}Pd(^{7}Li,4n\gamma)$ 1997Ch01

1997Ch01: E=35–45 MeV. Measured Eγ, Iγ, γγ–coin, γ(θ), DCO. Array detectors: five Compton–suppressed Ge with eight NaI multiplicity filter.
1976TuZX: ^{110}Pd(^{6}Li,3nγ), E=24 MeV. Preliminary. Measured Eγ, Iγ, γγ, γ(θ).
The level scheme is as given by 1997Ch01, some discrepancies are noted in comments in the level scheme by evaluator.

^{113}In Levels

E(level)‡	Jπ†	$T_{1/2}$
0.0	9/2+	stable
y		
x		
1173.11 *25*	11/2+	
1191.3c *3*	(7/2+)	

Continued on next page (footnotes at end of table)

^{110}Pd(^{7}Li,4nγ) 1997Ch01 (continued)

^{113}In Levels (continued)

E(level)‡	Jπ†	E(level)‡	Jπ†	E(level)‡	Jπ†
1344.51[b] *25*	13/2+	3190.1 *6*		4441.0+y[a] *6*	(31/2−)
1688.6[c] *5*	(11/2+)	3192.2[c] *6*	(19/2+)	4602.9[c] *8*	(27/2+)
2233.4[&] *4*	(15/2−)	3213.8[b] *6*	(23/2+)	4715.7[&] *6*	(29/2−)
2283.1[b] *4*	17/2+	3249.7[#] *5*		4799.4 *6*	
2357.6 *11*		3280.9[&] *6*	(25/2−)	5062.1[b] *7*	(31/2+)
2389.0[c] *6*	(15/2+)	3289.5[§] *6*	(21/2−)	5125.5 *6*	
2396.6[&] *4*	(17/2−)	3305.3 *6*		5172.5 *12*	
2442.3 *4*		3350.3 *6*		5259.2+y[a] *6*	(35/2−)
2653.8 *4*		3397.1[b] *7*	(25/2+)	5392.7[&] *6*	(31/2−)
2664.2[&] *5*	(19/2−)	3598.7 *6*		5394+x[@]	(33/2−)
2665+y[a]	(19/2−)	3743.9+y[a] *5*	(27/2−)	5447.3 *7*	
2669.2[b] *4*	17/2+	3787.9[b] *7*	(27/2+)	5730.3 *7*	
2785.5 *5*		3854.3[§] *7*	(23/2−)	5734.8+x[@] *3*	(35/2−)
2854.1[&] *5*	(21/2−)	3866.7[#] *6*		5790.3[b] *8*	(33/2+)
2880.5 *5*		3965.1[c] *7*	(23/2+)	6113.9+x[@] *5*	(37/2−)
3023.8[&] *6*	(23/2−)	3973.5[&] *6*	(27/2−)	6187.6+y[a] *7*	(39/2−)
3050.7[#] *5*		4090.4[§] *7*	(25/2−)	6476.0+x[@] *6*	(39/2−)
3071.2[b] *4*	(19/2+)	4377.4[b] *7*	(29/2+)	7215.9+y[a] *9*	(43/2−)
3122.0[b] *5*	(21/2+)	4430.5 *6*	(27/2−)		
3172.1+y[a] *3*	(23/2−)	4431.4[#] *6*			

† Jπ as given by 1997Ch01 derived from γ(θ), DCO the gammas's multipolarities, and bands consideration.
‡ From least–squares fit to γ energies.
§ (A): Band 1.
\# (B): Band 2.
@ (C): Band 3.
& (D): Band 4.
a (E): Band 5.
b (F): Band 6.
c (G): Band 7.

γ(^{113}In)

Eγ†	E(level)	Iγ†	Mult.‡	Comments
68.6 *3*	2854.1	17 *2*		
91.8 *3*	3213.8	122 *2*	(M1,E2)	Mult.: DCO=0.57 *5*.
131.8 *3*	2785.5	33 *1*		
163.2 *3*	2396.6	443 *4*	(M1,E2)	Mult.: DCO=0.49 *1*.
169.5 *3*	3023.8	254 *2*	(M1,E2)	Mult.: DCO=0.45 *4*.
170.2[#] *3*	3050.7	44[#] *3*		
171.5 *3*	1344.51	44 *3*	(M1,E2)	Mult.: DCO=0.57 *5*.
183.3 *3*	3397.1	228 *2*	(M1,E2)	Mult.: DCO=0.55 *3*.
189.7 *3*	2854.1	228 *2*	(M1,E2)	Mult.: DCO=0.58 *4*.
199.1 *3*	3249.7	39 *1*		
211.7 *3*	2653.8	17 *2*		
226.7 *3*	2880.5	23 *2*		Eγ: given also deexciting the 3050 level but no level to feed?
236.1 *3*	4090.4	17 *2*	(M1,E2)[§]	
256.9 *3*	3280.9	167 *2*	(M1,E2)	Mult.: DCO=0.59 *5*.
267.5 *3*	2664.2	349 *2*	(M1,E2)	Mult.: DCO=0.57 *5*.
[x]271.1 *3*		12 *2*		
[x]278.2 *3*		56 *2*		
284.5 *3*	4715.7	12 *2*	(M1,E2)[§]	
326.2 *3*	5125.5	<10		
340.8 *3*	5734.8+x	25 *2*	[§]	
362.1 *3*	6476.0+x	16 *2*	(M1,E2)[§]	
[x]377.2 *3*				
379.1 *3*	6113.9+x	15 *2*	(M1,E2)[§]	
386.5 *3*	3050.7	45 *2*	(M1,E2)	Mult.: DCO=0.55 *10*.
388.9 *3*	2785.5	63 *2*	(M1,E2)	Mult.: DCO=0.47 *12*. Eγ: placed as deexciting the 2652 level and feeding the 2396 level by 1997Ch01, placed from this level by evaluator.

Continued on next page (footnotes at end of table)

$^{110}Pd(^{7}Li,4n\gamma)$ 1997Ch01 (continued)

$\gamma(^{113}In)$ (continued)

Eγ†	E(level)	Iγ†	Mult.‡	Comments
390.9 *3*	3787.9	167 *2*	(M1,E2)	Mult.: DCO=0.52 *5*.
395.8 *3*	3249.7	19 *1*	(M1,E2)	Mult.: DCO=0.53 *10*.
401.8 *3*	3071.2	70 *2*	(M1,E2)	Mult.: DCO=0.61 *20*.
409.7 *3*	5125.5	24 *2*	(M1,E2)§	
420.4 *3*	2653.8	42 *4*	(M1,E2)	Mult.: DCO=0.49 *15*.
x474.3 *3*		10 *2*		
483.9 *3*	2880.5	23 *2*		
497.3 *3*	1688.6	90 *3*	E2	Mult.: DCO=0.9 *1*.
507.1 *3*	3172.1+y	25 *2*	E2	Mult.: DCO=0.9 *3*.
525.9 *3*	3190.1	35 *2*		
564.8 *3*	3854.3	23 *2*	(M1,E2)	
	4431.4			
571.8 *3*	3743.9+y	63 *2*	E2	Mult.: DCO=0.9 *3*.
589.4 *3*	4377.4	72 *2*	(M1,E2)	Mult.: DCO=0.49 *2*.
617.2 *3*	3866.7	45 *3*		
625.3 *3*	3289.5	28 *2*	(E2)	
637.8 *3*	4602.9	31 *2*	(E2)	
641.1 *3*	3305.3	15 *2*		
669 *1*	2357.6			Eγ: not given in Table 1, only in figure 1 (1997Ch01).
677.7 *3*	5392.7	17 *2*	(M1,E2)	
684.6 *3*	5062.1	47 *2*	(M1,E2)	Mult.: DCO=0.48 *16*.
686.1 *3*	3350.3	<10		
692.6 *3*	3973.5	68 *2*	(M1,E2)	Mult.: DCO=0.57 *17*.
697.1 *3*	4441.0+y	12 *2*	E2	Mult.: DCO=0.9 *2*.
700.4 *3*	2389.0	85 *2*	E2	Mult.: DCO=0.9 *2*.
728.2 *3*	5790.3	31 *2*	(M1,E2)	
731.6 *3*	5447.3	<10		
742.4 *3*	4715.7	25 *2*	(M1,E2)§	
744.6 *3*	3598.7	19 *2*		
772.9 *3*	3965.1	51 *3*	E2	
788.2 *3*	3071.2	124 *2*	(M1,E2)	Mult.: DCO=0.68 *2*.
803.2 *3*	3192.2	80 *2*	E2	Mult.: DCO=0.9 *2*.
818.2 *3*	5259.2+y	23 *4*	E2	Mult.: DCO=1.1 *3*.
826.3 *3*	4799.4	<10		
838.9 *3*	3122.0	87 *2*	E2	Mult.: DCO=0.95 *8*.
888.7 *3*	2233.4	515 *3*	(E1)	Mult.: DCO=0.44 *2*.
x919.2 *3*		31 *3*		
928.4 *3*	6187.6+y	<20	(E2)	
938.7 *3*	2283.1	256 *2*	E2	Mult.: DCO=0.99 *4*.
980.2 *3*	4377.4	<10	(E2)	
x991.5 *3*		56 *1*		
1014.6 *3*	5730.3	33 *3*		
1028.3 *6*	7215.9+y	<20	(E2)	
1097.9 *3*	2442.3	24 *2*		
1173.2 *3*	1173.11	25 *2*	(M1,E2)§	
1191.3 *3*	1191.3	88 *3*	(M1,E2)	
1199 *1*	5172.5			Eγ: not given in Table 1, only in figure 1 (1997Ch01).
1274.2 *3*	5062.1	<5		
1324.6 *3*	2669.2	82 *2*	E2	Mult.: DCO=0.89 *9*.
1344.4 *3*	1344.51	1000	E2	Mult.: DCO=1.07 *6*.
x1390.3 *3*		<10		
1406.7 *3*	4430.5	14 *2*	E2§	
1418.6 *3*	5392.7	14 *3*	(E2)	
1434.9 *3*	4715.7	32 *3*	E2§	
x1444.5 *3*		<10		
1518.3 *3*	4799.4	14 *3*		
x1583.5 *3*		14 *3*		

† From 1991Ch01.
‡ From DCO ratio and/or γ(θ). The values for DCO with the gating transition(s) as quadrupole are given in comments.
§ Mult from DCO when the gating transition is a dipole.
# Multiply placed; undivided intensity given.
x γ ray not placed in level scheme.

^{112}Cd(p,p) IAR 1970Mi08

E=6–11 MeV. Measured σ(E(p),θ), θ=90°, 120°, 150°, and 170°, semi, 1970Mi08.
For level widths, see 1970Mi08.
Others: 1969Ab09, 1975Ab09, 1977So10.

^{113}In Levels

E(level)#	Jπ‡	L†	Comments
12873	1/2+	0	IAS of 1/2+ ^{113}Cd g.s.
13180	3/2+	2	IAS of 299 keV, (3/2+) ^{113}Cd excitation.
13417	5/2+	2	IAS of 584 keV, 5/2+ ^{113}Cd excitation.
13531	3/2+	2	IAS of 681 keV, (3/2+) ^{113}Cd excitation.
13738	1/2+	0	IAS of 884 keV, 1/2+ ^{113}Cd excitation.
13857	1/2+	0	IAS of 988 keV, 1/2+ ^{113}Cd excitation.
14064	5/2+	2	
14379	3/2+	2	
14478	3/2+	2	
14673?	(5/2+)	(2)	
15033	1/2+	0	
15086?	(1/2+)	(0)	
15131	7/2−	3	
15325?	(3/2−)	(1)	
15466	3/2−	1	
15508	7/2−	3	
15600?	(3/2−)	(1)	
15629	(7/2−)	(3)	
15674?	(1/2+)	(0)	
15748	7/2−	3	
15791?	(7/2−)	(3)	
15870?	(5/2+)	(2)	
15924?	(1/2+)	(0)	
15961?	(5/2+)	(2)	
16028	3/2−	1	
16136	3/2−	1	
16226	7/2−	3	
16334?	(3/2−)	(1)	
16493?	(1/2+)	(0)	
16587	3/2−	1	

† From shape of σ(E(p),θ).
‡ Based on L–values, known Jπ in ^{113}Cd or shell–model considerations.
# From S(p)=6074 *4* (1985Wa02) + res E(p)(c.m.) (1970Mi08).

^{112}Cd(^{3}He,d) 1974Ma09

E=27 MeV. Magnetic spectrograph with spark counter. σ(θ) at 12 angles (5°–40°), compared with DWBA calculations, 1974Ma09.

^{113}In Levels

E(level)	Jπ†	L	C^{2}S‡
0.0	9/2+	4	0.17
393 *5*	1/2−	1	0.059
648 *5*	3/2−	1	0.048
1026 *5*	5/2+	2	0.52
1066 *5*	3/2+	2	0.15
1133 *5*	5/2+	2	0.02
1194 *5*	7/2+	4	0.21
1571 *5*	7/2+,9/2+	4	0.03,0.04
1634 *5*		(3,4)	
1700 *5*	1/2+	0	0.024
1774 *10*	3/2+	2	0.14
1831 *8*	1/2+	0	0.029
2048 *10*	7/2+	4	0.097
2153 *10*	1/2+	0	0.048
2190 *10*	3/2+,5/2+	2	0.045,0.03
2298 *10*	3/2+,5/2+	2	0.04,0.024
2346 *10*	3/2+,5/2+	2	0.033,0.02
2391 *10*	3/2+,5/2+	2	0.10,0.064

† Assumed for calculation of C^{2}S.
‡ C^{2}S normalized to the sum rule limit for the 3 lowest levels.

^{112}Cd(α,t) 1974Ma09

E=27 MeV. Magnetic spectrograph with spark counter. σ(θ) at 10 angles (10°–80°), compared with DWBA calculations.

^{113}In Levels

E(level)	Jπ†	L	C^2S‡	Comments
0.0	9/2+	4	0.15	
393 *5*	1/2−	1	0.083	
648 *5*	3/2−	1	0.078	
1026 *5*	5/2+	2	0.30	E(level): probable doublet.
1066 *5*	3/2+	2	0.090	
1133 *5*	5/2+	2	0.021	
1194 *5*	7/2+	4	0.19	
1571 *5*	7/2+,9/2+	4	0.022,0.03	
1634 *5*		(3,4)		
1774 *10*	3/2+	2	0.099	
2048 *10*	7/2+	4	0.063	
2104 *10*	11/2−	5	0.028	
2376 *10*	11/2−	5	0.11	
2559 *10*	11/2−	5	0.080	

† Assumed for calculation of C^2S.
‡ C^2S normalized to the sum rule limit for the 3 lowest levels.

^{113}Cd(p,nγ) 1990Vi09,1976Di03,1974Ki02

Jπ(^{113}Cd)=1/2+.
1976Di03: E=6–11 MeV. Measured (semi) Eγ, Iγ, γγ coin, γ(θ), E(ce), I(ce), excit. γ(θ) measured at 9 angles (30°–145°) at E=7.5 MeV.
1974Ki02: E=2.7–5.2 MeV. Measured neutron time of flight, Eγ, Iγ (semi), nγ coin.
1990Vi09: E=6.8 MeV. Measured Eγ, Iγ (semi), γγ.
The level scheme is as proposed by 1990Vi09, it is in agreement with the one given by 1976Di03 and 1974Ki02 upto the 1999-keV level. All levels above that have been proposed by 1990Vi09.

^{113}In Levels

E(level)	Jπ‡	$T_{1/2}$†
0.0	9/2+	
391.73 *6*	1/2−	
646.76 *6*	3/2−	
1024.23# *6*	5/2+	
1029.60# *8*	1/2+,(3/2+)	0.33 ns *3*
1063.89# *8*	3/2+,(1/2+)	0.58 ns *3*
1106.46 *9*	3/2−,5/2−	
1131.45 *6*	5/2+	
1173.06 *9*	(7/2+,9/2+),11/2+	
1191.11# *9*	7/2+	
1344.91 *10*	(9/2+,11/2+),13/2+	
1351.01 *20*		
1380.77 *8*	1/2−,3/2−	
1453.0 *3*		
1471.87 *9*	3/2−,5/2−,7/2−	
1496.34 *11*		
1504.0 *5*		
1508.97 *17*	(3/2,5/2),7/2+	
1535.93 *10*	3/2−,5/2−	
1552.0 *4*		
1567.04 *9*	(5/2),7/2+,9/2+	
1569.55 *9*	1/2−,3/2−	
1618.89 *10*		
1630.56 *9*	5/2+,7/2+,9/2+	
1675.47 *8*		
1684.12 *9*		
1688.61 *22*	9/2+	
1707.35 *9*	(3/2,5/2)+	
1760.26 *14*		
1768.03 *9*	3/2+,5/2+,7/2+	
1802.30 *8*		
1822.51 *11*	1/2,3/2,5/2	
1835.68 *19*		
1865.36 *22*	5/2−,7/2−	
1914.08 *10*	3/2+,5/2+	
1920.77 *10*	3/2+,5/2+,7/2+	
1937.88 *11*	3/2−,5/2−	
1947.57 *11*		
1999.13 *12*	1/2,3/2	
2032.71 *22*		
2039.72 *14*		
2051.45 *12*		
2064.00 *22*		
2070.10 *14*		
2095.38 *8*		
2118.32 *19*		
2144.51 *13*		
2170.32 *14*		
2180.8 *5*		
2183.23 *11*		
2253.39 *11*		
2281.04 *18*		

Continued on next page (footnotes at end of table)

^{113}Cd(p,nγ) 1990Vi09,1976Di03,1974Ki02 (continued)

^{113}In Levels (continued)

E(level)	E(level)	E(level)
2295.27 *14*	2383.83 *16*	2665.0 *4*
2331.24 *21*	2476.0 *2*	2727.98 *23*
2339.49 *17*	2515.6 *4*	2783.84 *11*
2371.64 *12*	2557.00 *18*	2904.8 *3*
2378.18 *15*	2560.46§ *22*	

† From pulsed–beam γ(t) with semi, 1971Ki14.
‡ Based on γ(θ), γ–decay properties, excit and systematics.
§ A 1451.1γ is given in Table 4 of 1990Vi09 but not in Table 2, does not fit in the level scheme.
# (A): Suggested members of rotational band with Nilsson Orbit 1/2+(431).

γ(^{113}In)

Eγ†	E(level)	Iγ†	Mult.§	δ	Comments
107.2 *2*	1131.45	0.5 *1*			
160.3 *4*	1835.68	0.4 *1*			
167.1 *3*	1191.11	0.6 *1*	M1(+E2)	<0.89	Mult.: α(K)exp=0.081 *35* yields D(+Q). From decay scheme D=M1.
255.0 *1*	646.76	100 *3*	M1(+E2)	<1.17	Mult.: from α(K)exp=0.035 *4*.
266.8 *2*	1802.30	0.8 *1*			
291.8 *1*	1999.13	1.4 *1*			
316.7 *1*	1380.77	4.4 *2*			
326.7 *1*	1835.68	2.3 *1*			
330.2 *2*	1802.30	0.2 *1*			
345.0 *3*	1535.93	0.6 *1*			
347.0 *3*	1914.08	0.3 *2*			
351.4 *1*	1380.77	5.7 *3*	E1		Mult.: from α(K)exp=0.0058 *14*.
377.6 *1*	1024.23	7.9 *5*			
382.9 *1*	1029.60	2.5 *1*			
388.1 *3*	2095.38	0.3 *1*			
391.8 *1*	391.73				
394.0 *5*	1567.04	0.4 *1*			
411.5 *1*	2095.38	1.4 *1*			
416.9 *1*	1063.89	0.4 *1*			
429.5 *2*	1535.93	0.6 *1*			
457.7 *2*	1630.56	1.0 *2*			
459.8 *2*	1106.46	2.3 *2*	M1,E2		Mult.: from α(K)exp=0.0074 *20*.
472.1 *1*	1496.34	4.0 *2*			
	1535.93	4.0 *2*	E1		Mult.: from α(K)exp=0.0024 *6*.
484.9 *1*	1131.45	5.5 *3*	E1		Mult.: from α(K)exp=0.0027 *7*.
497.5 *2*	1688.61	2.7 *2*	M1,E2		Mult.: from α(K)exp=0.0062 *10*.
528.1 *3*	2095.38	0.5 *1*			
544.0 *1*	1675.47	2.2 *1*			
548.7 *2*	2118.32	0.6 *1*			
576.0 *1*	1707.35	2.6 *2*	M1,E2		Mult.: from α(K)exp=0.0043 *11*.
587.2 *1*	1760.26	1.7 *1*			
598.1 *2*	2070.10	7.4 *4*			
606.4 *3*	1630.56	4.8 *3*			
609.5 *3*	2118.32	6.3 *4*			
613.3 *2*	2183.23	0.4 *1*			
638.0 *1*	1029.60	37 *2*	E1		Mult.: from α(K)exp=0.00130 *25*. B(E1)(W.u.)=3.2×10^{-6} *4*.
646.5 *2*	2560.46	0.6 *1*			
651.1 *3*	1675.47	0.6 *1*			
672.4 *2*	1063.89	20 *1*	E1		Mult.: from α(K)exp=0.00095 *18*. B(E1)(W.u.)=1.61×10^{-6} *14*.
677.5 *5*	1707.35	1.4 *1*			
683.2 *2*	1707.35	3.2 *2*	M1,E2		Mult.: from α(K)exp=0.0039 *10*.
689.5 *2*	2070.10	1.4 *1*			
696.0 *2*	1802.30	1.6 *1*			
711.0 *3*	2183.23	0.3 *1*			
714.9 *2*	1106.46	21 *1*	M1,E2		Mult.: from α(K)exp=0.0022 *3*.

Continued on next page (footnotes at end of table)

^{113}Cd(p,nγ) 1990Vi09,1976Di03,1974Ki02 (continued)

γ(^{113}In) (continued)

Eγ†	E(level)	Iγ†	Mult.§	Comments
734.1 *2*	1380.77	0.7 *1*		
738.4 *1*	1768.03	1.1 *1*		
743.8 *1*	1768.03	5.6 *3*		
758.9 *2*	1865.36	2.6 *1*	M1,E2	Mult.: from α(K)exp=0.0018 *4*.
759.3 *2*	2378.18	2.5 *3*		
782.9 *2*	1914.08	0.9 *1*		
789.3 *2*	1920.77	1.0 *1*		
792.9 *1*	1822.51	4.5 *2*		
808.0 *3*	1999.13	0.5 *1*		
813.9 *2*	2727.98	1.0 *2*		
825.0 *1*	1471.87	11 *5*	M1,E2	Mult.: from α(K)exp=0.0022 *4*.
831.3 *8*	1937.88	0.2 *1*		
835.9 *4*	2180.8	1.0 *1*		
841.2 *5*	1947.57	0.9 *1*		
848.6 *1*	2039.72	2.1 *1*		
856.6 *2*	1920.77	1.6 *1*		
889.8 *1*	1914.08	10.5 *5*		
896.6 *1*	1920.77	4.6 *2*		
922.7 *1*	1569.55	8.3 *5*	M1,E2	Mult.: from α(K)exp=0.0018 *3*.
945.0 *1*	2051.45	1.2 *1*		
963.7 *2*	2095.38	1.5 *2*		
972.1 *1*	1618.89	1.1 *1*		
979.2 *1*	2170.32	1.3 *1*		
989.0 *1*	1380.77	2.1 *1*		
1000.1 *2*	2064.00	2.5 *3*		
1003.1 *2*	2032.71	3.9 *4*		
1024.3 *1*	1024.23	73 *3*	E2	
1034.4 *4*	2665.0	1.0 *1*		
1037.6 *1*	1684.12	6.8 *4*		
1040.5 *5*	2070.10	0.5 *1*		
1052.1 *2*	2183.23	1.7 *1*		
1060.4	1707.35			
x1064.4 *3*		0.2 *1*		
1076.5 *3*	2183.23	0.8 *1*		
1080.1 *2*	1471.87	5.0 *4*		
1114.9 *1*	2144.51	8.0 *5*		
1131.5 *1*	1131.45	31 *2*	E2	
1136.5 *5*	2904.8	0.4 *1*		
1144.5 *4*	1535.93	0.7 *1*		
1147.1 *4*	2253.39	0.4 *1*		
1149.8 *3*	2281.04	0.2 *1*		
1155.5 *4*	1802.30	0.3 *1*		
1159.5 *2*	2183.23	0.9 *1*		
1164.3 *3*	2295.27	0.6 *1*		
1173.1 *1*	1173.06	11.3 *6*	M1,E2	Mult.: from α(K)exp=0.00090 *15*.
1177.8 *1*	1569.55	2.6 *3*		
1191.1 *1*	1191.11	27 *1*	M1,E2	Mult.: from α(K)exp=0.00085 *14*.
1233.1 *2*	2339.49	2.2 *1*		
1256.7 *2*	2281.04	1.2 *1*		
1271.9 *2*	2378.18	1.4 *1*		
1274.4 *4*	2904.8	0.6 *1*		
1291.1 *1*	1937.88	6.5 *4*		
1300.8 *1*	1947.57	2.7 *2*		
1307.0 *2*	2331.24	1.2 *1*		
1315.3 *2*	1707.35	0.8 *1*		
1344.9 *1*	1344.91	2.9 *2*	E2	
1347.4 *1*	2371.64	1.4 *1*		
1351.0‡ *2*	1351.01	2.8 *2*		
1352.0 *4*	1999.13	0.4 *1*		
1359.6 *2*	2383.83	0.6 *1*		
1409.1 *3*	2515.6	0.6 *1*		
1423.2 *3*	2070.10	0.6 *1*		
1430.8 *2*	1822.51	0.3 *1*		

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^{113}Cd(p,nγ) 1990Vi09,1976Di03,1974Ki02 (continued)

γ(^{113}In) (continued)

Eγ†	E(level)	Iγ†	Eγ†	E(level)	Iγ†	Eγ†	E(level)	Iγ†
1451.0 *2*	2476.0	1.2 *1*	1567.0 *1*	1567.04	6.7 *4*	1802.2 *1*	1802.30	5.2 *3*
1453.0‡ *3*	1453.0	1.1 *1*	1606.6 *1*	2253.39	2.1 *1*	1861.7 *2*	2253.39	2.3 *2*
x1454.1 *5*		0.7 *1*	1619.0 *2*	1618.89	5.0 *5*	1903.2 *2*	2295.27	0.9 *1*
1496.4 *3*	1496.34	0.4 *1*	1630.5 *1*	1630.56	6.3 *4*	1910.2 *2*	2557.00	0.5 *1*
1504.0‡ *5*	1504.0	0.4 *1*	1648.6 *2*	2295.27	1.0 *1*	1947.6 *5*	2339.49	0.4 *1*
1509.0 *2*	1508.97	13.0 *6*	1675.5 *1*	1675.47	7.3 *4*	1992.1 *3*	2383.83	1.4 *1*
1532.8 *3*	2557.00	0.9 *1*	1692.6 *3*	2339.49	0.8 *1*	2051.4 *2*	2051.45	0.4 *1*
1536.0 *3*	2183.23	1.5 *1*	1731.0 *3*	2378.18	0.8 *1*	2095.2 *1*	2095.38	3.6 *2*
1546.3 *3*	1937.88	0.8 *1*	1737.0 *3*	2383.83	0.2 *1*	2137.0 *2*	2783.84	0.7 *1*
1552.0‡ *4*	1552.0	0.4 *1*	1759.6 *1*	2783.84	3.2 *2*	x2475.3 *3*		0.2 *1*
1555.9 *3*	1947.57	0.4 *1*	1773.4 *4*	2904.8	0.5 *1*	2476.3	2476.0	

† From 1990Vi09, Iγ at 90° to beam.
‡ Not observed by 1976Di03.
§ α(K)exp calculated by evaluators normalizing 1024γ, 1132γ and 1345γ to E2 theory. These E2 assignments are based on adopted Jπ values for the levels involved.
x γ ray not placed in level scheme.

^{113}In(γ,γ') 1969Bo42

Bremsstrahlung, E=1000–1800. Measured yield of 392γ, semi, 1969Bo42.
Others: 1967Bo10, 1977Ca14.
1991Vo05 has shown a resonant and a non–resonant contribution to photoactivation process.

^{113}In Levels

E(level)	Jπ†	$T_{1/2}$†	Comments
0.0	9/2+	stable	
392	1/2−	1.6582 h *6*	
1025 *5*			
1130 *10*			
1177 *1*	11/2+	60 fs *6*	E(level): from 1977Ca14. $T_{1/2}$ from Γ of level.
1500 *10*			
1630 *10*			

† From adopted levels.

^{113}In(d,d') 1967Hj03

E=15 MeV. θ=45° and 60°, magnetic–wedge spectrograph, 1967Hj03.

^{113}In Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0	9/2+	1648 *15*		2290 *15*	(+)
1117? *15*	(7/2+)	1697? *15*		2380 *15*	
1187 *15*	(13/2+)	1786 *15*		2450 *15*	(−)
1360 *15*	(11/2+)	1980? *15*		2540 *15*	
1477? *15*		2120 *15*		2610 *15*	
1520? *15*	(9/2+)	2180 *15*	(−)		
1587? *15*		2240 *15*			

† Systematically≈15 keV too high in comparison to adopted values.
‡ π from the ratio σ(45)/σ(60). Spin assignments from the strengths.

^{113}In(α,α') 1968St17

E=42.2 MeV. Measured σ(θ) semi, energy resolution≈100.

^{113}In Levels

E(level)	L†
1170	2
1360	2
1560 *20*	2
2170	3
2480	3

† From differential cross sections between 30° and 80°, characteristic shape.

Coulomb Excitation 1976Tu02

E(α)=9.4, 10.0, 10.6 MeV.
E(^{16}O)=42, 45 MeV.
Enriched target (96%) were chemically processed to eliminate contaminants.
Measured: γ singles, γ(θ) and γγ coin, semi, Doppler broadening.
Others: 1970Be02, 1974Er06, 1974Le34.

^{113}In Levels

B(E2)↑ B(E2) and B(E3) values were calculated from measured yield at 55° in ^{113}In(α,α'γ); see 1976Tu02.

E(level)	Jπ†	$T_{1/2}$	Comments
0.0	9/2+	stable	
391.7 *8*	1/2−		
646.9 *8*	3/2−		B(E3)↑=0.0048 *5*.
1024.2 *7*	5/2+	3.6 ps *3*	B(E2)↑=0.0075 *6*. $T_{1/2}$: from B(E2). 3.8 ps *7* from DSA.
1131.7 *7*	5/2+	0.97 ps *7*	B(E2)↑=0.0160 *10*. $T_{1/2}$: from B(E2).
1173.0 *7*	11/2+	0.07 ps‡ *4*	B(E2)↑=0.093 *6*. $T_{1/2}$: from B(E2). Jπ: x,γ(θ) for 171γ and 1173γ consistent with 11/2+ only.
1344.4 *8*	13/2+	0.33 ps *3*	B(E2)↑=0.053 *3*. Jπ: x,γ(θ) gives 9/2+ or 13/2+. $T_{1/2}$(DSA) and B(E2) not mutually consistent with 9/2+. $T_{1/2}$: from B(E2). 0.28 ps *7* from DSA.
1509.5 *8*	7/2+,9/2+	≤0.2 ps‡	B(E2)↑=0.0145 *10*. $T_{1/2}$: from B(E2). Jπ: from x,γ(θ) and adopted levels.
1566.9 *8*	7/2+,9/2+	0.24 ps‡ *10*	B(E2)↑=0.0178 *12*. Jπ: from x,γ(θ) and adopted levels. $T_{1/2}$: from B(E2).
1630.7 *7*			B(E2)↑=0.0032 *12*.

† From adopted levels, except as noted.
‡ From DSA–method line shapes in ^{113}In(^{16}O,^{16}O'γ).

γ(^{113}In)

Eγ†	E(level)	Iγ‡	Mult.§	δ	Comments
107.5	1131.7	0.9 *2*			
171.4	1344.4	2.1 *1*	M1+E2	+0.03 *3*	B(M1)(W.u.)=0.28 *3*; B(E2)(W.u.)=7 *+14−7*.
255.3	646.9				
377.3	1024.2	9.0 *6*			
377.8	1509.5	6.5 *32*			
391.7	391.7				
393.9	1566.9	12.5 *9*			
457.7	1630.7	25.9 *48*			
484.8	1131.7	14.0 *3*	E1(+M2)	−0.03 *5*	δ: −3.0 *5* excluded from transition strength. B(E1)(W.u.)=(0.00037 *3*); B(M2)(W.u.)=(6 *+22−6*).
606.5	1630.7	≤1.0			
1024.2	1024.2	91.0 *6*	E2		B(E2)(W.u.)=3.9 *4*.

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Coulomb Excitation 1976Tu02 (continued)

γ(^{113}In) (continued)

Eγ†	E(level)	Iγ‡	Mult.§	Comments
1131.7	1131.7	85.1 *5*	E2	B(E2)(W.u.)=8.2 *6*.
1173.0	1173.0	100		
1344.4	1344.4	97.9 *1*	E2	B(E2)(W.u.)=11.8 *11*.
1509.5	1509.5	93.5 *32*		
1566.9	1566.9	87.5 *9*		
1630.7	1630.7	73.1 *48*		

† Uncertainty not given, 1 keV assumed by evaluator.
‡ % photon branching from each level.
§ Mult and δ from γ(θ).

^{114}Sn(d,^{3}He) 1969Co03

E=22 MeV. Measured σ(θ), θ=30°–70°, 1969Co03.

^{113}In Levels

E(level)	Jπ‡	L†	C^2S
0.0	9/2+	4	6.0
380 *25*	1/2−	1	1.3
635 *25*	3/2−	1	1.7

† From comparison with DWBA calculations.
‡ Assumed for calculation of C^2S.

^{115}In(p,t) 1974Ma09

Jπ(^{115}In)=9/2+.
E=17, 19 MeV. σ(θ), θ=5°–50° with magnetic spectrograph, 1974Ma09.
L–values are from comparisons with DWBA calculations.

^{113}In Levels

E(level)	L	E(level)	L	E(level)	L	E(level)	L
0.0	0	1345	2	1758	0+2	2230	(3)
1026	2	1511	2	2094	(3)	2263	(3)
1133	2	1569	2	2116	(3)	2407	(3)
1171	2	1634	(3)	2167	(3)	2439	(3)

^{116}Sn(p,α) 1976Sm04

E=22 MeV. Measured σ(θ), θ=10°–60°, 1976Sm04.

^{113}In Levels

E(level)	Jπ†	E(level)	Jπ†	E(level)	Jπ†	E(level)	E(level)
0.0	9/2+	1110 *2*	5/2−	1633 *3*	9/2+	2092 *4*	2451 *5*
393 *1*	1/2−	1349 *3*	13/2+	1753 *4*		2249 *5*	2586 *5*
645 *1*	3/2−	1561 *3*	9/2+	1944 *4*		2369 *5*	

† From comparisons of σ(θ) with known transfers in ^{118}Sn(p,α).

Adopted Levels, Gammas

Q(β^-)=–3913 *17*; S(n)=7743.1 *18*; S(p)=7626 *5*; Q(α)=–2250 *4* 2003Au03,2009AuZZ.

^{113}Sn Levels

For neutron resonance, see ^{112}Sn(n,γ) (1981MuZQ).
For gross structure of deeply bound hole states in odd tin isotopes observed with the (^{3}He,α) reaction, see 1978Ta22. For onset of neutron single–particle strengths with (α,^{3}He) at 183 MeV, see 1991Ma06.

Cross Reference (XREF) Flags

A ^{113}Sn IT Decay (21.4 min)	F ^{112}Sn(n,γ) E=95 eV	K ^{115}Sn(p,t)
B ^{113}Sb ε Decay	G ^{112}Sn(d,p),^{114}Sn(d,t)	L ^{114}Sn(p,d) IAS
C ^{110}Cd(α,nγ)	H ^{113}In(p,nγ)	M ^{100}Mo(^{18}O,5nγ)
D ^{111}Cd(α,2nγ)	I ^{113}In(p,3nγ)	
E ^{112}Cd(α,3nγ)	J ^{114}Sn(p,d)	

E(level)[#]	Jπ[†]	XREF	$T_{1/2}$[§]	Comments
0.0	1/2+	ABCDEFGHIJKLM	115.09 d *3*	%ε+%β^+=100. μ=–0.8791 *6* (1989Ra17). μ: atomic beam. $T_{1/2}$: from weighted average of 115.2 d *8* (1972Em01), 115.07 d *10* (1972La14), 115.09 d *4* (1980Ho17), 115.12 d *13* (1982RuZV), and 115.08 d *8* (1992Un01). The reduced–χ^2 = 0.03. Because this set of values is consistent, the Limited Relative Statistical Weight method (1985ZiZY, 1992Ra09) does not increase the uncertainty for the 1980Ho17 value even though it contributes 66% of the relative weight. If the 1980Ho17 uncertainty were increased from 0.04 to 0.056 in order to decrease its relative weight to 50%, the weighted average average would still be 115.09 with an uncertainty of 0.04. The very small reduced–χ^2 value suggests that the reported uncertainties are overestimated. Other measurements: 107 d (1959Bu08), 115.12 d *20* (1976MeZR, replaced by 1982RuZV), and 115.06 d 7 (1982HoZJ, replaced by 1992Un01). Jπ: atomic beam (1976Fu06), L(d,p)=0.
77.389 *19*	7/2+	ABCDE GHIJK	21.4 min *4*	%IT=91.1 *23*; %ε+%β^+=8.9 *23* (1961Sc12). $T_{1/2}$: from 1974Ho17. Others: 21 min *1* (1961Se08), 20 min *1* (1961Sc12). %IT from I(Kα x ray,^{113}In)/I(Kα x ray,^{113}Sn). Jπ: atomic beam (1976Fu06), 77γ is M3(+E4).
409.83 *4*	5/2+	BCD GHIJK		Jπ: L(d,p)=2, σ(d,p)/σ(d,t) favors 5/2+.
498.07 *5*	3/2+	BCD FGHIJK	>0.35 ps	Jπ: L(d,p)=2, σ(d,p)/σ(d,t) favors 3/2+.
738.4[b] *3*	11/2–	CDE GHIJ M	86 ns *2*	μ=–1.293 *16* (1989Ra17); Q=+0.41 *1* (1989Ra17). μ: μ and Q: differential perturbed angular distribution. Jπ: L(d,p)=5, M2(+E3) γ to 7/2+. $T_{1/2}$: unweighted av of 88 ns *3* (1973IsZQ), 89 ns *3* (1974Di18), 82.1 ns *17* (1974Br29).
1013.94 *14*	3/2+	BCD GH	0.2 ps *1*	E(level): a level with L(d,p)=2 observed at 1014 *5*, may correspond to either 1013.22 or 1018.09 level. Jπ: log *ft*=5.86 *3* from 5/2+, M1+E2 γ to 1/2+.
1018.08 *5*	5/2+	BCD HI K	1.0 ps *5*	Jπ: allowed ε decay from 5/2+. E2 γ to 1/2+.
1042 *25*	3/2+,5/2+	J		E(level): from (p,d), possibly same as 1018 level. Jπ: L(p,d)=2.
1140 *25*		J		
1248.7 *3*		D H		
1284.06 *11*	5/2+	BCD HI	0.5 ps *2*	Jπ: E2 γ to 1/2+. log *ft*=6.93 *7* from 5/2+.
1303 *25*	1/2+	J		Jπ: L(p,d)=0.
1314.07 *15*	3/2+	BCD FGHI		Jπ: L(d,p)=2.
1355.90 *20*	3/2+	CD HI	0.7 ps *3*	Jπ: M1 γ to 1/2+.
1472.54 *15*	5/2+	CD HI	0.8 ps *5*	Jπ: $\gamma(\theta)$ gives 3/2,5/2. E2 to 1/2+ g.s.
1537 *5*	(7/2+,9/2+)	G		Jπ: L(d,p)=(4).
1539.0 *7*	5/2+	CD HI	0.6 ps *1*	Jπ: M1+E2 γ to 1/2+.
1539.9 *4*	(11/2–)	CD HI	0.2 ps *1*	Jπ: from $\gamma(\theta)$, γ to 11/2–.
1556.50 *10*	3/2+	BCD FGHI		Jπ: allowed ε decay from 5/2+, M1 γ to 1/2+.

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Adopted Levels, Gammas (continued)

^{113}Sn Levels (continued)

E(level)[#]	Jπ[†]	XREF	$T_{1/2}$[§]	Comments
1646.06 *14*	3/2+,5/2+	BCD GH		Jπ: L(d,p)=2. E(level): the 1646 level in (d,p) could also correspond to the 1651 level.
1647.2 *3*		D		
1651.62 *17*	5/2+	BCD H J		Jπ: L(p,d)=2, M1 γ to 7/2+.
1732.22 *17*	(3/2+,5/2+)	BCD H		Jπ: log *ft*=6.05 *5* from 5/2+.
1744.81 *14*	3/2+,5/2+	BCD GHIJ	0.31 ps *8*	Jπ: L(d,p)=2 at 1745 *5*.
1781.1 *3*	9/2−	D HI	0.19 ps *7*	Jπ: M1+E2 γ to 11/2− and γ to 7/2+.
1821.0 *3*	1/2+	C GH J		Jπ: L(d,p)=0.
1831.0 *3*	1/2+	C H J		Jπ: L(p,d)=0.
1867.28 *20*	5/2+	CD HI	0.33 ps *10*	Jπ: M1,E2 γ to 3/2+,5/2+, γ(θ) in ^{113}In(p,nγ).
1906.6[b] *4*	15/2−	CDE GHI M	0.8 ps *2*	Jπ: stretched E2 to 11/2−.
1909.64 *18*	(5/2+,7/2+)	CD HI		Jπ: γ's to 3/2+,5/2+, γ(θ) in ^{113}In(p,nγ).
1935.4 *4*	(11/2−)	CD HI	1.9 ps *8*	Jπ: γ to 11/2−, M1+E2 γ to 11/2−.
1945.3 *4*	(9/2−)	CD HI	0.40 ps *20*	Jπ: γ to 11/2−.
1952.1 *4*	13/2−	CDE HI	1.0 ps *4*	Jπ: γ to 11/2−, γ(θ) in ^{113}In(p,nγ).
1957.05 *16*	3/2(+),5/2(+)	B		Jπ: log *ft*=6.40 *10* from 5/2+, γ to 1/2+ and 7/2+.
2031.4 *3*		D H		
2039.88 *19*	7/2+	CD H	0.2 ps *1*	Jπ: γ's to 3/2+,5/2+ and 5/2+,7/2+. γ(θ) in ^{113}In(p,nγ).
2045.47 *20*	(3/2+,5/2+)	B E JK		Jπ: log *ft*=6.63 *12* from 5/2+, γ to 7/2+.
2050 *5*	1/2−,3/2−	G		E(level): probably not identical to 2045 level from γ decay. Jπ: L(d,p)=1.
2105 *5*	(3/2−)	G		Jπ: L(d,p)=1, and from shell–model syst.
2128.14 *21*	3/2+,5/2+	B G		Jπ: L(d,p)=2 at 2129 *5*, the 2129 level in (d,p) does not seem to correspond to the 2134 level (no γ to g.s.).
2135.0 *3*		D H		
2176.27 *18*	7/2+	D HI	0.3 ps *2*	Jπ: M1 γ to 5/2+ and 7/2+.
2200.7 *3*	5/2+	CD GHI	>0.24 ps	Jπ: M1+E2 γ to 3/2+, γ(θ) in ^{113}In(p,nγ).
2258.6 *3*	5/2+	CD HI	0.3 ps *1*	Jπ: from γ(θ) and linear polarization in (α,2nγ).
2275.8 *3*	1/2−,3/2−	D GH		Jπ: L(d,p)=1.
2336.7 *4*	11/2−	CD HI	0.35 ps *8*	Jπ: γ to 11/2−.
2385.77 *25*	7/2+	CD H	0.7 ps *6*	Jπ: γ's to 5/2+.
2410.8 *5*		D		
2448.38 *23*	7/2+	CD HI		Jπ: M1+E2 γ to 5/2+.
2457.11 *22*		C H		
2467.9 *3*		H		
2506.0 *3*		CD H		
2512.0 *3*	(3/2,5/2)	CD H		Jπ: γ to 3/2+,5/2+, γ(θ) in ^{113}In(p,nγ).
2538.27 *22*	3/2+,5/2+	B HI		Jπ: L(d,p)=2.
2540 *5*	5/2−,7/2−	G		Jπ: L(d,p)=3.
2540.0 *4*	(15/2−)	CD H	0.07 ps *3*	Jπ: E2 γ to 11/2−.
2552.4 *3*	(3/2,5/2,7/2)	D H		Jπ: γ's to 3/2+,5/2+, γ(θ) in ^{113}In(p,nγ).
≈2579		F		E(level): not the same as 2583 level with Jπ between 7/2− and 15/2−.
2582.3 *4*	(15/2−)	CD HI	0.22 ps *9*	Jπ: E2 γ to 11/2−.
2590.77 *22*	(3/2)	GHI		Jπ: L=1,2 (d,p).
2616.7 *5*		C HI		
2619.4 *4*		D		
2620 *5*	1/2+	CD GHI		E(level): could correspond to 2617 or 2624 level, who have γ feeding to low Jπ. Jπ: L(d,p)=0.
2624.04 *21*		CD H		
2649.0 *4*	(9/2−)	CD H		
2662.8 *3*	(3/2+,5/2+)	CD HI		Jπ: γ to 3/2+,5/2+, γ(θ) in ^{113}In(p,nγ).
2671.1 *4*		CD H		
2675.3 *4*		D		E(level): from coin between 1284–583–808 gammas.
2700.4 *4*		D	0.4 ps *1*	
2717.8 *4*	(11/2−)	D		Jπ: M1 γ to 11/2−.
2749.7 *4*	17/2−	D	0.21 ps *7*	Jπ: E2 γ to 13/2−.
2764 *5*	(7/2)−[‡]	G		Jπ: L(d,p)=3.
2777.9 *4*		CD GHI		
2780 *5*		F		
2806.6[b] *5*	19/2−	CDE I M	0.31 ps *10*	Jπ: stretched (E2) to 15/2−.

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Adopted Levels, Gammas (continued)

^{113}Sn Levels (continued)

E(level)#	Jπ†	XREF	$T_{1/2}$§	Comments
2851.6 4	(17/2−)	D	1.2 ps 6	
2862 5	(7/2)−‡	G		Jπ: L(d,p)=3.
2888.9 4		CD H		
2915.9 4		D		
2932.2 5		B		
2956.5 4		CD H		
2975.0 4	(19/2−)	CDE I M	0.28 ps 14	
3004 5	1/2−,3/2−	G		Jπ: L(d,p)=1.
3080 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3091.2 4	19/2−	DE I M	0.45 ps 18	Jπ: (E2) to 15/2−.
3128.7 5	21/2−	CDE I		Jπ: M1,E2 to 19/2−.
3130.3 5		D M		
3138.9 6		D		
3204 5	1/2−,3/2−	G		Jπ: L(d,p)=1.
3223.2 5	(19/2)−	D M	>1.4 ps	Jπ: Q γ to 15/2−.
3307 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3409.5@ 6	17/2	M		
3412.5 4		D		
3418 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3420.4 5	(21/2−)	D M		Jπ: M1+E2 γ to (21/2−).
3456.5 5		D		
3458.3 5	(23/2−)	DE M		Jπ: M1,E2 to (21/2−).
3494 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3499 5		G		
3539 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3584 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3680.4 6	(23/2−)	E		Jπ: M1+E2 γ to (21/2−).
3696 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3743 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3796 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3808 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3822 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3837.5 6	(23/2−)	D		
3846 5		G		
3873 5	(7/2)−‡	G		Jπ: L(d,p)=3.
3901.9 5	(23/2−)	DE M	0.6 ps 2	Jπ: (E2) γ to 19/2−.
3906 2	(7/2)−‡	G		Jπ: L(d,p)=3.
3913.8 6	(21/2−)	D		Jπ: M1 γ to (19/2−).
3960 5		G		
3972.1 5	(23/2−)	DE M	0.5 ps 2	Jπ: M1+E2 γ to (21/2−).
4022 5	(3/2)	G		
4044 5	(7/2)−‡	G		Jπ: L(d,p)=3.
4051.8@ 5	21/2	M		
4058.0 6	25/2+	DE M	0.69 ns 28	Jπ: E1 γ to 23/2−, a three quasi−particle neutron configuration proposed by 1997Ka40. $T_{1/2}$: from γ−rf(t) in (α,2nγ).
4233 5	(7/2)−‡	G		Jπ: L(d,p)=3.
4265 5	(7/2)−‡	G		Jπ: L(d,p)=3.
4315 5	(7/2)−‡	G		Jπ: L(d,p)=3.
4335 5		G		
4343 5	(7/2)−‡	G		Jπ: L(d,p)=3.
4364 5		G		
4397 5	(7/2)−‡	G		Jπ: L(d,p)=3.
4430 5	(7/2)−‡	G		Jπ: L(d,p)=3.
4438 5		G		
4475.1 6	(27/2+)	DE M	>1.1 ps	Jπ: D+Q γ to (25/2).
4504 5		G		
4589 5	(7/2)−‡	G		Jπ: L(d,p)=3.
4609 5	(7/2)−‡	G		Jπ: L(d,p)=3.
4649 5		G		
4714.4 6	(27/2−)	DE M	0.31 ps 10	Jπ: (E2) γ to (23/2−).
4752.2@ 6	25/2	M		
4992 5	(7/2)−‡	G		Jπ: L(d,p)=3.

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Adopted Levels, Gammas (continued)

^{113}Sn Levels (continued)

E(level)#	Jπ†	XREF	Comments
5012 *5*	(7/2)–‡	G	Jπ: L(d,p)=3.
5067 *5*	(7/2)–‡	G	Jπ: L(d,p)=3.
5239 *5*	(7/2)–‡	G	Jπ: L(d,p)=3.
5291 *5*	(7/2)–‡	G	Jπ: L(d,p)=3.
5318 *5*		G	
5450 *5*	(7/2)–‡	G	Jπ: L(d,p)=3.
5534.4@ *6*	29/2	M	
5605.7 *8*	31/2+	M	
5645.6a *7*	31/2–	M	
5647 *5*	(7/2)–‡	G	Jπ: L(d,p)=3.
6385.3@ *7*	33/2	M	
6682.3a *9*	35/2–	M	
7322.0@ *9*	37/2	M	
7745.5 *25*	1/2+	F	
7784.4a *10*	39/2–	M	
7883.1& *10*	39/2–	M	
8347.8@ *10*	41/2	M	
8811.7a *10*	43/2–	M	
9014.0& *10*	43/2–	M	
9466.9@ *11*	45/2	M	
9936.4a *11*	47/2–	M	
10209.7& *11*	47/2–	M	
10589.1@ *12*	49/2	M	
11242.0a *12*	51/2–	M	
11405.1& *12*	51/2–	M	
11723.5@ *13*	53/2	M	
11826 *50*	9/2+	L	IAS of ^{113}In g.s.
12254 *50*	1/2–	L	IAS of ^{113}In 392 level.
12513 *50*	3/2–	L	IAS of ^{113}In 647 level.
12642.9& *13*	55/2–	M	
12736.8a *13*	(55/2–)	M	
13034.6@ *14*	57/2	M	
14032.6& *14*	59/2–	M	
14286.5a *14*	59/2–	M	
14577.5@ *15*	(61/2)	M	
15653.9& *15*	(63/2–)	M	
15990.8a *18*	(63/2–)	M	
16309.8@ *18*	(65/2)	M	
17504.3& *18*	(67/2–)	M	
18219.8?@ *20*	(69/2)	M	

† Jπ without comments are based on band assignments.
‡ J is assigned to 7/2 from shell–model syst.
§ In the ps range are from Doppler shift in (α,2nγ) (1991Vi09).
\# From least–squares fit to γ energies.
@ (A): ΔJ=2 band based on 17/2.
& (B): ΔJ=2 band based on 39/2–.
a (C): ΔJ=2 band based on 31/2–.
b (D): Proposed neutron h11/2 band. ΔJ=2 spacings.

γ(^{113}Sn)

E(level)	Eγ†	Iγ†	Mult.‡	δ	α	Comments
77.389	77.38 *2*	100	M3+E4	0.13 *2*	181 *5*	Mult.,δ: see ^{113}Sn IT decay (21.4 min). B(M3)(W.u.): the calculated B(E4)(W.u.) gives 140 *50* which violates RUL. B(M3)(W.u.)=0.0281 *15*; B(E4)(W.u.)=140 *50*.
409.83	332.41 *5*	100 *4*	M1+E2	–0.08 *2*		
	409.9 *2*	0.87 *11*				
498.07	88.25 *2*	3.4 *4*				
	420.7 *2*	0.3 *2*				

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Adopted Levels, Gammas (continued)

γ(^{113}Sn) (continued)

E(level)	Eγ†	Iγ†	Mult.‡	δ	α	Comments
498.07	497.96 *9*	100 *5*	M1+E2	0.12 *6*		B(M1)(W.u.)<0.49; B(E2)(W.u.)<44.
738.4	661.0 *3*	100	M2(+E3)	<2.6	0.0133 *16*	Mult.,δ: from 1972Br38. RUL gives δ≤0.65, then B(M2)(W.u.)=0.10 *2*. B(M2)(W.u.)>0.015; B(E3)(W.u.)<300.
1013.94	603.0 *4*	0.65 *14*				
	936.7 *2*	100 *5*				
	1014.4 *3*	96 *6*	M1+E2	0.5 *1*		B(M1)(W.u.)=0.041 *21*; B(E2)(W.u.)=8 *5*.
1018.08	608.2 *2*	100 *7*	M1+E2	3 *1*		B(M1)(W.u.)=0.006 *5*; B(E2)(W.u.)=110 *60*.
	940.63 *6*	59 *3*	M1+E2	0.5 *2*		B(M1)(W.u.)=0.007 *4*; B(E2)(W.u.)=1.6 *13*.
	1018.12 *6*	15 *3*	E2			B(E2)(W.u.)=1.4 *8*.
1248.7	838.9 *3*	100				
1284.06	786.1 *3*	11 *1*				
	873.9 *4*	6.3 *3*	M1+E2	2.7 *8*		B(M1)(W.u.)=0.0004 *3*; B(E2)(W.u.)=3.0 *13*.
	1206.3 *3*	9 *5*				
	1284.2 *2*	100 *5*	E2			B(E2)(W.u.)=8 *4*.
1314.07	816.3 *3*	18.3 *22*				
	1314.0 *2*	100 *11*	M1			
1355.90	1356.0 *3*	100	M1+E2	0.14 *6*		B(M1)(W.u.)=0.012 *6*; B(E2)(W.u.)=0.10 *10*.
1472.54	1472.8 *3*	100	E2			B(E2)(W.u.)=3.1 *20*.
1539.0	1129.2 *7*	100	M1+E2	−2.5 *10*		B(M1)(W.u.)=0.0035 *25*; B(E2)(W.u.)=14 *3*.
1539.9	801.5 *3*	100	M1+E2	−0.3 *1*		B(M1)(W.u.)=0.20 *10*; B(E2)(W.u.)=22 *18*.
1556.50	242.6 *3*	2.2 *5*				
	273.4 *8*	3.6 *4*				Eγ: not reported in (α,2nγ).
	538.2 *2*	5.6 *4*				
	1058.3 *2*	5.2 *5*				
	1146.6 *4*	43 *3*				
	1478.8 *2*	11.5 *15*				
	1557.0 *2*	100 *8*	M1+E2	0.2 *1*		
1646.06	1147.2 *4*	88 *22*				
	1568.9 *2*	34 *4*				
	1646.0 *2*	100 *15*				
1647.2	1149.3 *4*	100 *30*				
	1237.1 *4*	30 *15*				
1651.62	1241.6 *3*	100 *20*	M1			
	1574.3 *2*	50 *5*	M1+E2	−1.0 *5*		
1732.22	448.3 *5*	4.8 *20*				
	718.4 *3*	7 *4*				
	1234.2 *3*	100 *13*	M1			
	1654.6 *3*	13.0 *13*				
1744.81	725.3 *10*	6 *3*				
	1247.1 *3*	15 *2*	M1+E2	2.1 *15*		B(M1)(W.u.)=0.0006 *+8−6*; B(E2)(W.u.)=1.4 *6*.
	1334.9 *2*	100 *5*	M1+E2	0.6 *4*		B(M1)(W.u.)=0.014 *6*; B(E2)(W.u.)=2.2 *22*.
	1667.5 *3*	41 *3*				
1781.1	1042.6 *5*	100 *5*	M1+E2	−0.5 *3*		Mult.: δ=0.5 *3* or −1.6 *3*. B(M1)(W.u.)=0.08 *4*; B(E2)(W.u.)=14 *+15−14*.
	1703.8 *4*	5 *2*	[E1]			B(E1)(W.u.)=1.5×10^{-5} *8*.
1821.0	1821.0 *3*	100				
1831.0	1831.0 *3*	100				
1867.28	394.8 *3*	11.3 *25*				
	583.2 *3*	100 *5*	M1+E2	0.15 *10*		B(M1)(W.u.)=0.30 *10*; B(E2)(W.u.)=15 *+21−15*.
1906.6	1168.3 *3*	100	E2			B(E2)(W.u.)=10 *3*.
1909.64	1411.7 *2*	100 *14*				
	1499.5 *3*	45 *9*				
1935.4	1196.9 *3*	100	M1+E2	−5 *3*		B(M1)(W.u.)=0.0003 *+4−3*; B(E2)(W.u.)=3.6 *16*.
1945.3	1206.9 *3*	100	M1+E2	0.15 *5*		B(M1)(W.u.)=0.031 *16*; B(E2)(W.u.)=0.4 *3*.
1952.1	1213.6 *3*	100	M1+E2	3.4 *2*		B(M1)(W.u.)=0.0010 *4*; B(E2)(W.u.)=6.1 *25*.
1957.05	1458.9 *2*	85 *8*				
	1547.2 *5*	≈100				
	1880.1 *4*	33 *4*				
	1956.9 *4*	100 *10*				
2031.4	1621.6 *3*	100				
2039.88	172.7 *3*	80 *7*	M1+E2	0.4 *2*		B(M1)(W.u.)=5 *3*; B(E2)(W.u.)=2.0×10^{4} *20*.
	567.2 *3*	80 *7*	M1+E2	6 *3*		B(M1)(W.u.)=0.004 *4*; B(E2)(W.u.)=380 *200*.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{113}Sn) (continued)

E(level)	Eγ†	Iγ†	Mult.‡	δ	Comments
2039.88	684.0 *2*	100 *7*	E2		B(E2)(W.u.)=190 *100*.
	755.8 *3*	47 *5*			
2045.47	573.0 *3*	53 *5*	(M1)		
	1547.9 *5*	≈100			
	1635.3 *3*	63 *8*			
	1968.3 *5*	35 *5*			
2128.14	1718.3 *2*	100			
2135.0	1725.2 *3*	100			
2176.27	892.1 *3*	64 *4*	M1+E2	−0.2 *1*	Mult.: δ=−0.2 *1* or −2.1 *6*. B(M1)(W.u.)=0.029 *20*; B(E2)(W.u.)=1.2 *+14−2*.
	1766.4 *3*	100 *8*	M1		B(M1)(W.u.)=0.006 *4*.
	2099.0 *3*	56 *4*	M1		B(M1)(W.u.)=0.0020 *14*.
2200.7	1702.6 *3*	100	M1+E2	−0.5 *3*	B(M1)(W.u.)<0.018; B(E2)(W.u.)<2.0.
2258.6	786.0 *3*	67 *25*			
	974.6 *4*	100 *8*			
2275.8	1866.0 *3*	100			
2336.7	1598.3 *3*	100	M1+E2	1.9 *2*	B(M1)(W.u.)=0.0033 *10*; B(E2)(W.u.)=3.7 *9*.
2385.77	518.4 *5*	17 *7*			
	913.2 *3*	100 *30*	M1+E2	0.4 *2*	B(M1)(W.u.)=0.03 *3*; B(E2)(W.u.)=4 *+6−4*.
	1101.8 *4*	14 *7*			
2410.8	543.5 *4*	100			
2448.38	975.8 *3*	70.8			
	1092.6 *5*	7 *3*			
	1164.3 *3*	100	M1+E2	1.4 *6*	
2457.11	1959.1 *3*	100 *5*			
	2047.2 *3*	14 *1*			
2467.9	1969.8 *3*	100			
2506.0	1034.0 *4*	66 *22*			
	1221.7 *3*	100 *10*			
2512.0	2013.9 *3*	100			
2538.27	2040.3 *3*	100 *18*			
	2128.3 *3*	60 *10*			
2540.0	633.3 *3*	70 *5*	M1+E2	−1.2 *8*	B(M1)(W.u.)=0.21 *19*; B(E2)(W.u.)=6.×10^{2} *5*.
	1801.6 *3*	100 *5*	E2		B(E2)(W.u.)=8 *4*.
2552.4	1079.8 *4*	100 *66*			
	1268.4 *3*	100 *20*			
2582.3	1843.8 *3*	100			
2590.77	2092.9 *3*	12 *3*			
	2180.7 *3*	100 *10*			
2616.7	2206.9 *5*	100			
2619.4	282.7 *3*	33 *13*			
	838.4 *4*	100 *13*			
	1881.0 *3*	60 *7*			
2624.04	879.4 *3*	56 *3*			
	1151.8 *5*	25 *13*			
	2213.9 *3*	100 *10*			
2649.0	1910.6 *3*	100	(E2)		
2662.8	2164.7 *3*	100			
2671.1	1932.7 *3*	100			
2675.3	808.0 *4*	83 *33*			
	1202.8 *4*	100 *33*			
2700.4	363.7 *4*	56 *22*			
	748.4 *3*	100 *22*			
	765.0 *4*	44 *22*			
	1962.0 *3*	78 *22*			
2717.8	381.1 *5*	66 *33*			
	772.5 *3*	100 *33*	M1		
	1979.4 *3*	100 *33*			
2749.7	797.7 *3*	100	(E2)		B(E2)(W.u.)=260 *90*.
2777.9	2039.5 *3*	100 *12*			
2806.6	900.0 *3*	100	E2		B(E2)(W.u.)=100 *30*.
2851.6	899.1 *4*	100 *50*			
	945.0 *2*	84 *11*			

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

$\gamma(^{113}Sn)$ (continued)

E(level)	Eγ†	Iγ†	Mult.‡	δ	Comments
2888.9	2150.5 3	100			
2915.9	963.8 2	100 17			
	1009.1 5	17 8			
2932.2	1918.7 8	37 15			
	2433.9 8	100 19			
	2854.4 8	48 11			
2956.5	1672.4 3	100			
2975.0	225.3 3	60 30	M1+E2	0.25 5	B(M1)(W.u.)=1.8 13; B(E2)(W.u.)=1.7×10^3 15.
	392.7 2	61 5			
	1068.3 3	100 30	E2		B(E2)(W.u.)=20 13.
3091.2	1184.7 3	100	E2		B(E2)(W.u.)=17 7.
3128.7	153.0	3 1			
	322.4 3	100 13	M1+E2	0.15 5	
3130.3	510.9 5	100 57			
	1223.6 4	29 14			
3138.9	1271.6 5	100			
3223.2	1316.5 3	100	Q		Mult.: From $^{100}Mo(^{18}O,5n\gamma)$.
3409.5	1502.6 5	100	D		Mult.: From $^{100}Mo(^{18}O,5n\gamma)$.
3412.5	1502.8 3	100			
3420.4	291.7 2	100 11	M1+E2	0.35 15	
	613.9 4	39 11	M1+E2	0.4 1	
3456.5	1546.8 4	100			
3458.3	329.3 3	100	M1+E2	0.16 5	
	651.1 5	3.4 17			
3680.4	551.7 3	100	M1+E2	>10	
3837.5	379.2 4	33 17			
	708.7 4	100 8	M1		
3901.9	678.7 4	44 11	(E2)		B(E2)(W.u.)=60 30.
	810.8 3	100	(E2)		B(E2)(W.u.)=58 20.
3913.8	1107.2 3	100	M1		
3972.1	551.9 3	14 14	M1+E2	>10	B(M1)(W.u.)<0.00067.
	843.7 3	100 18	M1+E2	0.25 5	B(M1)(W.u.)=0.06 3; B(E2)(W.u.)=4 3.
4051.8	642.0 5	100 5	E2		
	960.7 5	73 5	D		
4058.0	86.1 2	40 20			
	599.1 3	100 20	E1		B(E1)(W.u.)=1.4×10^{-6} 7.
4475.1	417.1 3	100	M1+E2	0.4 2	B(M1)(W.u.)<0.27; B(E2)(W.u.)<320.
4714.4	812.4 3	100	(E2)		B(E2)(W.u.)=160 60.
4752.2	700.3 5	88 5	E2		
	850.5 5	100 5	D		
5534.4	782.3 5	100 4	E2		
	820.3 5	34.9 18	D		
5605.7	1130.6 5	100	E2		
5645.6	930.8 5	100	E2		
6385.3	739.4 5	17.8 9	D		
	851.3 5	100 3	E2		
6682.3	1036.7 5	100	E2		
7322.0	936.7 5	100	E2		
7784.4	1102.3 5	100	E2		
7883.1	1200.7 5	100	E2		
8347.8	1025.7 5	100	E2		
8811.7	928.4 5	≤14	E2		
	1027.4 5	100 4	E2		
9014.0	1130.8 5	91 5	E2		
	1229.6 5	100 5	E2		
9466.9	1119.1 5	100	E2		
9936.4	1124.7 5	100	E2		
10209.7	1195.7 5	100	E2		
10589.1	1122.2 5	100	E2		
11242.0	1305.6 5	100	E2		
11405.1	1195.4 5	100	E2		
11723.5	1134.4 5	100	E2		
12642.9	1237.8 5	100	E2		
12736.8	1494.8 5	100	(E2)		
13034.6	1311.1 5	100	E2		
14032.6	1389.7 5	100	E2		
14286.5	1549.7 5	100	(E2)		
14577.5	1542.9 5	100	(E2)		
15653.9	1621.3 5	100	(E2)		
15990.8	1704.3 10	100	(E2)		
16309.8	1732.3 10	100	(E2)		
17504.3	1850.4 10	100	(E2)		
18219.8?	1910.8§ 10	100	(E2)		

† Average from (p,nγ), (p,3nγ), (α,2n), (α,3n) when they are given.
‡ The M and δ are from (α,2nγ), unless otherwise noted.
§ Placement of transition in the level scheme is uncertain.

^{113}Sn IT Decay (21.4 min) 1961Sc12

Parent ^{113}Sn: E=77; Jπ=7/2+; $T_{1/2}$=21.4 min *4*; %IT decay=91.1 *23*.
Measured Eγ, Iγ, α(K)exp from Iγ and I(K x–ray), 1961Sc12.

^{113}Sn Levels

E(level)	Jπ	$T_{1/2}$†	Comments
0.0	1/2+	115.09 d *4*	
77	7/2+	21.4 min *4*	Jπ: atomic beam (1976Fu06), 77γ is M3(+E4).

† See adopted levels.

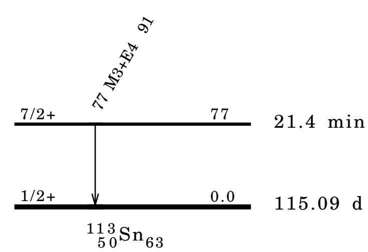
γ(^{113}Sn)

Eγ	E(level)	Iγ†	Mult.	δ	α	Comments
77	77	0.55	M3+E4	0.13 *2*	181 *5*	Eγ: from 1960Se06; other: 79 *3* (1961Sc12). Mult.,δ: M and δ: from α(K)exp=95 *15* (1961Sc12) and α(K)exp/α(L)exp=1.7 *1*(1961Se08). %IT from I(Kα x ray,^{113}In)/I(Kα x ray,^{113}Sn). B(M3)(W.u.)=0.029 *3*; B(E4)(W.u.)=150 *50*.

† For absolute intensity per 100 decays, multiply by 0.911 *23*.

Decay Scheme

Intensity: I(γ+ce) per 100 parent decays
%IT=91.1 *23*



^{113}Sb ε Decay 1976Wi10,1975WiZX

Parent ^{113}Sb: E=0.0; Jπ=5/2+; $T_{1/2}$=6.67 min *7*; Q(g.s.)=3913 *17*; %ε+%β^+ decay=100.
Chemical and mass separation. γ singles with escape–suppression spectrometer and semi, γγ coin, γ(t), 1976Wi10, 1975WiZX.
Others: 1969Ki16, 1972Si28.

^{113}Sn Levels

New levels are proposed only if they could be based on coincidence relations.

E(level)	Jπ	$T_{1/2}$†
0.0	1/2+	115.09 d *4*
77.39 *2*	7/2+	21.4 min *4*
409.77 *4*	5/2+	
498.01 *5*	3/2+	
1013.22 *5*	3/2+	
1018.09 *4*	5/2+	
1283.17 *12*	5/2+	
1314.04 *14*	3/2+	
1556.36 *9*	3/2+	
1646.18 *13*	3/2+,5/2+	
1651.75 *20*	5/2+	
1731.90 *17*	(3/2+,5/2+)	
1743.94 *14*	3/2+,5/2+	
1957.02 *16*	3/2,5/2	
2045.39 *23*	(5/2+,5/2+)	
2128.08 *21*	3/2+,5/2+	
2540.3 *4*	3/2+,5/2+	
2931.9 *5*		

† From adopted levels.

^{113}Sb ε Decay 1976Wi10,1975WiZX (continued)

β^+,ε Data

ε branches were obtained from (γ+ce) imbalance at each level.

Eε	E(level)	Iβ$^+$	Iε	Log *ft*	I(ε+β$^+$)
(981 17)	2931.9		0.040 6	6.42 7	0.040 6
(1373 17)	2540.3	0.00036 8	0.131 11	6.20 4	0.131 11
(1785 17)	2128.08	0.0112 15	0.213 24	6.22 5	0.224 25
(1868 17)	2045.39	0.0067 18	0.088 23	6.64 12	0.095 25
(1956 17)	1957.02	0.017 4	0.16 4	6.42 10	0.18 4
(2169 17)	1743.94	0.090 10	0.42 4	6.10 5	0.51 5
(2181 17)	1731.90	0.10 1	0.46 5	6.06 5	0.56 6
(2261 17)	1651.75	0.037 9	0.13 3	6.63 11	0.17 4
(2267 17)	1646.18	0.11 2	0.37 5	6.19 7	0.48 7
(2357 17)	1556.36	0.47 3	1.32 8	5.67 3	1.79 10
(2599 17)	1314.04	0.047 8	0.076 13	7.00 8	0.123 21
(2630 17)	1283.17	0.058 8	0.088 12	6.94 6	0.146 20
(2895 17)	1018.09	1.76 9	1.67 8	5.750 24	3.43 16
(2900 17)	1013.22	1.34 7	1.26 7	5.874 25	2.60 13
(3415 17)	498.01	60.3 19	26.7 9	4.691 18	87.0 26
(3503 17)	409.77	4.2 19	1.7 7	5.92 20	5.9 26
(3836† 17)	77.39	<2	<0.4	>6.6	<2.4

† Existence of this branch is questionable.

γ(^{113}Sn)

Measured Iγ of annihilation radiation is 168 4, 1976Wi10.
Iγ normalization: Calculated from measured annihilation radiation intensity and theoretical ε/β$^+$ ratios by assuming no ε decay to g.s., since I(ε+β$^+$) to g.s. <8×10^{-5}% from log *ft*>11 for a second–forbidden transition.

Eγ	E(level)	Iγ†	Mult.	δ	α	I(γ+ce)†	Comments
77.38 2	77.39	0.13 1	M3+E4	0.13 2	181 5	23 1	Iγ: from I(γ+ce) and α (from adopted levels). I(γ+ce): deduced from decay scheme. B(M3)(W.u.)=0.0309 14; B(E4)(W.u.)=160 50.
88.25 2	498.01	3.4 4	M1,E2		1.7 9		α: 88γ is M1,E2 from spin difference.
242.6 3	1556.36	0.029 6					
273.4 2	1556.36	0.047 5					
332.0 4	1646.18	0.030 14					
332.41 5	409.77	18.5 8					
409.9 2	409.77	0.16 2					
420.7 2	498.01	0.3 2					
448.3 5	1731.90	0.027 11					
497.96 9	498.01	100					
538.2 2	1556.36	0.073 5					
603.0 4	1013.22	0.014 3					
608.4 1	1018.09	0.50 3					
718.4 3	1731.90	0.04 2					
725.3 10	1743.94	0.015 8					
785.2 3	1283.17	0.019 4					
x801.0 2		0.034 4					
816.3 3	1314.04	0.033 4					
x886.5 2		0.10 2					
935.77 6	1013.22	2.14 11					
940.63 6	1018.09	3.27 16					
1013.28 6	1013.22	1.14 7					
1018.12 6	1018.09	0.60 3					
1058.3 2	1556.36	0.068 6					
x1128.8 2		0.034 4					
1146.6 4	1556.36	0.56 4					
1148.4 4	1646.18	0.14 4					

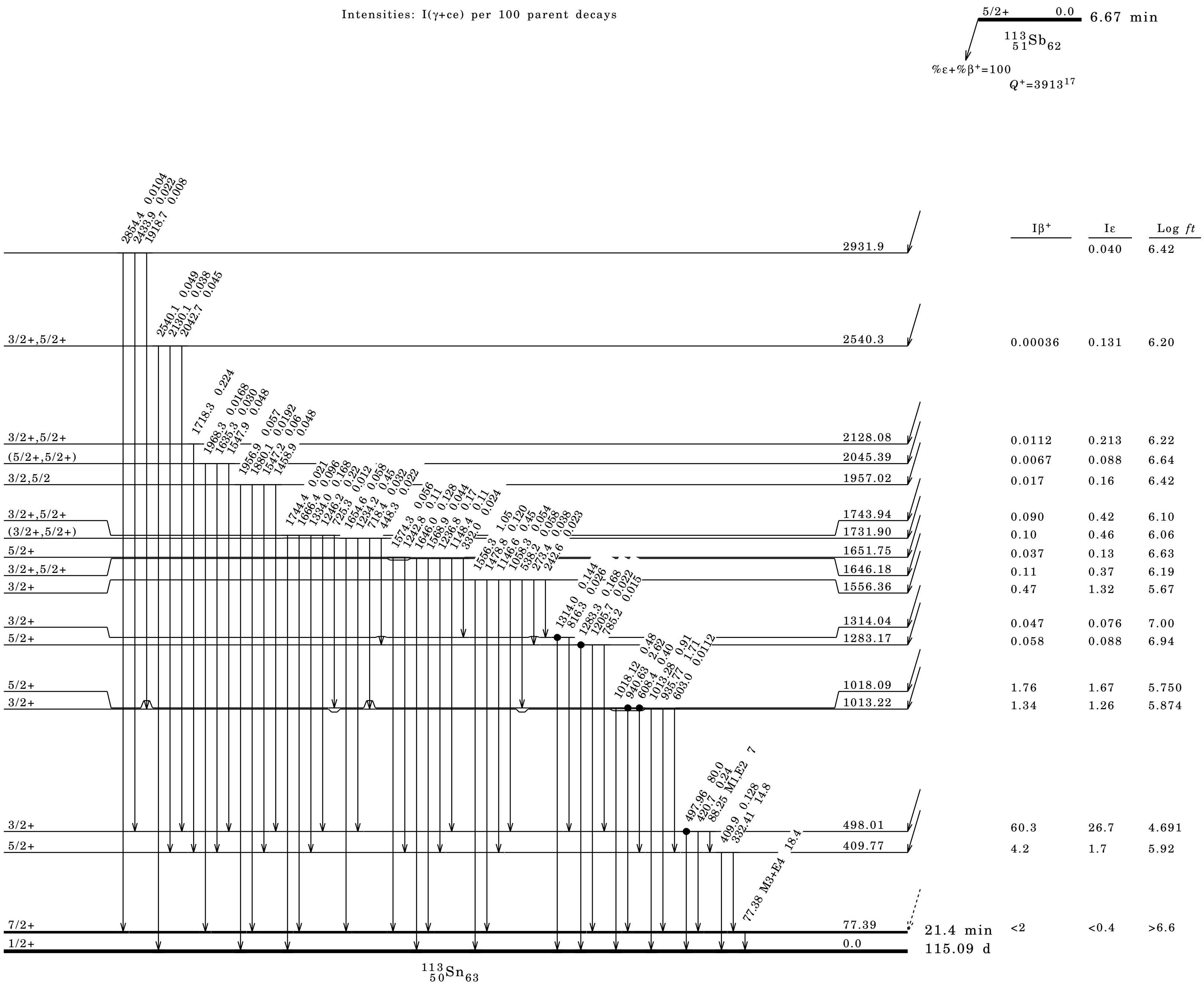
Eγ	E(level)	Iγ†
1205.7 3	1283.17	0.027 4
1234.2 3	1731.90	0.56 7
1236.8 7	1646.18	0.21 7
1242.8 8	1651.75	0.14 5
1246.2 3	1743.94	0.27 5
1283.3 2	1283.17	0.21 2
1314.0 2	1314.04	0.18 2
1334.0 2	1743.94	0.21 2
x1355.9 3		0.036 4
x1390.7 2		0.058 5
1458.9 2	1957.02	0.060 6
1478.8 2	1556.36	0.15 2
1547.2 5	1957.02	0.07 4
1547.9 5	2045.39	0.06 3
1556.3 2	1556.36	1.31 10
1568.9 2	1646.18	0.055 6
1574.3 2	1651.75	0.070 7
1635.3 3	2045.39	0.038 5
1646.0 2	1646.18	0.16 2
1654.6 3	1731.90	0.073 7
1666.4 3	1743.94	0.12 2
1718.3 2	2128.08	0.28 3
1744.4 4	1743.94	0.026 4
x1806.1 3		0.035 4
1880.1 4	1957.02	0.024 3
x1889.4 3		0.078 7
1918.7 8	2931.9	0.010 4
1956.9 4	1957.02	0.071 7
1968.3 5	2045.39	0.021 3
x2006.7 6		0.033 4
x2014.7 6		0.044 6
2042.7 6	2540.3	0.056 7
2130.1 6	2540.3	0.047 6
x2304.8 7		0.016 3
x2337.2 7		0.015 3
2433.9 8	2931.9	0.027 5
2540.1 7	2540.3	0.061 8
x2624.6 6		0.015 3
x2791.5 13		0.011 3
2854.4 8	2931.9	0.013 3
x3143.7 12		0.016 3
x3192.5 12		0.014 3
x3605.6 13		0.021 5

† For absolute intensity per 100 decays, multiply by 0.80 2.
x γ ray not placed in level scheme.

^{113}Sb ε Decay 1976Wi10,1975WiZX (continued)

Decay Scheme

Intensities: I(γ+ce) per 100 parent decays



Level	Iβ⁺	Iε	Log *ft*
2931.9		0.040	6.42
2540.3	0.00036	0.131	6.20
2128.08	0.0112	0.213	6.22
2045.39	0.0067	0.088	6.64
1957.02	0.017	0.16	6.42
1743.94	0.090	0.42	6.10
1731.90	0.10	0.46	6.06
1651.75	0.037	0.13	6.63
1646.18	0.11	0.37	6.19
1556.36	0.47	1.32	5.67
1314.04	0.047	0.076	7.00
1283.17	0.058	0.088	6.94
1018.09	1.76	1.67	5.750
1013.22	1.34	1.26	5.874
498.01	60.3	26.7	4.691
409.77	4.2	1.7	5.92
77.39	<2	<0.4	>6.6

^{100}Mo(^{18}O,5nγ) 1998Se14,1998Ch38

1998Se14: ^{100}Mo(^{18}O,5nγ) E=94 MeV. Measured Eγ, Iγ, γγ, γγ(θ)(DCO) using 20 Ge detectors and 71–detector BGO filter at "TASCC" facility at "CHALK RIVER".
See 1998Se14 for detailed orbital configurations for each band.
1998Ch39: ^{100}Mo(^{18}O,5nγ) E=70 MeV. Measured Eγ, Iγ, γγ, using the OSIRIS spectrometer array.
The data of 1998Se14 are adopted. Only a figure is given in 1998Ch38. without table, however 1998Ch38 agree with the 1998Se14 until the 8810 level (43/2–).

^{113}Sn Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0§	1/2+	4474.3 *10*	27/2+	10208.9@ *13*	47/2–
77.4§	7/2+	4713.5& *8*	27/2–	10588.3# *14*	49/2
738.4§	11/2–	4751.6# *8*	25/2	11241.2& *14*	51/2–
1906.3 *5*	15/2–	5533.7# *8*	29/2	11404.3@ *14*	51/2–
2806.1 *7*	19/2–	5604.9 *11*	31/2+	11722.7# *15*	53/2
2973.8 *7*	19/2–	5644.8& *9*	31/2–	12642.1@ *14*	55/2–
3091.0 *7*	19/2–	6384.6# *9*	33/2	12736.0& *14*	(55/2–)
3128.4 *7*	21/2–	6681.5& *10*	35/2–	13033.8# *15*	57/2
3222.7 *7*	19/2–	7321.3# *10*	37/2	14031.8@ *15*	59/2–
3409.1# *7*	17/2	7783.6& *11*	39/2–	14285.7& *15*	59/2–
3419.7 *9*	21/2–	7882.3@ *11*	39/2–	14576.7# *16*	(61/2)
3457.6 *9*	23/2–	8347.0# *12*	41/2	15653.1@ *16*	(63/2–)
3901.3& *7*	23/2–	8810.9& *12*	43/2–	15990.0& *18*	(63/2–)
3971.6 *8*	23/2(+)	9013.2@ *12*	43/2–	16309.0# *19*	(65/2)
4051.4# *7*	21/2	9466.1# *13*	45/2	17503.5@ *19*	(67/2–)
4057.1 *9*	25/2+	9935.6& *13*	47/2–	18219.8?# *20*	(69/2)

† From least–squares fit to Eγ's.
‡ From 1998Se14, based on their γγ(θ)(DCO) data and band assignments.
§ From adopted levels, rounded–off value.
\# (A): ΔJ=2 band based on on 17/2 at 3409.5 keV, [21,3].
@ (B): ΔJ=2 band based on on 39/2– at 7883.1 keV, [21,4].
& (C): ΔJ=2 band based on on 31/2– at 5645.6 keV, [20,3].

γ(^{113}Sn)

Eγ	E(level)	Iγ	Mult.†	Comments
77.4‡	77.4			
85.5 *5*	4057.1	≤1.0	(M1+E2)	
154.5 *5*	3128.4	≤1.0	M1,E2	
291.3 *5*	3419.7	1.9 *1*	M1+E2	DCO=1.16 *12*.
322.4 *5*	3128.4	20.3 *6*	M1+E2	DCO=0.84 *2*.
329.1 *5*	3457.6	7.8 *2*	M1+E2	DCO=0.86 *3*.
417.2 *5*	4474.3	4.5 *1*	M1,E2	DCO=0.89 *3*.
551.9 *5*	3971.6	2.1 *1*	(E1)	DCO=0.66 *7*.
599.4 *5*	4057.1	7.6 *2*	E1	DCO=0.78 *5*.
642.0 *5*	4051.4	2.2 *1*	E2	DCO=1.02 *13*.
661.0‡	738.4			
678.6 *5*	3901.3	12.2 *4*	E2	DCO=0.97 *9*.
700.3 *5*	4751.6	3.8 *2*	E2	DCO=1.02 *11*.
739.4 *5*	6384.6	2.1 *1*	D	DCO=0.61 *20*.
782.3 *5*	5533.7	10.9 *4*	E2	DCO=0.95 *8*.
810.3 *5*	3901.3	23.2 *8*	E2	DCO=1.00 *2* for 810.3+812.0.
812.0 *5*	4713.5	32.8 *11*	E2	DCO=1.00 *2* for 810.3+812.0.
820.3 *5*	5533.7	3.8 *2*	D	DCO=0.58 *9*.
843.3 *5*	3971.6	9.3 *3*	(E1)	DCO=0.56 *3*.
850.5 *5*	4751.6	4.3 *2*	D	DCO=0.85 *3* for 850.5+851.3.
851.3 *5*	6384.6	11.8 *4*	E2	DCO=0.85 *3* for 850.5+851.3.
899.9 *5*	2806.1	38.9 *13*	E2	DCO=0.97 *3*.
928.4 *5*	8810.9	≤1.0	E2	
930.8 *5*	5644.8	30.9 *10*	E2	DCO=0.98 *2*.
936.7 *5*	7321.3	15.9 *5*	E2	DCO=0.97 *4*.
960.7 *5*	4051.4	1.6 *1*	D	
1025.7 *5*	8347.0	12.6 *4*	E2	DCO=0.98 *8* for 1025.7+1027.4.

Continued on next page (footnotes at end of table)

$^{100}Mo(^{18}O,5n\gamma)$ 1998Se14,1998Ch38 (continued)

$\gamma(^{113}Sn)$ (continued)

Eγ	E(level)	Iγ	Mult.†	Comments
1027.4 *5*	8810.9	7.3 *3*	E2	DCO=0.98 *8* for 1025.7+1027.4.
1036.7 *5*	6681.5	23.2 *7*	E2	DCO=0.98 *3*.
1067.4 *5*	2973.8	9.1 *5*	E2	DCO=1.01 *10*.
1102.3 *5*	7783.6	13.6 *4*	E2	DCO=1.00 *5*.
1119.1 *5*	9466.1	7.8 *3*	E2	DCO=0.98 *3* for 1119.1+1122.2.
1122.2 *5*	10588.3	6.9 *3*	E2	DCO=0.98 *3* for 1119.1+1122.2.
1124.7 *5*	9935.6	6.3 *2*	E2	DCO=0.92 *14*.
1130.6 *5*	5604.9	3.8 *1*	E2	DCO=1.09 *10*.
1130.8 *5*	9013.2	3.9 *2*	E2	DCO=0.93 *19*.
1134.4 *5*	11722.7	7.2 *2*	E2	DCO=0.95 *6*.
1167.9 *5*	1906.3	100.0 *37*	E2	
1184.9 *5*	3091.0	31.0 *11*	E2	DCO=0.98 *4*.
1195.4 *5*	11404.3	2.6 *2*	E2	DCO=1.07 *9* for 1195.4+1195.7.
1195.7 *5*	10208.9	3.5 *2*	E2	DCO=1.07 *9* for 1195.4+1195.7.
1200.7 *5*	7882.3	4.2 *2*	E2	DCO=1.07 *15*.
1229.6 *5*	9013.2	4.3 *2*	E2	DCO=1.06 *13*.
1237.8 *5*	12642.1	2.2 *1*	E2	DCO=1.04 *14*.
1305.6 *5*	11241.2	3.9 *1*	E2	DCO=1.05 *9*.
1311.1 *5*	13033.8	3.2 *1*	E2	DCO=0.97 *6*.
1316.4 *5*	3222.7	17.7 *7*	E2	DCO=1.01 *7*.
1389.7 *5*	14031.8	1.9 *1*	E2	DCO=1.11 *18*.
1494.8 *5*	12736.0	1.5 *1*	(E2)	
1502.6 *5*	3409.1	3.3 *3*	D	
1542.9 *5*	14576.7	1.8 *1*	(E2)	
1549.7 *5*	14285.7	1.2 *1*	(E2)	
1621.3 *5*	15653.1	≤1.0	(E2)	
1704.3 *10*	15990.0	≤1.0	(E2)	
1732.3 *10*	16309.0	≤1.0	(E2)	
1850.4 *10*	17503.5	≤1.0	(E2)	
1910.8§ *10*	18219.8?	≤1.0	(E2)	

† Primarily from DCO.
‡ Rounded–off value from adopted gammas.
§ Placement of transition in the level scheme is uncertain.

$^{110}Cd(\alpha,n\gamma)$ 1997Ka40,1976Ma09

1997Ka40: E=18 MeV. Measured: γ and ce singles, excit, γγ coin. Preliminary report was given in 1995KaZV.
1976Ma09: E=15–18 MeV. Measured: γ and ce singles, excit functions, γγ.

^{113}Sn Levels

E(level)†	Jπ‡	$T_{1/2}$
0.0	1/2+	
77.38 *1*	7/2+	
410.37 *18*	5/2+	
498.16 *16*	3/2+	
739.3 *4*	11/2−	86 ns§ *2*
1014.66 *24*	(1/2),3/2+	
1018.36 *21*	5/2+	
1284.22 *17*	5/2+	
1314.0 *3*	3/2+	
1356.0 *3*	3/2+	
1472.77 *23*	5/2+	
1539.4 *4*	5/2+	
1540.8 *5*	(11/2−)	
1557.0 *3*	3/2+	
1645.2 *4*		
1652.1 *3*	5/2+	
1732.3 *4*	(3/2+,5/2+)	
1745.29 *23*	5/2+	
1781.5 *3*	9/2−	
1831.0 *3*		
1867.5 *3*	5/2+	
1907.6 *5*	15/2−	
1909.9 *3*	(5/2+,7/2+)	
1936.3 *5*	(11/2−)	
1946.2 *5*	(9/2−)	
1952.9 *5*	(13/2−)	
2039.97 *25*	(7/2+)	
2045.9 *3*	(3/2+,5/2+)	
2176.9 *5*	7/2+	
2200.8 *4*	5/2+	
2258.8 *4*	5/2+	
2337.6 *5*	11/2−	
2386.0 *4*	7/2+	
2448.6 *3*	7/2+	
2457.4 *3*		
2505.8 *4*		
2512.1 *4*	(3/2+,5/2+)	
2540.9 *5*	(15/2−)	
2583.1 *5*		
2591.1 *3*		
2617.3 *4*		
2620.1 *4*		
2624.7 *4*		
2649.9 *5*		
2662.9 *4*	(3/2+,5/2+)	
2672.0 *5*		
2750.7 *6*	17/2−	
2778.8 *5*		

Continued on next page (footnotes at end of table)

^{110}Cd(α,nγ) 1997Ka40,1976Ma09 (continued)

^{113}Sn Levels (continued)

E(level)†	Jπ‡
2807.7 *6*	19/2–
2890.0 *5*	11/2–
2956.6 *4*	
2976.0 *7*	(19/2–)
3130.2 *6*	21/2–

† From least–squares fit to γ energies.
‡ From adopted levels. All the reactions works (α,xnγ) and (p,nγ) of 1997Ka40 are in the same paper and have the same Jπ.
§ From adopted levels. Measured in ^{111}Cd(α,2nγ).

γ(^{113}Sn)

Eγ†	E(level)	Iγ†	Mult.‡	Comments
77.38 *1*	77.38			Eγ: from adopted levels, gammas.
172.4 *3*	2039.97	1.2 *1*		
225.3 *3*	2976.0	0.5 *2*		
322.5 *3*	3130.2	1.1 *1*		
332.6 *3*	410.37	44 *3*	M1,E2	Mult.: from α(K)exp=0.0192 *13*.
498.1 *2*	498.16	30 *2*	M1	Mult.: from γ(θ) and linear polarization.
567.2 *3*	2039.97	1.2 *1*		
583.2 *3*	1867.5	7.1 *4*	M1,E2	Mult.: from α(K)exp=0.0038 *7*.
608.0 *3*	1018.36	2.5 *2*	M1	Mult.: from γ(θ) and linear polarization.
633.3 *3*	2540.9	1.2 *1*		
661.5 *3*	739.3	100 *4*	M2	Mult.: from γ(θ) and linear polarization. B(M2)(W.u.)=0.122 *3*.
755.8 *3*	2039.97	0.6 *1*		
786.0§ *3*	2258.8	4.4§ *2*		
786.1§ *3*	1284.22	4.4§ *2*		
797.8 *3*	2750.7	1.4 *1*		
801.5 *3*	1540.8	3.6 *3*		Eγ: the placement of this transition is questionable. 1987Vi09 in (p,nγ) has found 801γ in coin with 662γ but not with 1018γ and 332γ.
838.4§ *3*	2620.1	2.3§ *2*		
ˣ838.9§ *3*		2.3§ *2*		
873.9 *3*	1284.22	2.0 *2*		
879.4 *3*	2624.7	1.1 *1*		
892.6 *3*	2176.9	2.8 *2*		
ˣ899.7§ *3*		3.9§ *2*		
900.1§ *3*	2807.7	3.9§ *2*		
913.2 *3*	2386.0	1.8 *1*		
936.7 *3*	1014.66	5.5 *3*		
940.6 *3*	1018.36	12.0 *6*		
975.8 *3*	2448.6	1.1 *1*		
1014.4 *3*	1014.66	3.6 *2*		
1018.3 *3*	1018.36	2.5 *2*		
1042.3 *3*	1781.5	6.8 *3*		
1068.3 *3*	2976.0	1.2 *1*		
1129.0 *3*	1539.4	4.4 *3*		
1147.2 *3*	1645.2	1.5 *1*		
1164.3 *3*	2448.6	1.2 *1*		
1168.3 *3*	1907.6	22.1 *9*		
1197.0 *3*	1936.3	7.3 *4*		
1206.9 *3*	1946.2	3.8 *3*		
1213.6 *3*	1952.9	11.3 *6*		
1221.6 *3*	2505.8	0.9 *2*		
1234.1 *3*	1732.3	3.8 *3*		
1241.6 *3*	1652.1	4.0 *3*		
1247.1 *3*	1745.29	1.4 *1*		
1284.2 *3*	1284.22	28 *2*	E2	Mult.: M1,E2 from α(K)exp=0.0006 *1*, E2 from γ(θ) and linear polarization.
1314.0 *3*	1314.0	5.0 *3*	M1	Mult.: from γ(θ) and linear polarization.
1334.9 *3*	1745.29	7.3 *4*		
1356.0 *3*	1356.0	8.8 *4*		
1411.7 *3*	1909.9	3.7 *3*		
1472.8 *3*	1472.77	23.3 *2*	E2	Mult.: from γ(θ) and linear polarization.
1499.5 *3*	1909.9	2.9 *2*		
ˣ1546.8 *3*		2.0 *2*		

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^{110}Cd(α,nγ) 1997Ka40,1976Ma09 (continued)

γ(^{113}Sn) (continued)

Eγ†	E(level)	Iγ†	Eγ†	E(level)	Iγ†	Eγ†	E(level)	Iγ†
1547.7§ 3	2045.9	2.0§ 2	1801.6 3	2540.9	0.7 2	2039.5 3	2778.8	1.4 1
1557.0 3	1557.0	1.4 1	1831.0 3	1831.0	1.4 1	2092.9 3	2591.1	0.1 1
1574.5 3	1652.1	2.4 2	1843.8 3	2583.1	2.4 2	2099.3 3	2176.9	1.2 1
1598.3 3	2337.6	4.0 3	1910.6 3	2649.9	0.4 1	2150.5 3	2890.0	0.6 2
1667.5 3	1745.29	3.5 3	1932.7 3	2672.0	0.6 2	2164.7 3	2662.9	1.3 1
1672.4 3	2956.6	0.6 2	1959.1 3	2457.4	1.1 1	2206.9 3	2617.3	0.3 1
1702.6 3	2200.8	3.9 3	2013.9 3	2512.1	1.4 1			

† From 1997Ka40, ΔEγ=0.3 keV estimated by evaluator, average of ΔEγ=0.1–0.4 keV (1997Ka40).
‡ α(K)exp normalized by 498γ and 662γ to M1 and M2 theory, respectively. 498γ is M1,E2 from decay scheme, and 662γ is M2(+E3) from ^{113}Sn IT decay (86 ns). The other multipolarity assignments are not affected by this uncertainty.
§ Multiply placed; undivided intensity given.
x γ ray not placed in level scheme.

^{111}Cd(α,2nγ) 1997Ka40,1991Vi09

1997Ka40: E=27 MeV. Measured: γ, excit, γγ coin, γ(θ), γ(t) Doppler shift, linear polarization, γ–rf distribution. Preliminary report was given in 1995KaZV.
1991Vi09: E=27 MeV. Measured: γ, excit, γγ coin, γ(θ), γ(t) Doppler shift.
Others: 1972Br38, 1973IsZQ, 1974Br29. Measured: $T_{1/2}$ of 739 level.

^{113}Sn Levels

E(level)	Jπ†	$T_{1/2}$‡	Comments
0.0§	1/2+		
77.38§	7/2+		
410.36§ 14	5/2+		
498.11§ 9	3/2+	>0.35 ps	
739.17# 18	11/2−	86 ns 2	$T_{1/2}$: from adopted levels.
1014.39§ 22	3/2+	0.2 ps 1	
1018.31§ 18	5/2+	1.0 ps 5	
1249.3 5			
1284.27§ 12	5/2+	0.5 ps 2	
1314.01§ 20	3/2+		
1356.00§ 16	3/2+	0.7 ps 3	
1472.78§ 9	5/2+	0.8 ps 5	
1539.36§ 24	5/2+	0.6 ps 1	
1540.7# 4	(11/2−)	0.2 ps 1	
1557.0§ 3	3/2+		
1645.3 5			
1647.4 3			
1652.0§ 3	5/2+		
1732.5§ 5	(3/2+,5/2+)		
1745.22§ 18	5/2+	0.31 ps 8	
1781.52# 24	9/2−	0.19 ps 7	
1867.55§ 16	5/2+	0.33 ps 10	
1907.45# 20	15/2−	0.8 ps 2	
1909.83§ 19	(5/2+,7/2+)		
1936.18# 20	11/2−	1.9 ps 8	
1946.08# 25	(9/2−)	0.4 ps 2	
1952.78# 20	13/2−	1.0 ps 4	
2031.7 6			
2039.99§ 16	7/2+	0.2 ps 1	
2045.81§ 24	(3/2+,5/2+)		
2135.5 6			
2176.83§ 16	7/2+	0.3 ps 2	
2200.72 22	(5/2)	>0.24 ps	
2258.8§ 3	(5/2+)	0.3 ps 1	
2275.2 6			

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$^{111}Cd(\alpha,2n\gamma)$ 1997Ka40,1991Vi09 (continued)

^{113}Sn Levels (continued)

E(level)	Jπ†	$T_{1/2}$‡	Comments
2337.47# *24*	11/2−	0.35 ps *8*	
2386.01§ *24*	7/2+	0.7 ps *4*	
2411.0 *5*			E(level): from coin between 1284–583–543 gammas.
2448.59 *18*	(7/2)		
2506.2 *3*			
2512.0§ *5*	(3/2+,5/2+)		
2540.78# *25*	(15/2−)	0.07 ps *3*	
2552.6 *4*			
2583.10# *24*	(15/2−)	0.22 ps *9*	
2620.1 *3*			
2624.6 *3*			
2649.8# *6*	(9/2−)		
2662.8§ *4*	(3/2+,5/2+)		
2671.9 *6*			
2675.6 *3*			E(level): from coin between 1284–583–808 gammas.
2701.15 *25*		0.4 ps *1*	
2718.6# *3*	(11/2−)		
2750.61# *25*	17/2−	0.21 ps *7*	
2778.7 *4*			
2807.50# *22*	19/2−	0.31 ps *10*	
2852.5# *3*	(17/2−)	1.2 ps *6*	
2889.9 *6*			
2916.6 *3*			
2956.7 *4*			
2975.92# *24*	(19/2−)	0.28 ps *14*	
3092.55# *22*	19/2−	0.45 ps *18*	
3129.9# *3*	21/2−	>0.35 ps	
3131.0 *4*			
3139.2 *6*			
3224.0# *4*	(19/2−)	>1.4 ps	
3410.3 *4*			
3421.4# *3*	21/2−		
3454.3 *5*			
3459.5# *3*	23/2−		
3838.7# *4*	(23/2−)		
3902.7# *4*	(23/2−)	0.6 ps *2*	
3914.7# *4*	(21/2−)		
3973.4# *3*	(23/2−)	0.5 ps *2*	
4059.2§ *4*	25/2+	0.69 ns *28*	$T_{1/2}$: from γ–rf(t) (1997Ka40).
4476.6§ *4*	(27/2+)	>1.1 ps	
4714.7# *6*	(27/2−)	0.31 ps *10*	

† From decay properties, as given by 1997Ka40.
‡ From Doppler shift.
§ (A): Positive–parity levels.
# (B): Negative–parity levels.

$\gamma(^{113}Sn)$

Eγ†	E(level)	Iγ†	Mult.‡	δ	Comments
77.38	77.38				Eγ: from adopted levels, gammas.
86.1 *3*	4059.2				
87.8	498.11				
153.5 *3*	3129.9	0.4 *2*			
172.4 *2*	2039.99	1.2 *1*	M1+E2	0.4 *2*	B(M1)(W.u.)=5 *3*; B(E2)(W.u.)=2.1×10^4 *21*.
225.3 *2*	2975.92	1.6 *1*	M1+E2	0.25 *5*	B(M1)(W.u.)=1.3 *7*; B(E2)(W.u.)=1.2×10^3 *8*.
282.7 *3*	2620.1	0.5 *2*			
291.7 *2*	3421.4	1.8 *2*	M1+E2	0.35 *15*	
322.5 *1*	3129.9	15.9 *8*	M1+E2	0.15 *5*	B(M1)(W.u.)<1.8; B(E2)(W.u.)<510.
329.5§ *2*	3459.5	5.8§ *5*	M1+E2	0.16 *5*	
332.6 *2*	410.36	11.2 *6*	M1+E2	−0.08 *2*	

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$^{111}Cd(\alpha,2n\gamma)$ 1997Ka40,1991Vi09 (continued)

$\gamma(^{113}Sn)$ (continued)

Eγ†	E(level)	Iγ†	Mult.‡	δ	Comments
363.7 4	2701.15	0.5 2			
379.2 4	3838.7	0.4 2			
381.1 5	2718.6	0.4 2			
392.7 2	2975.92	2.5 2			
394.8 3	1867.55	0.9 2			
410.3 3	410.36	0.6 2			
417.4 2	4476.6	1.3 1	M1+E2	0.4 2	B(M1)(W.u.)<0.27; B(E2)(W.u.)<320.
498.1 1	498.11	6.6 4	M1+E2	0.12 6	B(M1)(W.u.)<0.51; B(E2)(W.u.)<46.
510.9 5	3131.0	1.4 8			
518.4 5	2386.01	0.5 2			
543.5 4	2411.0	0.4 2			
551.9 3	3973.4	0.9 1	M1+E2	>10	B(M1)(W.u.)<0.00044; B(E2)(W.u.)>47.
567.2 3	2039.99	1.2 1	M1+E2	6 3	B(M1)(W.u.)=0.004 4; B(E2)(W.u.)=380 200.
573.0 3	2045.81	1.0 1	(M1)		
583.2 2	1867.55	8.0 4	M1+E2	0.15 10	B(M1)(W.u.)=0.30 10; B(E2)(W.u.)=15 +21−15.
599.5 2	4059.2	3.0 2	E1		B(E1)(W.u.)=1.9×10^{-6} 9.
608.0 2	1018.31	4.2 3	M1+E2	3 1	B(M1)(W.u.)=0.006 5; B(E2)(W.u.)=110 60.
613.3 3	3421.4	0.7 2	M1+E2	0.4 1	
633.3 3	2540.78	1.0 1	M1+E2	−1.2 8	B(M1)(W.u.)=0.24 22; B(E2)(W.u.)=$7.\times10^{2}$ 5.
652.1 5	3459.5	0.2 1			
661.5 1	739.17	100 4	M2		B(M2)(W.u.)=0.122 3.
678.7 4	3902.7	0.8 2	(E2)		B(E2)(W.u.)=60 30.
684.0 2	2039.99	1.5 1	E2		B(E2)(W.u.)=190 100.
708.7 4	3838.7	1.2 1	M1		
748.3 3	2701.15	0.9 2			
755.8 3	2039.99	0.7 2			
765.0 4	2701.15	0.4 2			
772.5 3	2718.6	0.6 2	M1		
786.0 4	2258.8	0.8 3			
786.1 3	1284.27	2.0 2			
797.8 2	2750.61	4.9 3	(E2)		B(E2)(W.u.)=260 90.
801.5 3	1540.7	2.0 2	M1+E2	−0.3 1	B(M1)(W.u.)=0.20 10; B(E2)(W.u.)=22 18.
808.0 4	2675.6	0.5 2			
810.1 3	3902.7	1.8 2	(E2)		B(E2)(W.u.)=58 22.
812.0 4	4714.7	0.7 1	(E2)		B(E2)(W.u.)=160 60.
838.4§ 4	2620.1	<1.5§			
838.9§ 4	1249.3	<1.5§			
843.7 2	3973.4	6.6 3	M1+E2	0.25 5	B(M1)(W.u.)=0.061 25; B(E2)(W.u.)=4.2 24.
873.9 4	1284.27	0.6 2	M1+E2	2.7 8	B(M1)(W.u.)=0.00032 24; B(E2)(W.u.)=2.4 13.
879.4 3	2624.6	0.4 2			
892.6 2	2176.83	1.6 1	M1+E2	−0.2 1	Mult.: δ=−0.2 1 or −2.1 6. B(M1)(W.u.)=0.029 20; B(E2)(W.u.)=1.1 +14−1.
899.7§ 4	2852.5	20.5§ 9			
900.1§ 1	2807.50	20.5§ 9	E2		B(E2)(W.u.)=100 30.
913.2 3	2386.01	2.9 2	M1+E2	0.4 2	B(M1)(W.u.)=0.027 17; B(E2)(W.u.)=4 +5−4.
936.7 2	1014.39	1.6 1	E2		B(E2)(W.u.)=60 40.
940.6 2	1018.31	2.5 2	M1+E2	0.5 2	B(M1)(W.u.)=0.008 4; B(E2)(W.u.)=1.7 14.
945.0 2	2852.5	1.6 2			
963.8 2	2916.6	1.2 2			
974.6 4	2258.8	1.2 1			
975.8 3	2448.59	1.9 1			
1009.1 5	2916.6	0.2 1			
1014.4 4	1014.39	1.5 1	M1+E2	0.5 1	B(M1)(W.u.)=0.041 21; B(E2)(W.u.)=8 5.
1018.3 5	1018.31	0.3 2	E2		B(E2)(W.u.)=0.7 6.
1034.0 4	2506.2	0.6 2			
1042.3 2	1781.52	4.1 2	M1+E2	−0.5 3	Mult.: δ=−0.5 3 or −1.6 3. B(M1)(W.u.)=0.08 4; B(E2)(W.u.)=14 +15−14.
1068.3 3	2975.92	4.1 2	E2		B(E2)(W.u.)=22 12.
1079.8 4	2552.6	0.3 2			
1092.6 5	2448.59	0.2 1			
1101.8 4	2386.01	0.4 2			
1107.2 3	3914.7	1.1 1	M1		
1129.0 2	1539.36	1.2 2	M1+E2	−2.5 10	B(M1)(W.u.)=0.0035 25; B(E2)(W.u.)=14 3.

Continued on next page (footnotes at end of table)

^{111}Cd(α,2nγ) 1997Ka40,1991Vi09 (continued)

γ(^{113}Sn) (continued)

Eγ†	E(level)	Iγ†	Mult.‡	δ	Comments
1147.2 *5*	1645.3	0.3 *2*			
1149.3 *4*	1647.4	0.6 *2*			
1151.8 *5*	2624.6	0.1 *1*			
1164.3 *2*	2448.59	2.9 *2*	M1+E2	1.4 *6*	
1168.3 *1*	1907.45	57 *3*	E2		B(E2)(W.u.)=10 *3*.
1185.1 *1*	3092.55	5.3 *3*	E2		B(E2)(W.u.)=17 *7*.
1197.0 *1*	1936.18	3.3 *2*	M1+E2	−5 *3*	B(M1)(W.u.)=0.0003 *+4−3*; B(E2)(W.u.)=3.6 *16*.
1202.8 *4*	2675.6	0.6 *2*			
1206.9 *2*	1946.08	2.5 *2*	M1+E2	0.15 *5*	B(M1)(W.u.)=0.031 *16*; B(E2)(W.u.)=0.4 *3*.
1213.6 *1*	1952.78	12.1 *6*	M1+E2	3.4 *2*	B(M1)(W.u.)=0.0010 *4*; B(E2)(W.u.)=6.1 *25*.
1221.6 *3*	2506.2	0.9 *1*			
1223.6 *4*	3131.0	0.4 *2*			
1234.4 *4*	1732.5	0.2 *1*	M1		
1237.1 *4*	1647.4	0.2 *1*			
1241.6 *3*	1652.0	1.0 *2*	M1		
1247.1 *5*	1745.22	0.1 *1*	M1+E2	2.1 *15*	B(M1)(W.u.)=0.00013 *+21−13*; B(E2)(W.u.)=0.3 *+4−3*.
1268.4 *5*	2552.6	0.2 *2*			
1271.6 *5*	3139.2	0.4 *2*			
1284.2 *2*	1284.27	12.5 *6*	E2		B(E2)(W.u.)=8 *4*.
1314.0 *2*	1314.01	2.6 *2*	M1		
1316.5 *3*	3224.0	2.4 *2*			
1334.9 *2*	1745.22	3.9 *2*	M1+E2	0.6 *4*	B(M1)(W.u.)=0.016 *8*; B(E2)(W.u.)=3 *3*.
1356.0 *2*	1356.00	2.2 *2*	M1+E2	0.14 *6*	B(M1)(W.u.)=0.012 *6*; B(E2)(W.u.)=0.10 *10*.
1411.7 *2*	1909.83	1.2 *2*			
1472.8 *1*	1472.78	13.3 *7*	E2		B(E2)(W.u.)=3.1 *20*.
1499.5 *3*	1909.83	0.5 *2*			
1502.8 *3*	3410.3	0.6 *2*			
1546.8 *4*	3454.3	<1.9			
1547.7 *5*	2045.81	<1.9			
1557.0 *3*	1557.0	0.7 *2*	M1+E2	0.2 *1*	
1574.5 *4*	1652.0	0.5 *2*	M1+E2	−1.0 *5*	
1598.3 *2*	2337.47	2.2 *2*	M1+E2	1.9 *2*	B(M1)(W.u.)=0.0033 *10*; B(E2)(W.u.)=3.7 *9*.
1621.3 *5*	2031.7	0.1 *1*			
1635.5 *5*	2045.81	0.1 *1*			
1667.5 *2*	1745.22	1.2 *1*			
1672.4 *3*	2956.7	0.3 *1*			
1702.6 *2*	2200.72	1.3 *1*	M1+E2	−0.5 *3*	B(M1)(W.u.)<0.018; B(E2)(W.u.)<2.0.
1703.8 *4*	1781.52	0.2 *1*	[E1]		B(E1)(W.u.)=1.4×10^{-5} *9*.
1725.1 *5*	2135.5	0.2 *1*			
1766.5 *2*	2176.83	2.5 *2*	M1		B(M1)(W.u.)=0.006 *4*.
1801.6 *2*	2540.78	1.1 *1*			
1843.8 *2*	2583.10	3.7 *2*	E2		B(E2)(W.u.)=3.7 *16*.
1864.8 *5*	2275.2	0.1 *1*			
1881.0 *3*	2620.1	0.9 *1*			
1910.6 *5*	2649.8	0.2 *1*	(M1)		
1932.7 *5*	2671.9	0.1 *1*			
1962.0 *3*	2701.15	0.7 *2*			
1979.4 *3*	2718.6	0.6 *2*			
2013.9 *4*	2512.0	0.5 *2*			
2039.5 *3*	2778.7	1.6			
2099.3 *3*	2176.83	1.4 *1*	M1		B(M1)(W.u.)=0.0020 *14*.
2150.5 *5*	2889.9	0.2 *1*			
2164.7 *3*	2662.8	0.9 *3*			

† From 1997Ka40, ΔEγ=0.3 keV estimated by evaluator, average of ΔEγ=0.1–0.4 keV (1997Ka40). The data of 1991Vi09 are in agreement with 1997Ka40.
‡ From γ(θ) at seven angles, linear polarization.
§ Multiply placed; undivided intensity given.

^{112}Cd(α,3nγ) 1979Ha12

Other: 1969Ya05, E=40 MeV.
E=40 MeV. Measured Eγ, Iγ, γγ–coin, γ(θ), excit, E(ce), I(ce), 1979Ha12.

^{113}Sn Levels

E(level)	Jπ‡	E(level)	Jπ‡	E(level)	Jπ‡
0.0	1/2+	2807.4 *12*	19/2–†	3902.9 *12*	(23/2–)
77.7 *10*	7/2+	2976.1 *11*	(17/2–)	3972.7 *12*	(23/2–)
738.7 *11*	11/2–†	3092.1 *12*	19/2–	4058.2 *12*	
1907.4 *11*	15/2–†	3129.8 *12*	21/2–	4475.3 *13*	
1952.4 *11*	(13/2–)	3459.1 *12*	(23/2–)	4715.3 *12*	(27/2–)
2750.1 *11*	(15/2–)	3681.2 *12*	23/2–		

† Proposed neutron h11/2 band. ΔJ=2 spacings correspond with ^{112}Sn, ^{114}Sn g.s. band up to 4+.
‡ Suggested by 1979Ha12 on the bases of angular distributions, α(K)exp, and known Jπ (g.s., 77 and 738 levels).

γ(^{113}Sn)

Eγ	E(level)	Iγ	Mult.†	Comments
77.7	77.7			
85.5 *3*	4058.2	4 *2*		
226.0 *3*	2976.1	4 *2*		
291.5 *3*	3972.7	4 *2*		Eγ: The placement of this γ is not as in (α,2nγ).
322.4 *3*	3129.8	48 *6*	M1,E2	Mult.: α(K)exp=0.024 *4*.
329.3 *3*	3459.1	20 *3*	M1,E2	Mult.: α(K)exp=0.025 *6*.
417.1 *3*	4475.3	8 *2*		
551.4 *3*	3681.2	6 *2*		Eγ: The placement of this γ is from the 3972 level in (α,2nγ).
599.1 *3*	4058.2	10 *2*		
ˣ617.8		15 *3*		
661.0 *3*	738.7	143 *16*	M2,E3	Mult.: α(K)exp=0.0088 *12*.
797.7 *3*	2750.1	7 *3*		
810.8 *3*	3902.9	9 *3*		
812.4 *3*	4715.3	6 *2*		
842.9 *3*	3972.7	17 *3*		
900.0 *3*	2807.4	50 *7*	(E2)‡	
ˣ1042.8		12 *3*		
1068.7 *3*	2976.1	7 *2*		
1168.7 *3*	1907.4	100		
1184.7 *3*	3092.1	13 *2*	(E2)‡	
1213.7 *3*	1952.4	16 *3*		

† From I(ce) and Iγ calibrated by means of known pure E2 transitions in adjacent even tin isotopes.
‡ γ(θ) typical of a J+2 to J transition.
ˣ γ ray not placed in level scheme.

^{112}Sn(n,γ) E=95 eV 1968Sa16,1981MuZQ

E=95–eV resonance with neutron time of flight, semi (1968Sa16).
For resonance parameters, see 1981MuZQ. Other: 1969Ju01.

^{113}Sn Levels

E(level)†	Jπ‡	Comments
0.0	1/2+	
504		
1317		
1557		
2060		
2579		
7745.5 *29*	1/2+	Jπ: 1968Sa16, 1981MuZQ.

† Rounded off level energies based on S(n)=7742.9 *18* (1995Au04).
‡ From adopted levels.

^{112}Sn(n,γ) E=95 eV 1968Sa16,1981MuZQ (continued)

γ(^{113}Sn)

Eγ	E(level)	Iγ
5167	7745.5	
5685	7745.5	
6189	7745.5	23 *7*
6429	7745.5	
7242	7745.5	100 *9*

^{112}Sn(d,p),^{114}Sn(d,t) 1972Bo76

Others: 1966Co35, E=12 MeV; 1967Sc12, E=15 MeV.
E=12 MeV. Magnetic spectrograph resolution≈9 keV, 80% enriched ^{112}Sn target, 1972Bo76.
Also authors have measured σ(d,t) and σ(d,p).

^{113}Sn Levels

E(level)	Jπ‡	L†	C^2S
0.0§	1/2+	0	0.57
76§ *5*	7/2+	4	0.23
407§ *5*	5/2+	2	0.15
496§ *5*	3/2+	2	0.60
735§ *5*	11/2−	5	1.00
1014§ *5*	3/2+,5/2+	2	0.02,0.014
1222? *5*			
1314 *5*	3/2+,5/2+	2	0.014,0.01
1537 *5*	(7/2+)	(4)	0.27
1556§ *5*			
1646 *5*	3/2+	2	0.044
1745 *5*	3/2+	2	0.011
1817§ *5*	1/2+	0	0.036
1907 *5*			
1939§ *5*	(7/2−)	(3)	0.012
2050 *5*	(3/2−)	1	0.007
2105 *5*	(3/2−)	1	0.005
2129§ *5*	3/2+,5/2+	2	0.04,0.026
2203 *5*			
2272§ *5*	(3/2−)	1	0.007
2540§ *5*	(7/2−)	3	0.028
2596 *5*	(3/2−,3/2+)	1,2	0.003,0.01
2620§ *5*	1/2+	0	0.027
2764 *5*	(7/2−)	3	0.008
2780§ *5*			
2862§ *5*	(7/2−)	3	0.040
3004§ *5*	(3/2−)	1	0.009
3080 *5*	(7/2−)	3	0.008
3204 *5*	(3/2−)	1	0.012
3307 *5*	(7/2−)	3	0.045
3418 *5*	(7/2−)	3	0.018
3494 *5*	(7/2−)	3	0.015
3499 *5*			
3539 *5*	(7/2−)	3	0.020
3584 *5*	(7/2−)	3	0.012
3696 *5*	(7/2−)	3	0.007
3743 *5*	(7/2−)	3	0.012
3796 *5*	(7/2−)	3	0.005
3808 *5*	(7/2−)	3	0.007
3822 *5*	(7/2−)	3	0.006
3846 *5*	(3/2−,3/2+)	1,2	0.005,0.01
3873 *5*	(7/2−)	3	0.009
3906 *5*	(7/2−)	3	0.016
3960 *5*			
4022 *5*	(3/2−,3/2+)	1,2	0.003,0.01
4044 *5*	(7/2−)	3	0.009
4233 *5*	(7/2−)	3	0.011
4265 *5*	(7/2−)	3	0.029
4315 *5*	(7/2−)	3	0.007
4335 *5*			
4343 *5*	(7/2−)	3	0.007
4364 *5*			
4397 *5*	(7/2−)	3	0.006
4430 *5*	(7/2−)	3	0.021
4438? *5*			
4504 *5*			
4589 *5*	(7/2−)	3	0.016
4609 *5*	(7/2−)	3	0.018
4649 *5*			
4992 *5*	(7/2−)	3	0.009
5012 *5*	(7/2−)	3	0.017
5067 *5*	(7/2−)	3	0.015
5239 *5*	(7/2−)	3	0.018
5291 *5*	(7/2−)	3	0.009
5318 *5*	(3/2−,7/2−)	1,3	0.005,0.01
5450 *5*	(7/2−)	3	0.013
5647 *5*	(7/2−)	3	0.008

† Based on angular distributions at 10 angles (10°–69°) compared with DWBA calc. For L≥3, the agreement with DWBA is rather poor.
‡ In the lighter Sn isotopes, the d5/2 shell–model state is almost full, while the d3/2 state is relatively empty. For L=2, J was therefore assigned 5/2 or 3/2 from comparison of σ(d,t) and σ(d,p). For L=1 and L=3, J was assigned 3/2 and 7/2, respectively, from shell–model syst as corresponding to the lower energy levels.
§ Also observed by 1967Sc12.

^{113}In(p,nγ) 1997Ka40,1987Vi09

1997Ka40: ^{113}In(p,nγ) E=6.7 MeV. Preliminary report was given in 1995KaZV.
1987Vi09: ^{113}In(p,nγ) E=3.2–6 MeV.
Also ^{115}In(p,3nγ) E=30 MeV.
1990ViZV (same group) present levels and gammas from ^{111}Cd(α,2nγ), but without information on Jπ or γ properties.
Measured: γ, γγ, γγ(t), γ(θ).
The energy gap between the 15/2– and 11/2– states is approximately equal to the energies of the first 2+ states in adjacent even Sn nuclides. The authors suggest the presence of a multiplet formed by a quasiparticle in the h11/2 neutron state and collective core excitation.
The 1908, 1953, 1947, 1936, and 1782 levels could be members of this multiplet.
The levels around 2650 with two 19/2– states could be also members of another multiplet formed by coupling of the (ν h11/2) with two–phonon core excitations.

^{113}Sn Levels

E(level)‡	Jπ†	E(level)‡	Jπ†	E(level)‡	Jπ†
0.0	1/2+	1781.9 5	9/2–,11/2–,13/2–	2448.5 3	
77.38	7/2+	1821.0 3	3/2+,5/2+	2457.6 3	
410.44 17	3/2+	1831.0 3		2468.1 4	
498.33 18	3/2+	1867.4 3	5/2+,7/2+	2505.8 4	
739.3 4	11/2–	1907.6 5	15/2–	2512.2 4	(3/2+,5/2+)
1014.46 23	3/2+,5/2+	1910.0 3	5/2+	2538.7 3	
1018.39 20	3/2+,5/2+	1936.3 5	(9/2–,11/2–,13/2–)	2540.9 5	(13/2–,15/2–)
1249.3 4	5/2–	1946.2 5		2552.0 3	(3/2+,5/2+,7/2+)
1284.15 18	5/2+	1952.9 5	(9/2–,13/2–)	2583.1 5	
1313.98 23	3/2+,5/2+	2031.8 4		2591.2 3	
1356.0 3	3/2+	2039.9 3	(3/2+,5/2+,7/2+)	2617.4 4	
1472.74 23	3/2+,5/2+	2046.0 3	(3/2+,5/2+)	2624.5 3	
1539.4 4	5/2+,7/2+	2135.6 4		2649.9 5	
1540.8 5	(13/2–)	2176.8 3	(5/2+,7/2+)	2663.1 4	(3/2+,5/2+)
1557.0 3	3/2+	2200.9 4	(3/2+,5/2+)	2672.0 5	
1645.3 4	3/2+	2258.7 4		2778.8 5	
1652.3 3	5/2+,9/2+	2275.3 4		2852.7 5	(17/2–)
1732.7 4		2337.6 5		2889.8 5	11/2–
1745.31 22	5/2+	2385.9 4		2956.6 4	

† From γ(θ) taken at six angles (13°,90°,120°,130°,140°,150°) and linear polarization in (α,2nγ), same authors and same paper.
‡ From least–squares fit to γ energies.

γ(^{113}Sn)

Eγ†	E(level)	Iγ†	Eγ†	E(level)	Iγ†	Eγ†	E(level)	Iγ†
77.38‡	77.38		940.6 3	1018.39	12.6 6	1499.5 3	1910.0	4.5 2
172.4 3	2039.9	1.7 1	975.8 3	2448.5	1.0 1	x1546.8 3		2.3 1
332.6 3	410.44	62 4	1014.4 3	1014.46	16 6	1547.7§ 3	2046.0	2.3§ 1
498.1 3	498.33	33 2	1018.3 3	1018.39	2.8 1	1557.0 3	1557.0	1.4 1
567.2 3	2039.9	1.4 1	1042.6 3	1781.9	8.0 4	1574.5 3	1652.3	4.1 3
583.2 3	1867.4	7.4 4	1129.0 3	1539.4	5.1 3	1598.3 3	2337.6	4.3 3
608.0 3	1018.39	3.8 3	1147.2 3	1645.3	2.6 1	1621.3 3	2031.8	0.5 1
633.3 3	2540.9	0.9 1	1164.3 3	2448.5	1.5 1	1635.5 3	2046.0	0.4 1
661.5 3	739.3	100 5	1168.3 3	1907.6	8.8 6	1667.5 3	1745.31	4.8 3
755.8 3	2039.9	0.8 1	1197.0 3	1936.3	7.4 5	1672.4 3	2956.6	0.6 1
786.0§ 3	2258.7	3.9§ 3	1206.9 3	1946.2	3.5 3	1702.6 3	2200.9	5.1 3
786.1§ 3	1284.15	3.9§ 3	1213.6 3	1952.9	8.1 4	1725.1 3	2135.6	1.4 1
801.5 3	1540.8	4.3 3	1221.6 3	2505.8	1.0 1	1766.5 3	2176.8	0.4 1
x838.4§ 3		1.7§ 2	1234.4 3	1732.7	6.6 4	1801.6 3	2540.9	1.2 1
838.9§ 3	1249.3	1.7§ 2	1241.7 3	1652.3	5.9 4	1821.0 3	1821.0	0.1 1
873.9 3	1284.15	2.3 1	1247.1 3	1745.31	1.7 2	1831.0 3	1831.0	2.1 2
879.4 3	2624.5	1.1 1	1268.4 3	2552.0	0.3 1	1843.8 3	2583.1	1.2 1
892.6 3	2176.8	3.3 2	1284.2 3	1284.15	36 2	1864.8 3	2275.3	0.8 1
x899.7§ 3		2.0§ 2	1314.0 3	1313.98	4.4 3	1910.6 3	2649.9	1.2 3
899.7§ 3	2852.7	2.0§ 2	1334.9 3	1745.31	11.8 6	1932.7 3	2672.0	0.7 1
903.7 3	1313.98	0.6 1	1356.0 3	1356.0	11 1	1959.2 3	2457.6	0.9 1
913.2 3	2385.9	1.5 2	1411.7 3	1910.0	5.4 3	1969.8 3	2468.1	0.9 1
936.7 3	1014.46	4.5 3	1472.8 3	1472.74	24 2	2013.9 3	2512.2	2.5 2

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$^{113}In(p,n\gamma)$ 1997Ka40,1987Vi09 (continued)

$\gamma(^{113}Sn)$ (continued)

Eγ†	E(level)	Iγ†
2039.5 *3*	2778.8	3.6 *4*
2040.3 *3*	2538.7	2.7 *4*
2047.1 *3*	2457.6	0.2 *4*
2092.9 *3*	2591.2	0.1 *1*
2099.3 *3*	2176.8	1.4 *1*
2128.3 *3*	2538.7	1.5 *1*
2150.5 *3*	2889.8	1.8 *1*
2164.7 *3*	2663.1	3.5 *3*
2180.7 *3*	2591.2	0.9 *1*
2206.9 *3*	2617.4	6.9 *6*

† From 1997Ka40, ΔEγ=0.3 keV estimated by evaluator, average of ΔEγ=0.1–0.4 keV (1997Ka40).
‡ From adopted levels, gammas.
§ Multiply placed; undivided intensity given.
x γ ray not placed in level scheme.

$^{113}In(p,3n\gamma)$ 1997Ka40,1987Vi09

1997Ka40: $^{113}In(p,3n\gamma)$ E=30 MeV. Preliminary report was given in 1995KaZV.
1987Vi09: $^{113}In(p,3n\gamma)$ E=30 MeV.
Measured: γ, γγ, γγ(t), γ(θ).
The energy gap between the 15/2− and 11/2− states is approximately equal to the energies of the first 2+ states in adjacent even Sn nuclides. The authors suggest the presence of a multiplet formed by a quasiparticle in the h11/2 neutron state and collective core excitation.
The 1908, 1953, 1947, 1936, and 1782 levels could be members of this multiplet.
The levels around 2650 with two 19/2− states could be also members of another multiplet formed by coupling of the (ν h11/2) with two–phonon core excitations.

^{113}Sn Levels

E(level)‡	Jπ†
0.0	1/2+
77.7 *3*	7/2+
410.39 *18*	3/2+
498.21 *18*	3/2+
739.3 *3*	11/2−
1018.37 *20*	3/2+,5/2+
1284.23 *19*	5/2+
1313.94 *21*	3/2+,5/2+
1356.0 *3*	3/2+
1472.8 *3*	3/2+,5/2+
1539.4 *3*	5/2+,7/2+
1540.8 *4*	(13/2−)
1557.0 *3*	3/2+
1745.33 *22*	5/2+
1781.6 *4*	9/2−
1867.4 *4*	5/2+
1907.6 *4*	15/2−
1909.9 *3*	5/2+
1936.3 *4*	(9/2−,11/2−,13/2−)
1946.2 *4*	
1952.8 *4*	(9/2−,13/2−)
2045.9 *3*	3/2+
2176.8 *3*	(5/2+,7/2+)
2200.8 *4*	(3/2+,5/2+)
2258.8 *4*	
2337.6 *4*	11/2−
2448.6 *3*	5/2+
2538.6 *3*	
2583.1 *4*	(15/2−)
2617.3 *4*	
2662.9 *4*	(3/2+,5/2+)
2750.6 *5*	(15/2−)
2778.7 *3*	
2807.7 *5*	19/2−
2975.9 *5*	(17/2−)
3092.7 *5*	19/2−
3130.2 *6*	21/2−

† From γ(θ) taken at six angles (13°,90°,120°,130°,140°,150°).
‡ From least–squares fit to γ energies.

$\gamma(^{113}Sn)$

Eγ†	E(level)	Iγ†
77.7‡ *3*	77.7	
206.0 *3*	1745.33	
225.3 *3*	2975.9	1.8 *3*
322.5 *3*	3130.2	12 *1*
332.6 *3*	410.39	14 *1*
498.1 *3*	498.21	10 *1*
583.2 *3*	1867.4	5.6 *7*
608.0 *3*	1018.37	
661.5 *3*	739.3	100 *5*
786.0§ *3*	1284.23	2.5§ *2*
	2258.8	2.5§ *2*
797.8 *3*	2750.6	3.0 *3*
801.5 *3*	1540.8	2.1 *2*
892.6 *3*	2176.8	2.2 *2*
900.1 *3*	2807.7	14 *2*
940.6 *3*	1018.37	3.5 *4*
1018.3 *3*	1018.37	0.9 *3*
1042.3 *3*	1781.6	3.8 *4*
1068.3 *3*	2975.9	2.0 *2*
1129.0 *3*	1539.4	2.1 *2*
1164.3 *3*	2448.6	4.9 *4*
1168.3 *3*	1907.6	35 *2*
1185.1 *3*	3092.7	2.5 *2*
1197.0 *3*	1936.3	3.5 *4*
1206.9 *3*	1946.2	2.6 *2*
1213.6 *3*	1952.8	8.4 *7*
1284.2 *3*	1284.23	16 *1*
1314.0 *3*	1313.94	4.9 *4*
1334.9 *3*	1745.33	3.1 *3*
1356.0 *3*	1356.0	2.9 *2*
1411.7 *3*	1909.9	2.2 *2*
1472.8 *3*	1472.8	15 *1*
1499.5 *3*	1909.9	2.5 *2*
x1546.8 *3*		2.3 *3*
1547.7§ *3*	2045.9	2.3§ *3*
1557.0 *3*	1557.0	1.0 *1*

Continued on next page (footnotes at end of table)

^{113}In(p,3nγ) 1997Ka40,1987Vi09 (continued)

γ(^{113}Sn) (continued)

Eγ†	E(level)	Iγ†	Eγ†	E(level)	Iγ†	Eγ†	E(level)	Iγ†
1598.3 *3*	2337.6	2.7 *2*	1766.3 *3*	2176.8		2040.3 *3*	2538.6	1.0 *3*
1635.5 *3*	2045.9		1843.8 *3*	2583.1	3.4 *2*	2164.7 *3*	2662.9	0.9 *1*
1702.6 *3*	2200.8	2.0 *2*	2039.5 *3*	2778.7	1.4 *2*	2206.9 *3*	2617.3	2.2 *2*

† From 1997Ka40, ΔEγ=0.3 keV estimated by evaluator, average of ΔEγ=0.1–0.4 keV (1997Ka40).
‡ From adopted levels, gammas.
§ Multiply placed; undivided intensity given.
x γ ray not placed in level scheme.

^{114}Sn(p,d) IAS 1980Ta04

E=55 MeV. Measured E(d), θ=11° and 23°, magnetic spectrograph, 1980Ta04.

^{113}Sn Levels

E(level)	Jπ†	S‡	Comments
11826 *50*	(9/2+)	0.0	Γ=22 keV *10*. E(level): IAS of ^{113}In g.s.
12254 *50*	(1/2−)	428 *5*	Γ=20 keV *8*. E(level): IAS of ^{113}In(392).
12513 *50*	(3/2−)	687 *5*	Γ=25 keV *9*. E(level): IAS of ^{113}In(647).

† From Jπ of parent state.
‡ E(level)−E(g.s. analog).

^{114}Sn(p,d) 1970Ca01

E=30 MeV. σ(θ) with magnetic spectrograph, FWHM=55–70 keV, 1970Ca01.

^{113}Sn Levels

E(level)‡	Jπ†	L§	E(level)‡	Jπ†	L§	E(level)‡	L§
0.0		0	1140			1760	
72 *6*	7/2+	4	1303 *6*		0	1830	0
404 *6*	5/2+	2	1360			1940	
492 *6*	3/2+	2	1450		#	2060	(1)
740	11/2−	5	1570			2120	1
1042 *6*	3/2+	2	1670	5/2+	2		

† From J–dependence of angular distribution (for L=2) and shell–model syst.
‡ Systematic errors ≤25 keV.
§ From angular distributions compared with characteristic shapes.
\# L could be (5).

^{115}Sn(p,t) 1971Fl05

E=20 MeV. σ(θ) with magnetic spectrograph, FWHM≈25 keV, 1971Fl05.
Jπ(^{115}Sn)=1/2+.

^{113}Sn Levels

E(level)	L†	E(level)
0.0	0	490 *20*
79 *15*		≈1020?
405 *10*	2	

† From comparisons with DWBA calculations.

Adopted Levels, Gammas

Q(β⁻)=–6070 *30*; S(n)=10890 *25*; S(p)=3047 *17*; Q(α)=–356 *18* 2003Au03,2009AuZZ.
Using DSAM, 1993Ja04 extracted an average quadrupole moment for the rotational sequence, consistent with a prolate deformation: β_2≈0.32.

^{113}Sb Levels

Cross Reference (XREF) Flags

A ^{113}Te ε Decay
B (HI,xnγ)
C ^{112}Sn(p,p) IAR
D ^{112}Sn(^{3}He,d)
E ^{114}Sn(p,2nγ)

E(level)[#]	Jπ[‡]	XREF	$T_{1/2}$[†]	Comments
0.0[&]	5/2+[§]	AB DE	6.67 min *7*	Jπ: ^{115}Sb to ^{121}Sb have Jπ=5/2+. Allowed ε to 3/2+, 5/2+ states in ^{115}Sn. %ε+%β⁺=100. $T_{1/2}$: from 1976Wi10. Others: 1962Pa04, 1969Ki16, 1972Si28.
644.78 *20*	1/2+	A DE	<1 ns	XREF: D(659). Jπ: L(^{3}He,d)=0.
814.17[&] *22*	7/2+[§]	AB DE	<1 ns	XREF: D(829).
1018.6 *3*	5/2+	A DE	<1 ns	XREF: D(1045). Jπ: L(^{3}He,d)=2. log *ft*=5.7 from (7/2+).
1181.0 *4*		A E	<1 ns	
1257.1 *3*	(9/2+)	AB E	<1 ns	Jπ: γ(θ) in (^{6}Li,3nγ), D+Q γ to 7/2+.
1347.9[@] *3*	11/2–	B D	<1 ns	XREF: D(1390). Jπ: L(^{3}He,d)=(5). (E3) γ to 5/2+.
1461.0[&] *3*	9/2+[§]	AB E	<1 ns	Jπ: could be the bandhead based on a Nilsson orbital (404) 9/2+ M1 γ to 7/2+, γ to 5/2+.
1551.0 *4*	5/2+	A D		XREF: D(1590). Jπ: L(^{3}He,d)=2. log *ft*=6.0 from (7/2+).
1716.5 *5*		A		
1853.2 *5*		A E	<1 ns	
1910.1[&] *4*	(11/2+)[§]	B E	<1 ns	
1995.2 *11*		E	<1 ns	
2094.2 *6*		A		
2115.5 *6*		A		
2132.1 *7*		A		
2172.1 *5*		A		
2217.7[&] *4*	(13/2+)[§]	B E	<1 ns	Jπ: D+Q γ to 11/2+, γ to (9/2+).
2307.6 *4*	(13/2+)	B		
2395.3 *5*		B		
2504.8 *5*	(15/2+)	B		
2534.9 *3*		A		
2626.3 *5*	(15/2–)	BC		
2659.1[&] *4*	(15/2+)[§]	B		
2815.5[@] *4*	15/2–	B		
3009.7 *11*		B		
3044.7[a] *5*	19/2(–)	B	3.7 ns *3*	$T_{1/2}$: from 1990Ko42.
3083.8[&] *5*	(17/2+)[§]	B		
3173.4[a] *5*	21/2(–)	B		
3212.9[@] *5*	19/2–	B		
3344.8 *5*	(21/2)	B		
3473.2[&] *5*	(19/2+)[§]	B		
3552.9[a] *5*	(23/2)	B		
3777.9[@] *11*	23/2–	B		
3914.4[&] *5*	(21/2+)[§]	B		
4166.8[a] *5*	(25/2)	B		
4344.4[c] *6*	(23/2–)	B		
4363.1[&] *5*	(23/2+)[§]	B		
4459.7[@] *12*	27/2–	B		
4506.4 *5*	(25/2–)	B		
4525.2 *5*		B		
4535.9 *5*		B		
4642.7[c] *6*	(25/2–)	B		
4744.8[b] *5*	25/2+	B		

E(level)[#]	Jπ[‡]	XREF
4783.9[a] *6*	(27/2)	B
5014.3[c] *6*	(27/2–)	B
5040.8[b] *6*	27/2+	B
5166.1 *6*	29/2	B
5177.7[&] *8*	(27/2+)[§]	B
5239.0[@] *12*	31/2–	B
5388.7[b] *6*	29/2+	B
5391.1[c] *7*	(29/2–)	B
5569.3[&] *9*	(29/2+)[§]	B
5612.0 *6*	(29/2–)	B
5716.4[a] *6*	(29/2)	B
5762.6[b] *6*	31/2+	B
5781.7[c] *7*	(31/2–)	B
5960.1[&] *10*	(31/2+)[§]	B
6052.6 *7*		B
6093.7[@] *12*	35/2–	B
6153.4[b] *6*	33/2+	B
6195.9[c] *7*	(33/2–)	B
6334.2[&] *11*	(33/2+)[§]	B
6424.1[a] *7*		B
6545.7[b] *6*	35/2+	B
6625.4[c] *7*	(35/2–)	B
6682.0[&] *12*	(35/2+)[§]	B
6976.6[b] *6*	37/2+	B
6977.6[&] *13*	(37/2+)[§]	B
7012.8[@] *13*	39/2–	B
7075.8[c] *7*	(37/2–)	B
7544.5[c] *7*	(39/2–)	B

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Adopted Levels, Gammas (continued)

^{113}Sb Levels (continued)

E(level)[#]	Jπ[‡]	XREF	Comments
7998.4[@] *13*	43/2−	B	
8025.2[c] *7*	(41/2−)	B	
9059.7[@] *14*	47/2−	B	
9280 *40*		C	IAS of ^{113}Sn g.s.
9720 *40*		C	IAS of ^{113}Sn 410 level.
9780 *40*		C	IAS of ^{113}Sn 498 level.
10215.4[@] *14*	51/2−	B	
11466.6[@] *14*	55/2−	B	
12800.9[@] *15*	59/2−	B	
14213.9[@] *18*	(63/2−)	B	
15717.9[@] *20*	(67/2−)	B	
17352.9[@] *23*	(71/2−)	B	
19143.9[@] *25*	(75/2−)	B	
21104[@] *3*	(79/2−)	B	

† From 1976Ka25 in ^{114}Sn(p,2nγ).
‡ Based on rotational band observed in (HI,xnγ) and Nilsson model consideration, unless given otherwise.
§ L(^{3}He,d)=2 and 4 for g.s. and 814 level, respectively. 814γ is not Q from γ(θ) in ^{110}Cd(^{6}Li,3nγ).
\# From least–squares fit to γ energies.
@ (A): Suggested (1993Ja04) as members of a rotational band with the 1348–keV level as bandhead. Proton h11/2 orbital, 1/2 [550] Nilsson configuration.
& (B): Suggested as members of a rotational band with the 1461–keV level as bandhead. Nilsson orbital [404]9/2+.
a (C): Band based on 19/2− at 3044.7 keV.
b (D): Band based on 25/2+ at 4744.8 keV.
c (E): Band based on (23/2−).

γ(^{113}Sb)

E(level)	Eγ[†]	Iγ[†]	Mult.[‡]	δ[‡]	Comments
644.78	644.8 *2*	100	[E2]		B(E2)(W.u.)>0.16. Mult.: from the level scheme.
814.17	814.4 *3*	100	D+Q	−0.22 *12*	B(M1)(W.u.)>3.7×10^{-5}.
1018.6	1018.1 *4*	100			
1181.0	1181.0 *4*	100			
1257.1	238.4 *5*	8 *3*			
	443.3 *4*	12 *4*	D+Q	−0.02 *9*	B(M1)(W.u.)>2.5×10^{-5}.
	1256.7 *5*	100 *12*			
1347.9	90.9 *2*	100 *1*	(E1+M2)	0.01 *5*	B(E1)(W.u.)>0.00032.
	1347.9 *7*	20 *2*	(E3)		B(E3)(W.u.)>33.
1461.0	646.6 *3*	29 *3*	D+Q	+0.03 *8*	B(M1)(W.u.)>1.8×10^{-5}.
	1460.8 *5*	100 *10*			
1551.0	737.0 *4*	44 *14*			
	1550.3 *7*	100 *30*			
1716.5	1071.7 *4*	100			
1853.2	391.8 *5*	100 *50*			
	1039.5 *5*	58 *17*			
1910.1	449.3 *3*	100	D+Q	+0.24 *6*	B(M1)(W.u.)>0.00022; B(E2)(W.u.)>0.027.
1995.2	1181.0	100			
2094.2	1449.7 *7*	62 *16*			
	2093.7 *10*	100 *23*			
2115.5	1301.3 *7*	90 *30*			
	2115.5 *10*	100 *22*			
2132.1	1317.9 *6*	100			
2172.1	915.0 *4*	100 *30*			
	1358.0 *8*	84 *22*			
2217.7	306.7 *5*	100 *10*	D+Q	+0.16 *6*	B(M1)(W.u.)>0.00044; B(E2)(W.u.)>0.026.
	756.1 *5*	64 *8*			
2307.6	397.4 *3*	100			
2395.3	1047.2 *5*	100			
2504.8	197.1 *3*	47 *5*	D+Q	+0.09 *6*	
	287.2 *3*	100 *11*	D+Q	+0.08 *9*	

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Adopted Levels, Gammas (continued)

γ(^{113}Sb) (continued)

E(level)	Eγ†	Iγ†	Mult.‡	δ‡
2534.9	1515.1 7	58 17		
	1719.8 10	33 10		
	2535.2 3	100 25		
2626.3	1278.9 6	100		
2659.1	351.5 3			
	440.9 3			
	749.5 3			
2815.5	1467.6 3	100	(E2)	
3009.7	504.9 10	100		
3044.7	418.5 3	100		
3083.8	424.8 3	100	D+Q	+0.07 8
	865.7		Q	
3173.4	128.7 2	100	D+Q	−0.10 4
3212.9	397.4 3		Q	
3344.8	171.5 3	100		
3473.2	389.9 3	100	Q	
	813.8 3		D+Q	−0.22 12
3552.9	379.6 4	100	D+Q	−0.25 5
3777.9	564.7 3	100	(E2)	
3914.4	441.3 3			
	830.3 3			
4166.8	613.9 3	100	D	
4344.4	998.9 3			
4363.1	448.7 3			
	890.0 3			
4459.7	681.8 3	100	(E2)	
4506.4	339.5 3			
	1161.7 3		Q	
4525.2	358.4 3			
	972.3 3			
4535.9	369.1 3			
4642.7	298.3 3	100	D	
4744.8	209.0 3			
	219.7 3			
	381.7 3			
	830.4 3			
4783.9	277.5 3			
	617.1 3		D	
5014.3	371.6 3			
	669.9 3			
5040.8	295.8 3			
5166.1	999.3 3	100	Q	
5177.7	432		D	
	815		Q	
5239.0	779.3 3	100	(E2)	
5388.7	347.6 3			
	644.0 3			
5391.1	376.7 3			
	748.3 3			
5569.3	392		D	
	824		Q	
5612.0	1105.6 3	100		
5716.4	932.5 3	100		
5762.6	373.8 3			
	722.0 3			
5781.7	390.6 3			
	767.3 3			

E(level)	Eγ†	Iγ†	Mult.‡
5960.1	391		D
	782		Q
6052.6	886.5 3	100	
6093.7	854.7 3	100	(E2)
6153.4	390.8 3		
	764.6 3		
6195.9	414.2 3		
	804.8 3		
6334.2	374		D
	765		Q
6424.1	707.7 3	100	
6545.7	392.3 3		
	783.1 3		
6625.4	429.5 3		
	843.7 3		
6682.0	348		D
	722		Q
6976.6	430.9 3		
	823.2 3		
6977.6	296		D
	643		Q
7012.8	919.0 3	100	(E2)
7075.8	450.4 3		
	879.9 3		
7544.5	468.7 3		
	919.1 3		
7998.4	985.6 3	100	(E2)
8025.2	480.7 3		
	949.4 3		
9059.7	1061.3 3		(E2)
10215.4	1155.7 3	100	(E2)
11466.6	1251.2 3	100	(E2)
12800.9	1334.3 3	100	(E2)
14213.9	1413 1	100	Q
15717.9	1504 1	100	Q
17352.9	1635 1	100	Q
19143.9	1791 1	100	Q
21104	1960 1	100	Q

† From ^{110}Cd(^{6}Li,3nγ) and ^{113}Te ε decay.

‡ Mult and δ from γ(θ) (1979Sh03) and DCO ratios (1993Ja04) in (HI,xnγ).

^{113}Te ε Decay 1975WiZX,1976Wi11

Parent ^{113}Te: E=0.0; Jπ=(7/2+); $T_{1/2}$=1.7 min *2*; Q(g.s.)=6070 *30*; %ε+%β$^+$ decay=100.
γ singles with escape–suppression spectrometer and semi, γγ coin, γ(t), 1975WiZX, 1976Wi11.
Others: 1974Ch17, 1974Bu21, 1975BuYW.

^{113}Sb Levels

E(level)	Jπ	$T_{1/2}$
0.0	5/2+	6.67 min *7*
644.78 *20*	1/2+	
814.07 *24*	7/2+	
1018.5 *4*	(5/2)+	
1181.0 *4*		
1257.1 *3*	(9/2+)	
1461.3 *5*	(9/2+)	
1550.9 *4*	(5/2)+	
1716.5? *5*		
1853.3 *5*		
2094.2 *6*		
2115.4 *6*		
2132.3? *8*		
2172.1 *5*		
2534.6 *4*		

β$^+$,ε Data

ε+β$^+$ branches were obtained from (γ+ce) imbalance at each level and measured annihilation radiation intensity.

Eε†	E(level)	Iβ$^+$†‡	Iε†‡	Log *ft*	I(ε+β$^+$)‡	Comments
(3540 *30*)	2534.6	≈3.5	≈1.5	≈5.4	≈5.0	
(3900 *30*)	2172.1	≈2.0	≈0.57	≈5.9	≈2.57	
(3950 *30*)	2115.4	≈2.9	≈0.77	≈5.8	≈3.7	
(3980 *30*)	2094.2	≈3.7	≈0.94	≈5.7	≈4.6	
(4220 *30*)	1853.3	≈3.5	≈0.71	≈5.9	≈4.2	
(4520 *30*)	1550.9	≈2.8	≈0.43	≈6.2	≈3.2	
(4810 *30*)	1257.1	≈4.6	≈0.57	≈6.1	≈5.2	
(4890 *30*)	1181.0	≈11	≈1.2	≈5.8	≈12.2	
(5050 *30*)	1018.5	≈10.0	≈1.0	≈5.9	≈11	
(5260 *30*)	814.07	≈13	≈1.1	≈5.9	≈14	
(5430 *30*)	644.78	<5.6	<0.44	>6.3	<6.0	
5700 *200*	0.0	≈28	≈1.4	≈5.9	≈29.4	Eε: from 1974Ch17. Other: 5600 *200* (1975BuYW).

† β$^+$ and ε intensities are approximate because of the large number of unplaced Iγ's.
‡ Absolute intensity per 100 decays.

γ(^{113}Sb)

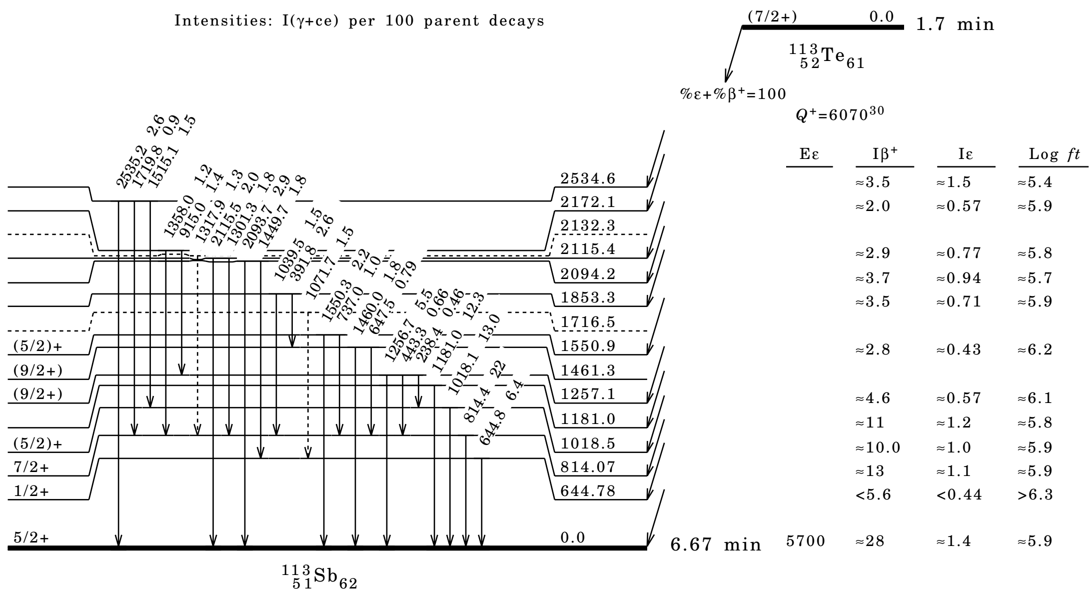
Measured Iγ(γ$^\pm$) is 780 *200* relative to Iγ(814)=100, 1976Wi11.
Iγ normalization: from Σ(Iγ+ce) to g.s. + Σ(ε+β$^+$) to g.s.=100.

Eγ	E(level)	Iγ†
238.4 *5*	1257.1	2.1 *7*
ˣ269.8 *5*		2.7 *7*
391.8 *5*	1853.3	12 *6*
ˣ437.7 *4*		1.1 *6*
443.3 *4*	1257.1	3.0 *9*
ˣ473.1 *8*		2.5 *6*
ˣ583.0 *5*		3 *2*
ˣ609.3 *5*		5 *2*
644.8 *2*	644.78	29 *3*
647.5 *8*	1461.3	3.6 *10*
737.0 *4*	1550.9	4.4 *14*
814.4 *3*	814.07	100
915.0 *4*	2172.1	6.3 *16*
1018.1 *4*	1018.5	59 *6*
1039.5 *5*	1853.3	7 *2*
1071.7‡ *4*	1716.5?	7 *2*
1181.0 *4*	1181.0	56 *6*
ˣ1206.6 *6*		6 *2*
ˣ1245.4 *5*		4 *3*
1256.7 *5*	1257.1	25 *3*
1301.3 *7*	2115.4	8 *3*
1317.9‡ *6*	2132.3?	6 *2*
1358.0 *8*	2172.1	5.3 *14*
1449.7 *7*	2094.2	8 *2*
1460.0 *10*	1461.3	8 *4*
1515.1 *7*	2534.6	7 *2*
1550.3 *7*	1550.9	10 *3*
ˣ1567.2 *8*		6 *2*
1719.8 *10*	2534.6	3.9 *12*
ˣ1803.6 *7*		8 *3*
ˣ1868.1 *9*		11 *3*
ˣ1944.3 *11*		4 *2*
ˣ2047.8 *10*		7 *2*
2093.7 *10*	2094.2	13 *3*
2115.5 *10*	2115.4	9 *2*
ˣ2221.2 *9*		9 *3*
2535.2 *5*	2534.6	12 *3*
ˣ2552.4 *9*		7 *2*
ˣ2606.5 *5*		8 *3*

† For absolute intensity per 100 decays, multiply by 0.22.
‡ Placement of transition in the level scheme is uncertain.
ˣ γ ray not placed in level scheme.

^{113}Te ε Decay 1975WiZX,1976Wi11 (continued)

Decay Scheme



^{112}Sn(p,p) IAR 1966Ri06

S(p)=3074 *31*.
σ(E(p)) at 92°, 125° and 165°, E(p)(c.m.)=6.1–6.9 MeV with semi. L–values from shape of σ(E(p)), 1966Ri06.
For resonance parameters, see 1966Ri06.

^{113}Sb Levels

E(level)‡	L	S†	Comments
9280 *40*	0	0.0	E(p)(c.m.)=6202 *15*. IAS of ^{113}Sn(g.s.) with Jπ=1/2+.
9720 *40*	2	440	E(p)(c.m.)=6649 *15*. IAS of ^{113}Sn(410) with Jπ=5/2+.
9780 *40*	2	500	E(p)(c.m.)=6710 *15*. IAS of ^{113}Sn(498) with Jπ=3/2+.

† E'=E(level)–E(g.s. analog).
‡ From E=res, E(p)(c.m.) + S(p).

^{112}Sn(^{3}He,d) 1966Ba25,1968Co22

E=18 MeV. σ(θ) with particle telescope, FWHM=70–110 keV, 1966Ba25, 1968Co22.
L–values and spectroscopic factors are from DWBA calculations.

^{113}Sb Levels

E(level)†	Jπ‡	L	C^{2}S'	Comments
0.0	5/2+	2	4.2	C^{2}S': for Jπ=5/2+.
659 *15*	1/2+	0	1.0	
829 *15*	7/2+	4	7.5	
1045 *30*	5/2+	2	2.3	

Continued on next page (footnotes at end of table)

$^{112}Sn(^3He,d)$ 1966Ba25,1968Co22 (continued)

^{113}Sb Levels (continued)

E(level)†	Jπ‡	L	C²S'	Comments
1390 *50*	(11/2−)	(5)	4.8	L: both L=4 and L=5 fit the angular distribution. L=5 is assigned because of sum rule limit for L=4. C²S': Jπ=7/2+ gives C²S'=5.0.
1590 *40*	5/2+	2	0.6	C²S': Jπ=3/2+ gives C²S'=0.8.

† Systematically 15–40 keV too high in comparison with the adopted levels.
‡ Assumed for C²S'.

$^{114}Sn(p,2n\gamma)$ 1976Ka25

E=15.8–18.2, 20, 28 MeV. Measured excit, pulsed beam γ(t), nγ coin, γγ coin, 1976Ka25.

^{113}Sb Levels

E(level)†	Jπ§	$T_{1/2}$
0.0	5/2+	
644.2 *5*	1/2+	<1 ns
814.3 *3*	7/2+	<1 ns
1018.1 *4*	(5/2)+	<1 ns
1181.2 *3*		<1 ns
1256.9 *4*	(9/2)+	<1 ns
1347.8 *7*	11/2−	<1 ns
1461.2 *5*	(9/2+)‡	<1 ns
1853.6 *11*		<1 ns
1910.0 *8*	(11/2+)‡	<1 ns
1995.5 *4*		<1 ns
2218.8 *9*	(13/2+)‡	<1 ns

† As given by 1976Ka25.
‡ Suggested [404] rotational band.
§ From adopted levels.

$\gamma(^{113}Sb)$

Eγ†	E(level)	Iγ‡
90.9	1347.8	
238.6	1256.9	
308.8	2218.8	
391.3	1853.6	20
442.3	1256.9	14
448.8	1910.0	
644.2	644.2	
647.0	1461.2	35
814.3	814.3	
1018.1	1018.1	
1039.6	1853.6	80
1181.2§	1181.2	
	1995.5	
1257.0	1256.9	86
1460.9	1461.2	65

† Uncertainty not given by authors.
‡ % photon branching from each level.
§ Multiply placed.

(HI,xnγ) 1998Mo22,1993Ja04,1979Sh03

1998Mo22: $^{103}Rh(^{16}O,\alpha2n)$ E=80 MeV. Measured Eγ, Iγ, γγ, γγ(θ)(DCO) using Spectrometer, 6 Compton–suppressed HPGe detectors.
1993Ja04,1995Ja15: $^{94}Mo(^{23}Na,2p2n)$ E=117 MeV. Preliminary data in 1993Ra08.
Measured Eγ, Iγ, γγ coin, γ(θ), DCO, 20 Compton–suppressed HPGe, spherical shell of 71 BGO.
1990Ko42: $^{104}Pd(^{12}C,p2n\gamma)$ E=63 MeV.
Measured Eγ, Iγ, γγ coin, γ(θ), γ(t).
1989Bu27: $^{112}Sn(\alpha,pn\gamma)$ E=40–50 MeV.
Measured Eγ, Iγ, γγ coin, γ(θ), excit.
1979Sh03: $^{110}Cd(^6Li,3n\gamma)$ E=24–34 MeV.
Measured Eγ, Iγ, γγ coin, γ(θ), excit.
Other: 1975Ga11.
Using DSAM, 1993Ja04 extracted an average quadrupole moment for the rotational sequence, consistent with a prolate deformation: $\beta_2 \approx 0.32$.

(HI,xnγ) 1998Mo22,1993Ja04,1979Sh03 (continued)

^{113}Sb Levels

E(level)†	Jπ‡	$T_{1/2}$	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0	5/2+		3914.7@ 5	21/2+	6093.5# 8	35/2−
814.6 3	7/2+		4167.1& 5	25/2	6153.7a 6	33/2+
1257.1 5	9/2+		4345.7b 6	(23/2−)	6197.1b 7	(33/2−)
1348.0# 5	11/2−		4363.4@ 5	23/2+	6334.2@ 11	33/2+
1461.1@ 3	9/2+		4459.5# 7	27/2−	6424.4& 7	
1910.4@ 4	11/2+		4506.8 6	(25/2−)	6546.0a 6	35/2+
2218.4@ 5	13/2+		4525.5 5		6626.6b 7	(35/2−)
2308.0 5	(13/2+)		4536.2 6		6682.0@ 12	35/2+
2395.5 5			4644.0b 6	(25/2−)	6976.9a 6	37/2+
2505.3 5	(15/2+)		4745.2a 5	25/2+	6977.6@ 13	37/2+
2626.3& 5	15/2−		4784.2& 6	27/2	7012.5# 9	39/2−
2659.9@ 5	15/2+		5015.6b 6	(27/2−)	7077.0b 7	(37/2−)
2815.6# 5	15/2−		5041.1a 6	27/2+	7545.7b 7	(39/2−)
3010.2 11			5166.4 6	29/2	7998.2# 9	43/2−
3044.8& 5	19/2−	3.7 ns§ 3	5177.7@ 8	27/2+	8026.4b 8	(41/2−)
3084.5@ 5	17/2+		5238.8# 8	31/2−	9059.5# 10	47/2−
3173.9 5	21/2(−)		5389.0a 6	29/2+	10215.2# 10	51/2−
3213.0# 5	19/2−		5392.3b 7	(29/2−)	11466.4# 11	55/2−
3345.3 6	(21/2)		5569.3@ 9	29/2+	12800.7# 11	59/2−
3346.8 6			5612.4 6	(29/2−)	14213.7# 15	63/2−
3400.2 12			5716.7& 7	29/2	15717.7# 18	67/2−
3473.4@ 5	19/2+		5762.9a 6	31/2+	17352.7# 21	71/2−
3553.2& 5	23/2		5782.9b 7	(31/2−)	19143.7# 23	75/2−
3777.7# 6	23/2−		5960.1@ 10	31/2+	21103.8# 25	79/2−
3826.7 6			6052.9 7			

† From least-squares fit to γ energies.
‡ From 1993Ja04. Based on levels being members of rotational band and Nilsson model consideration.
§ From 1990Ko42.
\# (A): Suggested (1993Ja04) as members of a rotational band with the 1348-keV level as bandhead. Proton h11/2 orbital? 1/2 [550] Nilsson configuration.
@ (B): Suggested as members of a rotational band with the 1461-keV level as bandhead. Nilsson orbital [404]9/2+.
& (C): Band based on 15/2−, only given in 1998Mo22.
a (D): Band 3 based on 25/2+, only given in 1998Mo22.
b (E): Band 4 based on 25/2−, only given in 1998Mo22.

γ(^{113}Sb)

Eγ†	E(level)	Iγ‡	Mult.#	δ§	Comments
90.9 2	1348.0	172 18	E1		
129.1 2	3173.9	122 13	D+Q	−0.10 4	
171.5 3	3345.3				Mult.: DCO=1.10 25.
173.0 3	3346.8				
197.1 3	2505.3	18 2	D+Q	+0.09 6	
209.0 3	4745.2				
219.7 3	4745.2				
230.8 3	2626.3				Eγ: From 1998Mo22.
277.5 3	4784.2				
287.2 3	2505.3	38 4	D+Q	+0.08 9	
295.8 3	5041.1				
296	6977.6		D		
298.3 3	4644.0	7 1	D		Mult.: DCO=0.65 16.
306.7	2218.4		D+Q	+0.16 6	Eγ: Eγ=306.7 (1979Sh03) Eγ=308.7 (1998Mo22).
339.5 3	4506.8				
340.3 3	4167.1				
347.6 3	5389.0				
348	6682.0		D		
358.4 3	4525.5				
369.1 3	4536.2				
371.6 3	5015.6				
373.8 3	5762.9				

Continued on next page (footnotes at end of table)

(HI,xnγ) 1998Mo22,1993Ja04,1979Sh03 (continued)

γ(^{113}Sb) (continued)

Eγ†	E(level)	Iγ‡	Mult.#	δ§	Comments
374	6334.2		D		
376.7 3	5392.3				
379.2 3	3553.2		D+Q	−0.25 5	Mult.: DCO=0.31 24.
381.7 3	4745.2				
389.0 3	3473.4				
390.0 3	3400.2				
390.6 3	5782.9				
390.8 3	6153.7				
391	5960.1		D		
392	5569.3		D		
392.3 3	6546.0				
397.4 3	2308.0	34 5	D+Q	+0.24 5	
	3213.0		(E2)		
414.2 3	6197.1				
418.5 3	3044.8	163 16	Q		
425.6 3	3084.5	23 3	D+Q	+0.07 8	
429.5 3	6626.6				
430.9 3	6976.9				
432	5177.7		D		
441.3 3	3914.7				
441.5 10	2659.9	43 4	D+Q	+0.09 5	
443.0 10	1257.1	41 4	D+Q	−0.02 9	
448.7 3	4363.4				
449.3 3	1910.4	100	D+Q	+0.24 6	
450.4 3	7077.0				
468.7 3	7545.7				
480.7 3	8026.4				
504.9 10	3010.2	24 4			
564.7 3	3777.7		(E2)		
586.7 3	3213.0				
613.9 3	4167.1		D		Mult.: DCO=0.67 17.
617.1 3	4784.2		D		Mult.: DCO=0.32 28.
643	6977.6		Q		
644.0 3	5389.0				
646.6 3	1461.1	34 3	D+Q	+0.03 8	
652.7 3	3826.7				
669.9 3	5015.6				
681.8 3	4459.5		(E2)		
707.7 3	6424.4				
722.0 3	5762.9				
722	6682.0		Q		
748.3 3	5392.3				
749.5 3	2659.9		Q		Eγ: Eγ=748.2 (1979Sh03).
756.1	2218.4		Q		Eγ: Eγ=756.1 (1979Sh03) Eγ=757.3 (1998Mo22).
764.6 3	6153.7				
765	6334.2		Q		
767.3 3	5782.9				
779.3 3	5238.8		(E2)		
782	5960.1		Q		
783.1 3	6546.0				
804.8 3	6197.1				
813.8 3	3473.4				
814.8 3	814.6	157 16	D+Q	−0.22 12	
815	5177.7		Q		
823.2 3	6976.9				
824	5569.3		Q		
830.3 3	3914.7				
830.4 3	4745.2				
843.7 3	6626.6				
854.7 3	6093.5		(E2)		
865.7 3	3084.5				
879.9 3	7077.0				
886.5 3	6052.9				

Continued on next page (footnotes at end of table)

(HI,xnγ) 1998Mo22,1993Ja04,1979Sh03 (continued)

γ(^{113}Sb) (continued)

Eγ†	E(level)	Iγ‡	Mult.#	Comments
890.0 *3*	4363.4			
919.0 *3*	7012.5		(E2)	
919.1 *3*	7545.7			
932.5 *3*	5716.7			
949.4 *3*	8026.4			
972.3 *3*	4525.5			
985.6 *3*	7998.2		(E2)	
998.9 *3*	4345.7			
999.3 *3*	5166.4		Q	Mult.: DCO=1.21 *37*.
1000.4 *3*	4345.7		D	Mult.: DCO=0.92 *42*.
1047.2 *5*	2395.5	38 *4*		
1061.3 *3*	9059.5		(E2)	
1105.6 *3*	5612.4			
1155.7 *3*	10215.2		(E2)	
1161.7 *3*	4506.8		Q	Mult.: DCO=1.50 *20*.
1251.2 *3*	11466.4		(E2)	
1257.1 *10*	1257.1			
1278.9 *6*	2626.3	165 *17*	Q	
1334.3 *3*	12800.7		(E2)	
1347.9 *7*	1348.0	35 *4*	E3	Mult.: from large A_2 in γ(θ).
1413	14213.7		Q	
1460.8 *5*	1461.1	117 *12*	E2	
1467.6 *3*	2815.6		(E2)	
1504	15717.7		Q	
1635	17352.7		Q	
1791	19143.7		Q	
1960	21103.8		Q	

† From 1979Sh03 and 1998Mo22.
‡ Relative intensity normalized to the Iγ(449)=100 (1979Sh03).
§ Or Jπ's shown and for an assumed Gaussian distribution with σ=2.2 *3* for the population of magnetic substates (1979Sh03).
\# From γ(θ) (1979Sh03).

Adopted Levels, Gammas

Q(β⁻)=–7230 *30*; S(n)=8850 *30*; S(p)=4040 *30*; Q(α)=1870 *30* 2003Au03,2009AuZZ.
Production and identification: ^{112}Sn(^{3}He,2n) E=25 MeV. Mass and chemical separation (1976Wi11).

^{113}Te Levels

Cross Reference (XREF) Flags

A ^{113}I ε Decay
B (HI,xnγ)

E(level)[†]	Jπ[‡]	XREF	$T_{1/2}$	Comments
0.0	(7/2+)	AB	1.7 min *2*	%ε+%β⁺=100. Jπ: 7/2+ probable from log *ft*≈5.7 to 5/2+ level and log *ft*≈5.9 to (9/2+) level. $T_{1/2}$: av of 2.0 min *2* (1974Ch17), 1.4 min *2* (1975BuYW), 1.6 min *2* (1976Wi11).
0+x[§]	(11/2–)	B		
587.2+x[§] *5*	(15/2–)	B		
1311.4+x[§] *7*	(19/2–)	B		
1994.4+x[§] *9*	(23/2–)	B		
2506.0+x *10*		B		
2786.6+x *10*		B		
2798.3+x[#] *10*	(25/2)	B		
2891.2+x *10*		B		
3001.3+x[§] *10*	(27/2–)	B		
3244.4+x *11*		B		
3430.7+x *11*		B		
3573.5+x *11*	(29/2+)	B		
3806.0+x[@] *10*	(29/2)	B		
3917.5+x[#] *10*		B		
3927.3+x *11*		B		
3975.1+x *11*		B		
4034.6+x[§] *11*	(31/2–)	B		
4184.7+x *11*		B		
4264.7+x *12*		B		
4273.4+x[#] *11*		B		
4377.9+x *11*		B		
4558.2+x *11*		B		
4616.5+x[@] *11*		B		
4906.3+x *12*		B		
5018.8+x[#] *12*		B		
5071.2+x[§] *12*		B		
5163.1+x[@] *11*		B		
5188.7+x *11*		B		
5196.2+x *13*		B		
5389.9+x *11*		B		
5551.2+x *12*		B		
5553.6+x *13*		B		
5819.9+x[#] *13*		B		
6149.9+x[§] *13*		B		
6155.9+x *13*		B		
6204.4+x[@] *11*		B		
6523.2+x *13*		B		
6621.8+x[@] *13*		B		
6786.8+x *14*		B		
6908.4+x[#] *14*		B		
7153.0+x[§] *14*		B		
7212.3+x *14*		B		
7360.6+x *13*		B		
7689.7+x[@] *14*		B		
8061.5+x[@] *14*		B		
8764.3+x *14*		B		

† From least–squares fit to γ energies.
‡ From gammas, DCO ratios, decay patterns and systematics.
§ (A): Ground–state band.
# (B): γ cascade, on 25/2 (2798.3+x keV).
@ (C): γ cascade, on 29/2 (3806+x keV).

γ(^{113}Te)

E(level)	Eγ	Iγ	Mult.[†]
587.2+x	587.2 *5*	100	(E2)
1311.4+x	724.2 *5*	100	(E2)
1994.4+x	683.0 *5*	100	(E2)
2506.0+x	511.6 *5*	100	
2786.6+x	792.2 *5*	100	
2798.3+x	803.6 *5*	100	D
2891.2+x	896.8 *5*	100	
3001.3+x	1007.2 *5*	100	(E2)
3244.4+x	446.2 *5*	100	
3430.7+x	429.4 *5*	100	
3573.5+x	572.6 *5*	100	(E1)
3806.0+x	804.9 *5*	100	D
3917.5+x	1118.8 *5*	100	
3927.3+x	926.1 *5*	100	
3975.1+x	973.8 *5*	100	
4034.6+x	1033.0 *5*	100	(E2)
4184.7+x	1183.0 *5*	100	
4264.7+x	834.0 *5*	100	
4273.4+x	355.6 *5*	100 *5*	
4273.4+x	467.7 *5*	50 *4*	
	1029.2 *5*	46 *4*	
4377.9+x	572.0 *5*	100	
4558.2+x	523.2 *5*	42 *3*	
	984.8 *5*	100 *4*	
4616.5+x	238.6 *5*	10.1 *11*	
	699.0 *5*	100 *5*	
	810.6 *5*	97 *5*	
	1043.9 *5*	66 *3*	
4906.3+x	931.2 *5*	100	
5018.8+x	745.4 *5*	100	
5071.2+x	1036.6 *5*	100	
5163.1+x	546.8 *5*	100 *4*	
	604.3 *5*	40.4 *21*	
5188.7+x	1003.7 *5*	39 *11*	
	1154.3 *5*	86 *11*	
	1261.6 *5*	100 *11*	
5196.2+x	931.5 *5*	100	
5389.9+x	226.7 *5*	55 *4*	
5389.9+x	832.1 *5*	100 *7*	
5551.2+x	993.0 *5*	100	
5553.6+x	482.4 *5*	100	
5819.9+x	801.1 *5*	100	
6149.9+x	1078.7 *5*	100	
6155.9+x	1084.7 *5*	100	
6204.4+x	814.9 *5*	41 *3*	
	1041.0 *5*	100 *5*	
6523.2+x	972.0 *5*	100	
6621.8+x	417.4 *5*	100	
6786.8+x	966.9 *5*	100	
6908.4+x	1088.5 *5*	100	
7153.0+x	1003.1 *5*	100	
7212.3+x	1056.4 *5*	100	
7360.6+x	1156.2 *5*	100	
7689.7+x	1067.8 *5*	100	
8061.5+x	371.8 *5*	100	
8764.3+x	1074.6 *5*	100	

† From DCO ratios.

^{113}I ε Decay 1980GoZX

Parent ^{113}I: E≥0.0; Jπ=?; $T_{1/2}$=6.6 s *2*; Q(g.s.)=7230 *30*; %ε+%$β^+$ decay=100.
Measured Eγ, Iγ, γ(t), K X–ray(t), γγ coin, βγ coin, (K x–ray)γ coin with semi. The results are only preliminary, 1980GoZX.
Other: 1977Ki11.

γ(^{113}Te)

Eγ†	Iγ	Comments
^{x}55.0 *2*	32 *2*	Eγ: coin with 352γ, 567γ, 802γ.
^{x}160.0 *2*	14 *2*	Eγ: coin with 463γ.
^{x}216.5 *2*	7 *2*	Eγ: coin with tellurium X–ray and 352γ.
^{x}320.4 *2*	33 *2*	
^{x}351.5 *2*	43 *2*	Eγ: coin with tellurium X–ray and 216γ.
^{x}406.1 *2*	8 *2*	
^{x}462.5 *2*	100	Eγ: coin with tellurium X–ray.
^{x}523.0 *5*	7.0 *10*	Eγ: coin with tellurium X–ray.
^{x}567.4 *2*	36 *3*	Eγ: coin with tellurium X–ray.
^{x}608.6 *5*	6.2 *10*	
^{x}622.4 *2*	74 *3*	
^{x}628.0 *2*	13 *2*	
^{x}651.9 *5*	3.4 *10*	
^{x}690.2 *5*	8.0 *10*	
^{x}696.2 *5*	3.1 *10*	
^{x}774.0 *5*	8.0 *10*	
^{x}798.2 *2*	12 *2*	
^{x}802.1 *5*	8.0 *20*	
^{x}896.0 *5*	9.7 *10*	
^{x}929.1 *3*	8.0 *10*	
^{x}1161.0 *5*	8.7 *10*	
^{x}1422.4 *3*	11 *2*	

† Assigned to ^{113}Te from $T_{1/2}$.
^{x} γ ray not placed in level scheme.

(HI,xnγ) 1998Se05,1997Mo09

Includes ^{64}Ni(^{56}Fe,α3nγ) E=236 MeV and ^{90}Zr(^{31}P,αpnγ) E=150 MeV.
1998Se05: E(^{63}Cu)=245 MeV, ^{64}Ni(^{56}Fe,α3nγ) E=236 MeV. Measured Eγ, Iγ, γγ, γγ(θ)(DCO) using GAMMASPHERE array with six rings of 61 'HPGe' detectors (escape–suppressed).
Data (1998Se05) have been verified using ^{90}Zr(^{31}P,αpn) E=150 MeV with 'eurogam ii' spectrometer.
1997Mo09: ^{88}Sr(^{28}Si,3n) E=120 MeV, Measured: γ, γγ, γ(θ), DCO, seven Ge–Li with BGO anti Compton.
The data given below are from 1998Se05. 1997Mo09 give Band(A) up to 27/2–.

^{113}Te Levels

E(level)†	Jπ‡
0.0	
0+x§	(11/2–)
587.2+x§ *5*	(15/2–)
1311.4+x§ *7*	(19/2–)
1994.4+x§ *9*	(23/2–)
2506.0+x *10*	
2786.6+x *10*	
2798.3+x# *10*	(25/2)
2891.2+x *10*	
3001.3+x§ *10*	(27/2–)
3244.4+x *11*	
3430.7+x *11*	
3573.5+x *11*	(29/2+)
3806.0+x@ *10*	(29/2)
3917.5+x# *10*	
3927.3+x *11*	
3975.1+x *11*	
4034.6+x§ *11*	(31/2–)
4184.7+x *11*	
4264.7+x *12*	
4273.4+x# *11*	
4377.9+x *11*	
4558.2+x *11*	
4616.5+x@ *11*	
4906.3+x *12*	
5018.8+x# *12*	
5071.2+x§ *12*	
5163.1+x@ *11*	
5188.7+x *11*	
5196.2+x *13*	
5389.9+x *11*	
5551.2+x *12*	
5553.6+x *13*	
5819.9+x# *13*	
6149.9+x§ *13*	
6155.9+x *13*	
6204.4+x@ *11*	
6523.2+x *13*	
6621.8+x@ *13*	
6786.8+x *14*	
6908.4+x# *14*	
7153.0+x§ *14*	
7212.3+x *14*	
7360.6+x *13*	
7689.7+x@ *14*	
8061.5+x@ *14*	
8764.3+x *14*	

† From least–squares fit to γ energies.
‡ From gammas, DCO ratios, decay patterns and systematics.
§ (A): Ground–state band.
\# (B): γ cascade, starting at 25/2.
@ (C): γ cascade, starting at 29/2.

(HI,xnγ) 1998Se05,1997Mo09 (continued)

γ(^{113}Te)

Eγ	E(level)	Iγ†	Mult.‡	Comments
226.7 *5*	5389.9+x	3.0 *2*		
238.6 *5*	4616.5+x	0.9 *1*		
355.6 *5*	4273.4+x	5.6 *3*		
371.8 *5*	8061.5+x	2.4 *2*		
417.4 *5*	6621.8+x	7.5 *3*		
429.4 *5*	3430.7+x	4.1 *3*		
446.2 *5*	3244.4+x	4.4 *4*		
467.7 *5*	4273.4+x	2.8 *2*		
482.4 *5*	5553.6+x	2.2 *3*		
511.6 *5*	2506.0+x	6.5 *5*		
523.2 *5*	4558.2+x	4.0 *3*		
546.8 *5*	5163.1+x	14.1 *5*		
572.0 *5*	4377.9+x	0.9 *2*		
572.6 *5*	3573.5+x	15.6 *6*	(E1)	DCO=0.47 *6*.
587.2 *5*	587.2+x	100 *3*	(E2)	DCO=1.00 used as reference.
604.3 *5*	5163.1+x	5.7 *3*		
683.0 *5*	1994.4+x	85 *3*	(E2)	
699.0 *5*	4616.5+x	8.9 *4*		
724.2 *5*	1311.4+x	100 *3*	(E2)	DCO=0.86 *5*.
745.4 *5*	5018.8+x	9.7 *4*		
792.2 *5*	2786.6+x	4.8 *7*		
801.1 *5*	5819.9+x	5.3 *4*		
803.6 *5*	2798.3+x	14.5 *11*	D	DCO=0.68 *22* for 803.6+804.9.
804.9 *5*	3806.0+x	8.5 *5*	D	DCO=0.68 *22* for 803.6+804.9.
810.6 *5*	4616.5+x	8.6 *4*		
814.9 *5*	6204.4+x	4.6 *3*		
832.1 *5*	5389.9+x	5.5 *4*		
834.0 *5*	4264.7+x	2.0 *3*		
896.8 *5*	2891.2+x	5.9 *6*		
926.1 *5*	3927.3+x	6.9 *5*		
931.2 *5*	4906.3+x	4.1 *4*		
931.5 *5*	5196.2+x	2.1 *3*		
966.9 *5*	6786.8+x	1.7 *2*		
972.0 *5*	6523.2+x	0.7 *2*		
973.8 *5*	3975.1+x	6.8 *5*		
984.8 *5*	4558.2+x	9.5 *4*		
993.0 *5*	5551.2+x	2.0 *2*		
1003.1 *5*	7153.0+x	1.6 *3*		
1003.7 *5*	5188.7+x	1.1 *3*		
1007.2 *5*	3001.3+x	50.0 *16*	(E2)	DCO=0.87 *6*.
1029.2 *5*	4273.4+x	2.6 *2*		
1033.0 *5*	4034.6+x	9.7 *5*	(E2)	DCO=0.90 *35*.
1036.6 *5*	5071.2+x	4.0 *3*		
1041.0 *5*	6204.4+x	11.2 *5*		
1043.9 *5*	4616.5+x	5.9 *3*		
1056.4 *5*	7212.3+x	1.7 *2*		
1067.8 *5*	7689.7+x	6.5 *3*		
1074.6 *5*	8764.3+x	2.3 *2*		
1078.7 *5*	6149.9+x	1.7 *2*		
1084.7 *5*	6155.9+x	1.6 *3*		
1088.5 *5*	6908.4+x	3.0 *2*		
1118.8 *5*	3917.5+x	11.0 *5*		
1154.3 *5*	5188.7+x	2.4 *3*		
1156.2 *5*	7360.6+x	2.1 *3*		
1183.0 *5*	4184.7+x	4.3 *4*		
1261.6 *5*	5188.7+x	2.8 *3*		

† Normalized to 100% for the 587 and 724 γ from 1998Se05.
‡ From DCO ratios.

Adopted Levels, Gammas

Q(β⁻)=−8920 *11*; S(n)=12130 *13*; S(p)=840 *11*; Q(α)=2730 *20* 2003Au03,2009AuZZ.
Production and identification: 290–MeV ^{58}Ni on ^{58}Ni. Mass separation, observed tellurium x rays, 1977Ki11. Chemical and mass separation, Q(α) syst (1979Sc22).

^{113}I Levels

Nomenclature for band labels:
[p_1p_2,n_1(n_2n_3)]; where p_1=number of $g_{9/2}$ proton holes; p_2=number of $h_{11/2}$ protons; n_1=number of $h_{11/2}$ neutrons; n_2=number $g_{9/2}$ or $f_{7/2}$ neutrons; n_3=number of $i_{13/2}$ neutrons.

Cross Reference (XREF) Flags

A ^{114}Cs εp Decay
B ^{58}Ni(^{58}Ni,3pγ)

E(level)[§]	Jπ[†#]	XREF	$T_{1/2}$[‡]	Comments
0.0	5/2+	B	6.6 s *2*	%ε+%β⁺=100; %α=3.310×10⁻⁷. %α: from 1981Sc17. E(level): tentative g.s. assignment for 6.6–s activity (1980GoZX). $T_{1/2}$: from 1980GoZX. Other: 5.9 s *5* (1979Sc22). Jπ: from systematics. All odd–a isotopes have Jπ=5/2+.
63.6[r] *5*	7/2+	B		
629.4 *4*	9/2+	B		
753.9[r] *6*	11/2+	B		
838.2 *6*	9/2+	B		
909.3[d] *4*	9/2+	B		
1017.9[p] *5*	11/2−	B	159 ps *36*	
1269.1[e] *6*	11/2+	B		
1548.7[p] *7*	15/2−	B	5.0 ps *3*	
1614.4[d] *6*	13/2+	B		
1616.7[r] *7*	15/2+	B		
1986.6[e] *7*	15/2+	B		
2186.4[p] *9*	19/2−	B	1.61 ps *17*	
2358.7[d] *8*	17/2+	B		
2684.9[r] *8*	19/2+	B		
2731.2[e] *9*	19/2+	B		
2870.3[p] *10*	23/2−	B	1.86 ps *30*	
3035.6[g] *10*	23/2−	B		
3106.2[d] *10*	21/2+	B		
3306.6 *10*	23/2−	B		
3480.9[e] *10*	23/2+	B		
3568.9[r] *10*	23/2+	B		
3696.2[p] *10*	27/2−	B	0.67 ps *25*	
3741.1[g] *10*	27/2−	B		
3766.8 *9*	23/2+	B		
3792.0 *9*	23/2+	B		
3861.1[d] *10*	25/2+	B		
4113.3 *11*	27/2−	B		
4127.9[o] *22*	25/2+	B		
4236.4[e] *10*	27/2+[@]	B		
4396.1[f] *9*	27/2+	B		
4497.0[g] *11*	31/2−	B	1.1 ps *3*	
4630.0[q] *10*	31/2−	B		
4630.4[d] *10*	29/2+	B		
4798.6[o] *20*	29/2+	B		
5015.4[e] *10*	31/2+	B		
5081.6 *10*	31/2+	B		
5211.8[q] *11*	35/2−	B	1.3 ps *4*	
5364.3[g] *12*	35/2−	B		
5423.5[d] *11*	33/2+	B		
5535.4[o] *17*	33/2+	B		
5838.6[e] *11*	35/2+	B		
5846.4[f] *10*	35/2+	B		
5947.3[q] *12*	39/2−	B		
6266.2[g] *13*	39/2−	B		
6278.3[d] *11*	37/2+	B		
6354.0[o] *14*	37/2+	B		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{113}I Levels (continued)

E(level)[§]	Jπ[†#]	XREF	E(level)[§]	Jπ[†#]	XREF	E(level)[§]	Jπ[†#]	XREF
6688.0[f] *11*	39/2+	B	19670[g] *3*	79/2−	B	y[j]	(59/2−)	B
6712.1[q] *13*	43/2−	B	19773[f] *3*	79/2+	B	1235.5+y[j] *10*	(63/2−)	B
6741.4[e] *12*	39/2+	B	20523[o] *3*	81/2+	B	2579.5+y[j] *15*	(67/2−)	B
7214.6[d] *12*	41/2+	B	21514[g] *3*	83/2−	B	4032.9+y[j] *18*	(71/2−)	B
7247.1[o] *13*	41/2+	B	21688[f] *3*	83/2+	B	5624.1+y[j] *20*	(75/2−)	B
7249.2[g] *14*	43/2−	B	22419[o] *4*	85/2+	B	7355.6+y[j] *23*	(79/2−)	B
7610.0[f] *12*	43/2+	B	23498[g] *4*	87/2−	B	9261.4+y[j] *25*	(83/2−)	B
7680.7[q] *14*	47/2−	B	23561 *4*	87/2−	B	11310+y *4*	(87/2−)	B
7699.5[e] *13*	43/2+	B	23764[f] *4*	87/2+	B	11375+y[j] *4*	(87/2−)	B
8198.4[o] *12*	45/2+	B	24459[o] *4*	89/2+	B	z[k]	(53/2+)	B
8213.6[d] *14*	45/2+	B	25743[g] *4*	91/2−	B	19.0+z *15*	+[b]	B
8296.2[g] *14*	47/2−	B	26005[f] *4*	91/2+	B	45.5+z *15*	+[c]	B
8347.6 *14*	47/2−	B	26660[o] *4*	93/2+	B	1258.0+z[k] *10*	(57/2+)	B
8586.3[q] *15*	51/2−	B	28185[g] *5*	(95/2−)[&]	B	2553.1+z[k] *15*	(61/2+)	B
8613.6[f] *12*	47/2+	B	28432[f] *5*	95/2+	B	3933.8+z[k] *18*	(65/2+)	B
8738.6[e] *15*	47/2+	B	29039[o] *4*	97/2+	B	5438.3+z[k] *20*	(69/2+)	B
9229.7[o] *13*	49/2+	B	31013[f] *5*	(99/2)+	B	7101.0+z[k] *23*	(73/2+)	B
9279.6[d] *16*	49/2+	B	31621[o] *5*	(101/2)+	B	8970.8+z[k] *25*	(77/2+)	B
9496.6[g] *14*	51/2−	B	x[i]	(53/2−)	B	11090+z[k] *4*	(81/2+)	B
9611.0[q] *16*	55/2−	B	11.9+x *15*	−[a]	B	u[l]	(63/2−)	B
9686.6[f] *13*	51/2+	B	992+x[h] *3*	(57/2−)	B	1543.7+u[l] *10*	(67/2−)	B
10332.7[o] *14*	53/2+	B	1098.0+x[i] *10*	(57/2−)	B	3173.4+u[l] *15*	(71/2−)	B
10767.2[g] *15*	55/2−	B	2176+x[h] *3*	(61/2−)	B	4915.6+u[l] *18*	(75/2−)	B
10834.3[f] *14*	55/2+	B	2218.8+x[i] *15*	(61/2−)	B	6782.5+u[l] *20*	(79/2−)	B
11066.9[q] *19*	59/2−	B	3392.5+x[i] *18*	(65/2−)	B	8822+u[l] *3*	(83/2−)	B
11510.1[o] *17*	57/2+	B	3433+x[h] *3*	(65/2−)	B	11025+u[l] *4*	(87/2−)	B
12083.4[f] *18*	59/2+	B	3518.7+x *18*		B	v[m]	(55/2+)	B
12120.1[g] *18*	59/2−	B	4737.3+x[i] *20*	(69/2−)	B	1360.6+v[m] *10*	(59/2+)	B
12769.5[o] *20*	61/2+	B	4773.8+x[h] *24*	(69/2−)	B	2839.0+v[m] *15*	(63/2+)	B
12990.5[q] *21*	63/2−	B	4913.3+x *20*		B	4418.2+v[m] *18*	(67/2+)	B
13414.8[f] *20*	63/2+	B	6184.8+x[i] *22*	(73/2−)	B	6102.5+v[m] *20*	(71/2+)	B
13554.5[g] *24*	63/2−	B	6230.6+x[h] *22*	(73/2−)	B	7873.5+v[m] *23*	(75/2+)	B
14117.4[o] *22*	65/2+	B	6344.7+x *23*		B	9817.5+v[m] *25*	(79/2+)	B
14841.4[f] *23*	67/2+	B	7778.2+x[i] *25*	(77/2−)	B	11930+v[m] *4*	(83/2+)	B
14993[g] *3*	67/2−	B	7857.7+x[h] *25*	(77/2−)	B	w[n]	(77/2−)	B
15559.3[o] *24*	69/2+	B	9537+x[i] *3*	(81/2−)	B	1680.5+w[n] *10*	(81/2−)	B
16366.9[f] *25*	71/2+	B	9644+x[h] *3*	(81/2−)	B	3458.7+w[n] *15*	(85/2−)	B
16436[g] *4*	71/2−	B	11540+x[i] *3*	(85/2−)	B	5329.3+w[n] *18*	(89/2−)	B
17104[o] *3*	73/2+	B	11615+x[h] *3*	(85/2−)	B	7301.4+w[n] *20*	(93/2−)	B
17990[g] *4*	75/2−	B	13772+x[h] *4*	(89/2−)	B	9403+w[n] *3*	(97/2−)	B
18005[f] *3*	75/2+	B	13837+x[i] *4*	(89/2−)	B	11659+w[n] *4*	(101/2−)	B
18756[o] *3*	77/2+	B	13903+x *4*	(89/2−)	B	14092+w[n] *4*	(105/2−)	B

† Assignments for several bands are based on theoretical calculations.
‡ From 2003Pe10, unless given.
§ From least-squares fit to Eγ's.
\# From the deduced transitions multipolarities and band assignments.
@ 755 γ E2 to 23/2+.
& From figure 1 of 2001St16.
a 1086 γ from (57/2−) is E2.
b 1258 γ is E2.
c 1212 γ is E2.
d (A): α=+1/2, based on 5/2+, ΔJ=2, [10,0].
e (B): α=−1/2, based on 11/2+, ΔJ=2, [10,0].
f (C): α=−1/2, based on 35/2+, ΔJ=2, [22,4].
g (D): α=+1/2, based on 31/2−, ΔJ=2, [22,3].
h (E): Based on (57/2−), ΔJ=2, [22,3].
i (F): Based on (53/2−), ΔJ=2, [22,3].
j (G): Based on (59/2−), ΔJ=2, [22,3].
k (H): Based on (53/2+), ΔJ=2, [21,3].
l (I): Based on (63/2−), ΔJ=2, [21,4].
m (J): Based on (55/2+), ΔJ=2, [21,3].
n (K): Based on (77/2−), ΔJ=2, [22,3(01)].

Footnotes continued on next page

Adopted Levels, Gammas (continued)

^{113}I Levels (continued)

o (L): Based on 25/2+, ΔJ=2, [22,4].
p (M): Based on 11/2−, ΔJ=2, [01,0].
q (N): Based on 31/2−, ΔJ=2, [01,2].
r (O): Based on 7/2+, ΔJ=2, [00,0].

γ(^{113}I)

E(level)	Eγ	Iγ	Mult.†	Comments
63.6	63.6			Eγ: from level energy difference.
629.4	565.7 *5*	66.6 *4*	M1,E2	
	629.2 *5*	100.0 *21*	E2	Iγ: uncertainty of 0.1 given by 2001St16 seems too low; increased to 1.0 by compilers.
753.9	690.4 *5*	100.0	E2	
838.2	774.3 *10*	100 *12*	M1,E2	
	838.0 *10*	94 *12*	E2	
909.3	846.0 *5*	100 *7*	M1,E2	
	909.4 *5*	59 *7*	E2	
1017.9	179.8 *5*	6.3 *7*	E1	B(E1)(W.u.)=1.4×10^{-5} *4*.
	263.9 *5*	31.9 *12*	E1	B(E1)(W.u.)=2.3×10^{-5} *6*.
	388.4 *5*	100 *4*	E1	B(E1)(W.u.)=2.2×10^{-5} *6*.
1269.1	360.0 *5*	100	M1,E2	
1548.7	530.8 *5*	100	E2	B(E2)(W.u.)=83 *5*.
1614.4	345.4 *5*	100 *6*	M1,E2	
	705.4 *8*	11 *3*	E2	
	775.0 *10*	17 *3*	E2	
	984.5 *10*	8 *3*	E2	
1616.7	862.8 *5*	100	E2	
1986.6	372.0 *10*	100 *30*	M1,E2	
	717.6 *5*	76 *7*	E2	
2186.4	637.7 *5*	100	E2	B(E2)(W.u.)=103 *11*.
2358.7	372.4 *10*	100 *40*	M1,E2	
	744.0 *10*	96 *18*	E2	
2684.9	1068.3 *5*	100	E2	
2731.2	373.0 *10*	100 *40*	M1,E2	
	744.4 *10*	97 *21*	E2	
2870.3	683.6 *5*	100	E2	B(E2)(W.u.)=63 *11*.
3035.6	165.1 *5*	21.2 *19*	M1,E2	
	848.6 *5*	100	E2	
3106.2	375.0 *10*	100 *40*	M1,E2	
	747.0 *10*	100 *15*	E2	
3306.6	271.0 *6*	25 *5*	M1,E2	
	1120.1 *9*	100 *10*	E2	
3480.9	374.0 *10*	96 *50*	M1,E2	
	750.0 *10*	100 *21*	E2	
3568.9	884.0 *5*	100	E2	
3696.2	825.7 *5*	100	E2	B(E2)(W.u.)=70 *30*.
3741.1	705.6 *5*	100 *7*	E2	
	870.9 *6*	17 *4*	E2	
3766.8	1081.7 *5*	100	E2	
3792.0	1107.3 *5*	100	E2	
3861.1	380.0 *10*	100 *9*	M1,E2	
	755.0 *10*	42 *15*	E2	
4113.3	806.6 *6*	100	E2	
4236.4	375.4 *10*	92 *50*	M1,E2	
	755.4 *10*	100 *30*	E2	
4396.1	604.3 *5*	57	E2	
	629.1 *5*	100 *14*	E2	
4497.0	756.0 *5*	25.1 *16*	E2	B(E2)(W.u.)=13 *4*.
	800.6 *5*	100 *3*	E2	B(E2)(W.u.)=39 *11*.
4630.0	516.6 *5*	18.7 *15*	E2	
	889.1 *5*	29.1 *15*	E2	
	933.9 *5*	100 *5*	E2	
4630.4	394.0 *5*	100 *6*	M1,E2	
	769.0 *10*	41 *6*	E2	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{113}I) (continued)

E(level)	Eγ	Iγ	Mult.†	Comments
4798.6	670.7 *10*	100	E2	
5015.4	385.0 *5*	71 *8*	M1,E2	
	779.0 *10*	100 *8*	E2	
5081.6	685.6 *5*	100	E2	
5211.8	582.0 *5*	61.1 *25*	E2	B(E2)(W.u.)=76 *24*.
	714.5 *5*	100 *4*	E2	B(E2)(W.u.)=45 *14*.
5364.3	867.2 *5*	100	E2	
5423.5	408.0 *5*	100 *11*	M1,E2	
	793.0 *10*	68 *11*	E2	
5535.4	736.8 *10*	100	E2	
5838.6	415.0 *5*	100	M1+E2	
	823.0 *10*	67 *19*	E2	
5846.4	423.3 *10*	13 *9*	M1,E2	
	764.8 *5*	100 *17*	E2	
	831.3 *10*	17 *4*	E2	
5947.3	735.5 *5*	100	E2	
6266.2	901.9 *5*	100	E2	
6278.3	439.6 *5*	100 *12*	M1,E2	
	854.6 *10*	81 *6*	E2	
6354.0	818.6 *10*	100	E2	
6688.0	841.9 *5*	100 *9*	E2	
	849.1 *10*	23 *9*	E2	
6712.1	764.8 *5*	100	E2	
6741.4	463.0 *5*	100 *12*	M1,E2	
	902.6 *10*	41 *12*	E2	
7214.6	473.0 *10*	100 *8*	M1,E2	
	936.0 *10*	92 *8*	E2	
7247.1	505.8 *10*	33 *22*	M1,E2	
	893.1 *5*	100 *22*	E2	
7249.2	983.0 *5*	100	E2	
7610.0	922.1 *5*	100	E2	
7680.7	968.6 *5*	100	E2	
7699.5	485.0 *10*	100 *14*	M1,E2	
	958.0 *10*	43 *30*	E2	
8198.4	589.2 *10*	36 *9*	M1,E2	
	951.3 *5*	100 *9*	E2	
	983.0 *10*	18 *9*	E2	
8213.6	514.0 *10*	30 *20*	M1,E2	
	999.0 *10*	100 *20*	E2	
8296.2	1046.9 *5*	100	E2	
8347.6	1098.5 *5*	100	E2	
8586.3	905.6 *5*	100	E2	
8613.6	1003.6 *5*	100	E2	
8738.6	525.0 *10*	60 *40*	M1,E2	
	1039.0 *10*	100 *40*	E2	
9229.7	616.0 *10*	12 *6*	M1,E2	
	1031.3 *5*	100 *12*	E2	
9279.6	541.0 *10*	67 *70*	M1,E2	
	1066.0 *10*	100 *70*	E2	
9496.6	1149.1 *3*	100 *8*	E2	
	1200.4 *5*	79 *4*	E2	
9611.0	1024.7 *5*	100	E2	
9686.6	1073.0 *5*	100	E2	
10332.7	1103.0 *5*	100	E2	
10767.2	1270.5 *5*	100	E2	
10834.3	1147.7 *5*	100	E2	
11066.9	1455.9 *10*	100	E2	
11510.1	1177.4 *10*	100	E2	
12083.4	1249.1 *10*	100	E2	
12120.1	1352.9 *10*	100	E2	
12769.5	1259.4 *10*	100	E2	
12990.5	1923.6 *10*	100	E2	
13414.8	1331.4 *10*	100	E2	

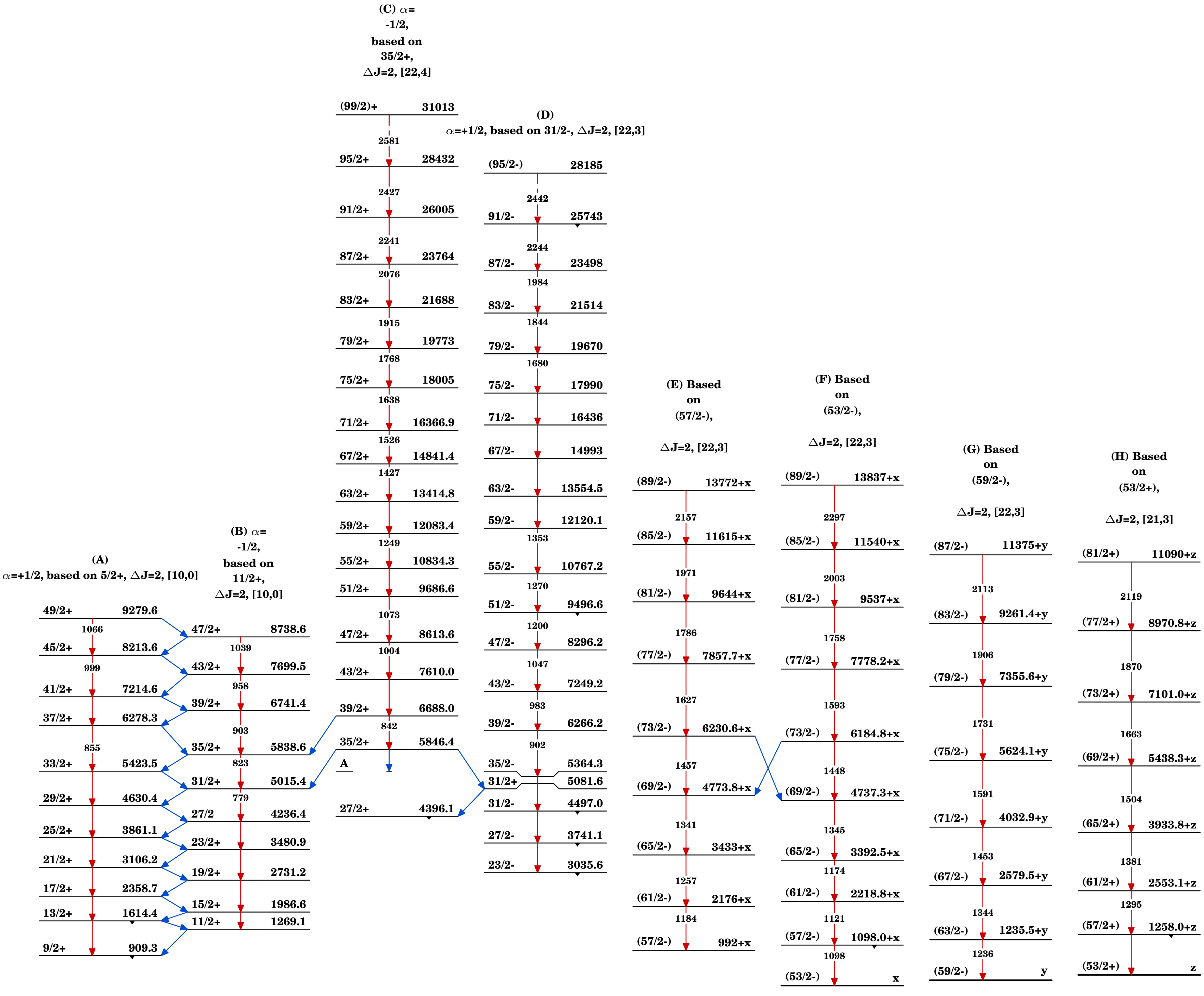
Continued on next page (footnotes at end of table)

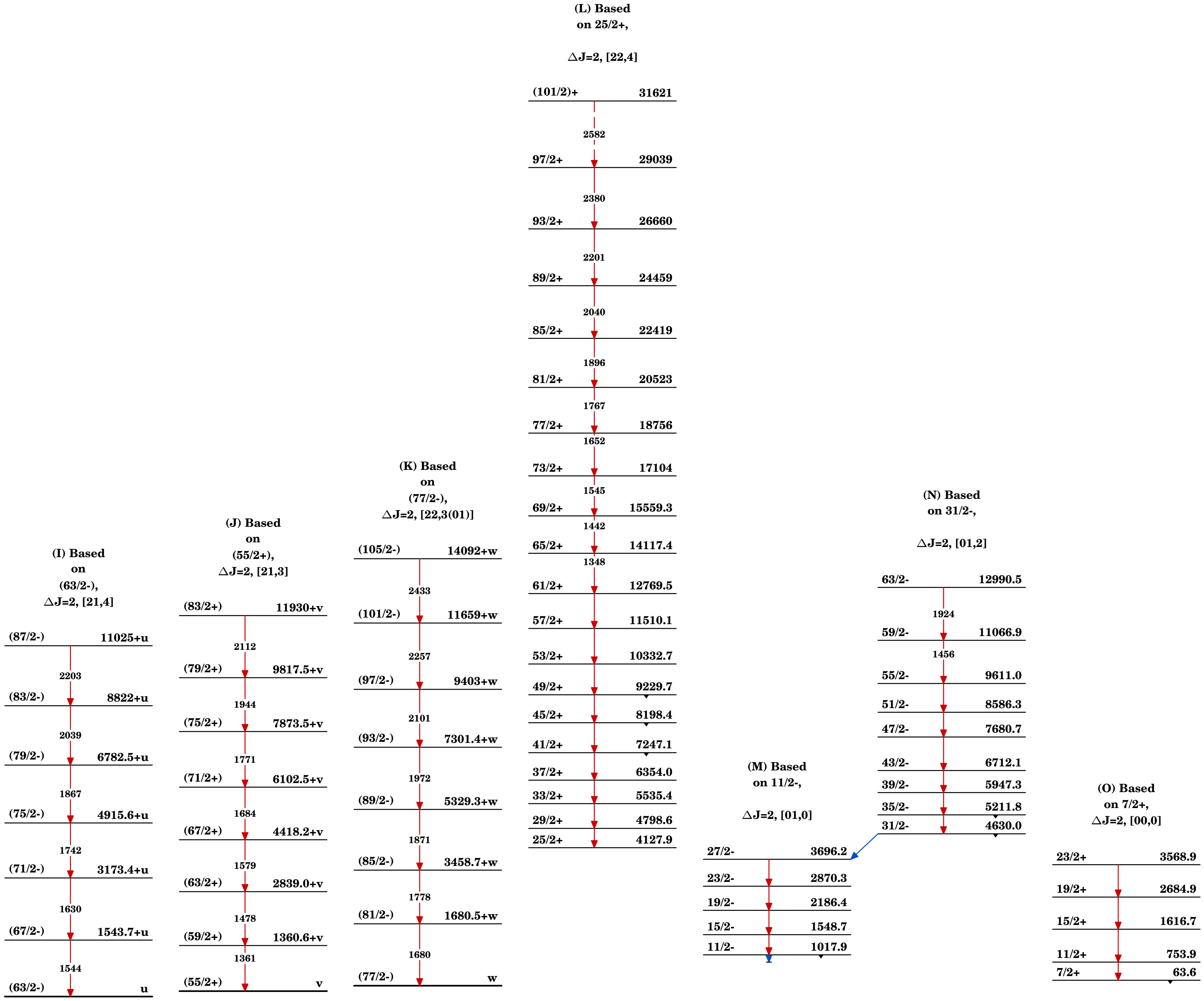
Adopted Levels, Gammas (continued)

γ(^{113}I) (continued)

E(level)	Eγ	Iγ	Mult.[†]
13554.5	1434.4 15	100	E2
14117.4	1347.9 10	100	E2
14841.4	1426.6 10	100	E2
14993	1438.5 15	100	E2
15559.3	1441.9 10	100	E2
16366.9	1525.5 10	100	E2
16436	1443.0 15	100	E2
17104	1544.8 10	100	E2
17990	1554.0 10	100	E2
18005	1638.2 10	100	E2
18756	1651.8 10	100	E2
19670	1680.4 10	100	E2
19773	1767.7 10	100	E2
20523	1766.9 10	100	E2
21514	1844.2 10	100	E2
21688	1915.3 10	100	E2
22419	1895.8 10	100	E2
23498	1984.1 10	100	E2
23561	2046.6 20	100	E2
23764	2075.8 10	100	E2
24459	2039.9 10	100	E2
25743	2181.6 20	100	E2
	2244.5 20	100	E2
26005	2241.2 20	100	E2
26660	2201.0 10	100	E2
28185	2442.2[‡] 20	100	E2
28432	2426.6 20	100	E2
29039	2379.5 20	100	E2
31013	2581.1[‡] 20	100	E2
31621	2582.0[‡] 20	100	E2
1098.0+x	1086.1 10	100 17	E2
	1098.0 10	92 17	E2
2176+x	1184.1 10	100	E2
2218.8+x	1120.8 10	100	E2
3392.5+x	1173.7 10	100	E2
3433+x	1257.4 10	100	E2
3518.7+x	1299.9 10	100	
4737.3+x	1344.8 10	100	E2
4773.8+x	1340.6 10	100	E2
4913.3+x	1394.6 10	100	
6184.8+x	1410.0 20	25 17	E2
	1447.8 10	100 17	E2
6230.6+x	1457.1 10	100 17	E2
	1493.0 10	33 17	E2
6344.7+x	1431.4 10	100	
7778.2+x	1593.3 10	100	E2
7857.7+x	1627.1 10	100	E2
9537+x	1758.4 10	100	E2
9644+x	1786.4 10	100	E2
11540+x	2003.2 10	100	E2
11615+x	1970.8 10	100	E2
13772+x	2156.9 20	100	E2
13837+x	2296.9 20	100	E2
13903+x	2363.0 20	100	E2
1235.5+y	1235.5 10	100	E2
2579.5+y	1344.0 10	100	E2
4032.9+y	1453.4 10	100	E2
5624.1+y	1591.2 10	100	E2
7355.6+y	1731.4 10	100	E2
9261.4+y	1905.8 10	100	E2
11310+y	2049.0 20	100	E2
11375+y	2113.1 20	100	E2
1258.0+z	1212.5 10	100 20	E2
	1239.0 10	60 20	E2
	1258.0 10	60 20	E2
2553.1+z	1295.1 10	100	E2
3933.8+z	1380.7 10	100	E2
5438.3+z	1504.5 10	100	E2
7101.0+z	1662.7 10	100	E2
8970.8+z	1869.7 10	100	E2
11090+z	2118.9 20	100	E2
1543.7+u	1543.7 10	100	E2
3173.4+u	1629.6 10	100	E2
4915.6+u	1742.2 10	100	E2
6782.5+u	1866.9 10	100	E2
8822+u	2039.4 20	100	E2
11025+u	2202.9 20	100	E2
1360.6+v	1360.6 10	100	E2
2839.0+v	1478.4 10	100	E2
4418.2+v	1579.2 10	100	E2
6102.5+v	1684.3 10	100	E2
7873.5+v	1770.9 10	100	E2
9817.5+v	1944.0 10	100	E2
11930+v	2112.3 20	100	E2
1680.5+w	1680.5 10	100	E2
3458.7+w	1778.1 10	100	E2
5329.3+w	1870.6 10	100	E2
7301.4+w	1972.1 10	100	E2
9403+w	2101.2 20	100	E2
11659+w	2256.7 20	100	E2
14092+w	2432.7 20	100	E2

[†] From DCO Measurements.
[‡] Placement of transition in the level scheme is uncertain.


(A)
α=+1/2, based on 5/2+, △J=2, [10,0]
(B) α=
-1/2,
based on
11/2+,
△J=2, [10,0]
(C) α=
-1/2,
based on
35/2+,
△J=2, [22,4]
(D)
α=+1/2, based on 31/2-, △J=2, [22,3]
(E) Based
on
(57/2-),
△J=2, [22,3]
(F) Based
on
(53/2-),
△J=2, [22,3]
(G) Based
on
(59/2-),
△J=2, [22,3]
(H) Based
on
(53/2+),
△J=2, [21,3]
49/2+ 9279.6
45/2+ 8213.6
41/2+ 7214.6
37/2+ 6278.3
33/2+ 5423.5
29/2+ 4630.4
25/2+ 3861.1
21/2+ 3106.2
17/2+ 2358.7
13/2+ 1614.4
9/2+ 909.3
1066
999
855
47/2+ 8738.6
43/2+ 7699.5
39/2+ 6741.4
35/2+ 5838.6
31/2+ 5015.4
27/2 4236.4
23/2+ 3480.9
19/2+ 2731.2
15/2+ 1986.6
11/2+ 1269.1
1039
958
903
823
779
(99/2)+ 31013
95/2+ 28432
91/2+ 26005
87/2+ 23764
83/2+ 21688
79/2+ 19773
75/2+ 18005
71/2+ 16366.9
67/2+ 14841.4
63/2+ 13414.8
59/2+ 12083.4
55/2+ 10834.3
51/2+ 9686.6
47/2+ 8613.6
43/2+ 7610.0
39/2+ 6688.0
35/2+ 5846.4
A
27/2+ 4396.1
2581
2427
2241
2076
1915
1768
1638
1526
1427
1249
1073
1004
842
(95/2-) 28185
91/2- 25743
87/2- 23498
83/2- 21514
79/2- 19670
75/2- 17990
71/2- 16436
67/2- 14993
63/2- 13554.5
59/2- 12120.1
55/2- 10767.2
51/2- 9496.6
47/2- 8296.2
43/2- 7249.2
39/2- 6266.2
35/2- 5364.3
31/2+ 5081.6
31/2- 4497.0
27/2- 3741.1
23/2- 3035.6
2442
2244
1984
1844
1680
1353
1270
1200
1047
983
902
(89/2-) 13772+x
(85/2-) 11615+x
(81/2-) 9644+x
(77/2-) 7857.7+x
(73/2-) 6230.6+x
(69/2-) 4773.8+x
(65/2-) 3433+x
(61/2-) 2176+x
(57/2-) 992+x
2157
1971
1786
1627
1457
1341
1257
1184
(89/2-) 13837+x
(85/2-) 11540+x
(81/2-) 9537+x
(77/2-) 7778.2+x
(73/2-) 6184.8+x
(69/2-) 4737.3+x
(65/2-) 3392.5+x
(61/2-) 2218.8+x
(57/2-) 1098.0+x
(53/2-) x
2297
2003
1758
1593
1448
1345
1174
1121
1098
(87/2-) 11375+y
(83/2-) 9261.4+y
(79/2-) 7355.6+y
(75/2-) 5624.1+y
(71/2-) 4032.9+y
(67/2-) 2579.5+y
(63/2-) 1235.5+y
(59/2-) y
2113
1906
1731
1591
1453
1344
1236
(81/2+) 11090+z
(77/2+) 8970.8+z
(73/2+) 7101.0+z
(69/2+) 5438.3+z
(65/2+) 3933.8+z
(61/2+) 2553.1+z
(57/2+) 1258.0+z
(53/2+) z
2119
1870
1663
1504
1381
1295


(I) Based on (63/2-), △J=2, [21,4]
(87/2-) 11025+u
2203
(83/2-) 8822+u
2039
(79/2-) 6782.5+u
1867
(75/2-) 4915.6+u
1742
(71/2-) 3173.4+u
1630
(67/2-) 1543.7+u
1544
(63/2-) u
(J) Based on (55/2+), △J=2, [21,3]
(83/2+) 11930+v
2112
(79/2+) 9817.5+v
1944
(75/2+) 7873.5+v
1771
(71/2+) 6102.5+v
1684
(67/2+) 4418.2+v
1579
(63/2+) 2839.0+v
1478
(59/2+) 1360.6+v
1361
(55/2+) v
(K) Based on (77/2-), △J=2, [22,3(01)]
(105/2-) 14092+w
2433
(101/2-) 11659+w
2257
(97/2-) 9403+w
2101
(93/2-) 7301.4+w
1972
(89/2-) 5329.3+w
1871
(85/2-) 3458.7+w
1778
(81/2-) 1680.5+w
1680
(77/2-) w
(L) Based on 25/2+, △J=2, [22,4]
(101/2)+ 31621
2582
97/2+ 29039
2380
93/2+ 26660
2201
89/2+ 24459
2040
85/2+ 22419
1896
81/2+ 20523
1767
77/2+ 18756
1652
73/2+ 17104
1545
69/2+ 15559.3
1442
65/2+ 14117.4
1348
61/2+ 12769.5
57/2+ 11510.1
53/2+ 10332.7
49/2+ 9229.7
45/2+ 8198.4
41/2+ 7247.1
37/2+ 6354.0
33/2+ 5535.4
29/2+ 4798.6
25/2+ 4127.9
(M) Based on 11/2-, △J=2, [01,0]
27/2- 3696.2
23/2- 2870.3
19/2- 2186.4
15/2- 1548.7
11/2- 1017.9
(N) Based on 31/2-, △J=2, [01,2]
63/2- 12990.5
1924
59/2- 11066.9
1456
55/2- 9611.0
51/2- 8586.3
47/2- 7680.7
43/2- 6712.1
39/2- 5947.3
35/2- 5211.8
31/2- 4630.0
(O) Based on 7/2+, △J=2, [00,0]
23/2+ 3568.9
19/2+ 2684.9
15/2+ 1616.7
11/2+ 753.9
7/2+ 63.6

$^{113}_{53}$I$_{60}$

^{114}Cs εp Decay 1980Ro04

Parent ^{114}Cs: E≥0; Jπ=(1+); $T_{1/2}$=0.57 s *2*; Q(g.s.)=10380 *170*; %εp decay=?
Measured energies, intensities, and half-lives for delayed protons, delayed α's and ground-state α's, E/ΔE telescope, Eγ, Iγ, γγ-coin, Iβ, βγ-coin, $T_{1/2}$; semi, 1980Ro04.

γ(^{113}I)

Eγ	Iγ
[x]30.7 *2*	39 *8*
[x]121.6 *2*	32 *6*

[x] γ ray not placed in level scheme.

^{58}Ni(^{58}Ni,3pγ) 2001St16,2003Pe10

2001St16: E=250 MeV. Measured Eγ, Iγ, γγ and γγ(θ)(DCO) using GAMMASPHERE array of 83 HPGe detectors coupled with the Microball array of 95 CsI(Tl) charged particle detectors and an array of 15 scintillators for neutron detection.
2003Pe10: ^{58}Ni(^{58}Ni,3πγ) E=210 MeV. Measured Eγ, Iγ, γγ and lifetimes by recoil-distance Doppler-shift using the 4π spectrometer euroball iv.
1993Pa13: ^{58}Ni(^{58}Ni,3p) E=240 MeV.
Measured: γ, γγ, Eurogam system.
1995Wa14: ^{58}Ni(^{58}Ni,3p) E=240 MeV.
Measured: γ, γγ, Eurogam system, same experiment with new analysis.
Except for lifetime data, all other data are from 2001St16.

^{113}I Levels

Nomenclature for band labels:
[p_1p_2,n_1(n_2n_3)]; where p_1=number of $g_{9/2}$ proton holes; p_2=number of $h_{11/2}$ protons; n_1=number of $h_{11/2}$ neutrons; n_2=number $g_{9/2}$ or $f_{7/2}$ neutrons; n_3=number of $i_{13/2}$ neutrons.

E(level)‡	Jπ†	$T_{1/2}$
0.0	5/2+	
63.6[l] *5*	7/2+	
629.4 *4*	9/2+	
753.9[l] *6*	11/2+	
838.2 *6*	9/2+	
909.3[#] *4*	9/2+	
1017.9[j] *5*	11/2−	159 ps *36*
1269.1[@] *6*	11/2+	
1548.7[j] *7*	15/2−	5.0 ps *3*
1614.4[#] *6*	13/2+	
1616.7[l] *7*	15/2+	
1986.6[@] *7*	15/2+	
2186.4[j] *9*	19/2−	1.61 ps *17*
2358.7[#] *8*	17/2+	
2684.9[l] *8*	19/2+	
2731.2[@] *9*	19/2+	
2870.3[j] *10*	23/2−	1.86 ps *30*
3035.6[a] *10*	23/2−	
3106.2[#] *10*	21/2+	
3306.6 *10*	23/2−	
3480.9[@] *10*	23/2+	
3568.9[l] *10*	23/2+	
3696.2[j] *10*	27/2−	0.67 ps *25*
3741.1[a] *10*	27/2−	
3766.8 *9*	23/2+	
3792.0 *9*	23/2+	
3861.1[#] *10*	25/2+	
4113.3 *11*	27/2−	
4127.9[i] *22*	25/2+	
4236.4[@] *10*	27/2	
4396.1[&] *9*	27/2+	
4497.0[a] *11*	31/2−	1.1 ps *3*
4630.0[k] *10*	31/2−	
4630.4[#] *10*	29/2+	
4798.6[i] *20*	29/2+	
5015.4[@] *10*	31/2+	
5081.6 *10*	31/2+	
5211.8[k] *11*	35/2−	1.3 ps *4*
5364.3[a] *12*	35/2−	
5423.5[#] *11*	33/2+	
5535.4[i] *17*	33/2+	
5838.6[@] *11*	35/2+	
5846.4[&] *10*	35/2+	
5947.3[k] *12*	39/2−	
6266.2[a] *13*	39/2−	
6278.3[#] *11*	37/2+	
6354.0[i] *14*	37/2+	
6688.0[&] *11*	39/2+	
6712.1[k] *13*	43/2−	
6741.4[@] *12*	39/2+	
7214.6[#] *12*	41/2+	
7247.1[i] *13*	41/2+	
7249.2[a] *14*	43/2−	
7610.0[&] *12*	43/2+	
7680.7[k] *14*	47/2−	
7699.5[@] *13*	43/2+	
8198.4[i] *12*	45/2+	
8213.6[#] *14*	45/2+	
8296.2[a] *14*	47/2−	
8347.6 *14*	47/2−	
8586.3[k] *15*	51/2−	
8613.6[&] *12*	47/2+	

Continued on next page (footnotes at end of table)

^{58}Ni(^{58}Ni,3pγ) 2001St16,2003Pe10 (continued)

^{113}I Levels (continued)

E(level)[‡]	Jπ[†]
8738.6[@] *15*	47/2+
9229.7[i] *13*	49/2+
9279.6[#] *16*	49/2+
9496.6[a] *14*	51/2−
9611.0[k] *16*	55/2−
9686.6[&] *13*	51/2+
10332.7[i] *14*	53/2+
10767.2[a] *15*	55/2−
10834.3[&] *14*	55/2+
11066.9[k] *19*	59/2−
11510.1[i] *17*	57/2+
12083.4[&] *18*	59/2+
12120.1[a] *18*	59/2−
12769.5[i] *20*	61/2+
12990.5[k] *21*	63/2−
13414.8[&] *20*	63/2+
13554.5[a] *24*	63/2−
14117.4[i] *22*	65/2+
14841.4[&] *23*	67/2+
14993[a] *3*	67/2−
15559.3[i] *24*	69/2+
16366.9[&] *25*	71/2+
16436[a] *4*	71/2−
17104[i] *3*	73/2+
17990[a] *4*	75/2−
18005[&] *3*	75/2+
18756[i] *3*	77/2+
19670[a] *3*	79/2−
19773[&] *3*	79/2+
20523[i] *3*	81/2+
21514[a] *3*	83/2−
21688[&] *3*	83/2+
22419[i] *4*	85/2+
23498[a] *4*	87/2−
23561 *4*	87/2−
23764[&] *4*	87/2+
24459[i] *4*	89/2+
25743[a] *4*	91/2−

E(level)[‡]	Jπ[†]
26005[&] *4*	91/2+
26660[i] *4*	93/2+
28185[a] *5*	(95/2−)[§]
28432[&] *5*	95/2+
29039[i] *4*	97/2+
31013[&] *5*	(99/2)+
31621[i] *5*	(101/2)+
x[c]	(53/2−)
11.9+x *15*	−
992+x[b] *3*	(57/2−)
1098.0+x[c] *10*	(57/2−)
2176+x[b] *3*	(61/2−)
2218.8+x[c] *15*	(61/2−)
3392.5+x[c] *18*	(65/2−)
3433+x[b] *3*	(65/2−)
3518.7+x *18*	
4737.3+x[c] *20*	(69/2−)
4773.8+x[b] *24*	(69/2−)
4913.3+x *20*	
6184.8+x[c] *22*	(73/2−)
6230.6+x[b] *22*	(73/2−)
6344.7+x *23*	
7778.2+x[c] *25*	(77/2−)
7857.7+x[b] *25*	(77/2−)
9537+x[c] *3*	(81/2−)
9644+x[b] *3*	(81/2−)
11540+x[c] *3*	(85/2−)
11615+x[b] *3*	(85/2−)
13772+x[b] *4*	(89/2−)
13837+x[c] *4*	(89/2−)
13903+x *4*	(89/2−)
y[d]	(59/2−)
1235.5+y[d] *10*	(63/2−)
2579.5+y[d] *15*	(67/2−)
4032.9+y[d] *18*	(71/2−)
5624.1+y[d] *20*	(75/2−)
7355.6+y[d] *23*	(79/2−)
9261.4+y[d] *25*	(83/2−)

E(level)[‡]	Jπ[†]
11310+y *4*	(87/2−)
11375+y[d] *4*	(87/2−)
z[e]	(53/2+)
19.0+z *15*	+
45.5+z *15*	+
1258.0+z[e] *10*	(57/2+)
2553.1+z[e] *15*	(61/2+)
3933.8+z[e] *18*	(65/2+)
5438.3+z[e] *20*	(69/2+)
7101.0+z[e] *23*	(73/2+)
8970.8+z[e] *25*	(77/2+)
11090+z[e] *4*	(81/2+)
u[f]	(63/2−)
1543.7+u[f] *10*	(67/2−)
3173.4+u[f] *15*	(71/2−)
4915.6+u[f] *18*	(75/2−)
6782.5+u[f] *20*	(79/2−)
8822+u[f] *3*	(83/2−)
11025+u[f] *4*	(87/2−)
v[g]	(55/2+)
1360.6+v[g] *10*	(59/2+)
2839.0+v[g] *15*	(63/2+)
4418.2+v[g] *18*	(67/2+)
6102.5+v[g] *20*	(71/2+)
7873.5+v[g] *23*	(75/2+)
9817.5+v[g] *25*	(79/2+)
11930+v[g] *4*	(83/2+)
w[h]	(77/2−)
1680.5+w[h] *10*	(81/2−)
3458.7+w[h] *15*	(85/2−)
5329.3+w[h] *18*	(89/2−)
7301.4+w[h] *20*	(93/2−)
9403+w[h] *3*	(97/2−)
11659+w[h] *4*	(101/2−)
14092+w[h] *4*	(105/2−)

† Assignments for several bands are based on theoretical calculations.
‡ From least–squares fit to Eγ's (by evaluators).
§ From figure 1 of 2001St16.
\# (A): α=+1/2, based on 5/2+, ΔJ=2, [10,0].
@ (B): α=−1/2, based on 11/2+, ΔJ=2, [10,0].
& (C): α=−1/2, based on 35/2+, ΔJ=2, [22,4].
a (D): α=+1/2, based on 31/2−, ΔJ=2, [22,3].
b (E): Based on (57/2−), ΔJ=2, [22,3].
c (F): Based on (53/2−), ΔJ=2,[22,3].
d (G): Based on (59/2−), ΔJ=2, [22,3].
e (H): Based on (53/2+), ΔJ=2, [21,3].
f (I): Based on (63/2−), ΔJ=2, [21,4].
g (J): Based on (55/2+), ΔJ=2, [21,3].
h (K): Based on (77/2−), ΔJ=2, [22,3(01)].
i (L): Based on 25/2+, ΔJ=2, [22,4].
j (M): Based on 11/2−, ΔJ=2, [01,0].
k (N): Based on 31/2−, ΔJ=2, [01,2].
l (O): Based on 7/2+, ΔJ=2, [00,0].

^{58}Ni(^{58}Ni,3pγ) 2001St16,2003Pe10 (continued)

γ(^{113}I)

Eγ	E(level)	Iγ	Mult.	Comments
63.6	63.6			Eγ: from level energy difference.
165.1 *5*	3035.6	2.2 *2*	M1,E2	DCO=0.86 *8*.
179.8 *5*	1017.9	4.7 *5*	E1	DCO=0.65 *6*. B(E1)(W.u.)=1.4×10^{-5} *4*.
263.9 *5*	1017.9	23.9 *9*	E1	DCO=1.3 *2*. B(E1)(W.u.)=2.3×10^{-5} *6*.
271.0 *6*	3306.6	0.5 *1*	M1,E2	
345.4 *5*	1614.4	6.6 *4*	M1,E2	DCO=0.73 *6*.
360.0 *5*	1269.1	8.4 *6*	M1,E2	DCO=0.74 *6*.
372.0 *10*	1986.6	4.1 *12*	M1,E2	DCO=0.75 *5*.
372.4 *10*	2358.7	2.8 *12*	M1,E2	DCO=0.75 *5*.
373.0 *10*	2731.2	2.9 *11*	M1,E2	DCO=0.75 *5* for six lines from 372.0 to 375.4.
374.0 *10*	3480.9	2.3 *11*	M1,E2	DCO=0.75 *5* for six lines from 372.0 to 375.4.
375.0 *10*	3106.2	2.7 *11*	M1,E2	DCO=0.75 *5* for six lines from 372.0 to 375.4.
375.4 *10*	4236.4	2.2 *11*	M1+E2	DCO=0.75 *5* for six lines from 372.0 to 375.4.
380.0 *10*	3861.1	3.3 *3*	M1,E2	
385.0 *5*	5015.4	1.7 *2*	M1,E2	
388.4 *5*	1017.9	75 *3*	E1	DCO=0.53 *5*, 0.65 *3*. B(E1)(W.u.)=2.2×10^{-5} *6*.
394.0 *5*	4630.4	3.2 *2*	M1,E2	
408.0 *5*	5423.5	1.9 *2*	M1,E2	
415.0 *5*	5838.6	2.1 *2*	M1,E2	
423.3 *10*	5846.4	0.3 *2*	M1,E2	
439.6 *5*	6278.3	1.6 *2*	M1,E2	
463.0 *5*	6741.4	1.7 *2*	M1,E2	
473.0 *10*	7214.6	1.2 *1*	M1,E2	
485.0 *10*	7699.5	0.7 *1*	M1,E2	
505.8 *10*	7247.1	0.3 *2*	M1,E2	
514.0 *10*	8213.6	0.3 *2*	M1,E2	
516.6 *5*	4630.0	2.5 *2*	E2	
525.0 *10*	8738.6	0.3 *2*	M1,E2	
530.8 *5*	1548.7	100 *3*	E2	B(E2)(W.u.)=83 *5*.
541.0 *10*	9279.6	0.2 *2*	M1,E2	
565.7 *5*	629.4	31.7 *2*	M1,E2	DCO=0.9 *1*.
582.0 *5*	5211.8	19.8 *8*	E2	DCO=0.91 *15*, 1.02 *8*. B(E2)(W.u.)=76 *24*.
589.2 *10*	8198.4	0.4 *1*	M1,E2	
604.3 *5*	4396.1	1.2 *2*	E2	
616.0 *10*	9229.7	0.2 *1*	M1,E2	
629.1 *5*	4396.1	2.1 *3*	E2	
629.2 *5*	629.4	47.6 *10*	E2	Iγ: uncertainty of 0.1 given by 2001St16 seems too low; increased to 1.0 by compilers. DCO=1.0 *1*.
637.7 *5*	2186.4	95 *3*	E2	DCO=0.97 *8*, 0.99 *5*. B(E2)(W.u.)=103 *11*.
670.7 *10*	4798.6	0.8 *2*	E2	
683.6 *5*	2870.3	78.7 *25*	E2	DCO=0.94 *10*, 0.97 *5*. B(E2)(W.u.)=63 *11*.
685.6 *5*	5081.6	2.4 *6*	E2	DCO=1.0 *2*.
690.4 *5*	753.9	20.0 *2*	E2	DCO=0.98 *4*.
705.4 *8*	1614.4	0.7 *2*	E2	
705.6 *5*	3741.1	12.9 *9*	E2	DCO=1.02 *6*.
714.5 *5*	5211.8	32.4 *12*	E2	DCO=1.09 *12*, 0.97 *9*. B(E2)(W.u.)=45 *14*.
717.6 *5*	1986.6	3.1 *3*	E2	
735.5 *5*	5947.3	52.7 *17*	E2	DCO=0.94 *12*, 1.01 *8*.
736.8 *10*	5535.4	0.8 *6*	E2	
744.0 *10*	2358.7	2.7 *5*	E2	DCO=0.95 *8* for 744.0+744.4+747.0.
744.4 *10*	2731.2	2.8 *6*	E2	DCO=0.95 *8* for 744.0+744.4+747.0.
747.0 *10*	3106.2	2.7 *4*	E2	DCO=0.95 *8* for 744.0+744.4+747.0.
750.0 *10*	3480.9	2.4 *5*	E2	
755.0 *10*	3861.1	1.4 *5*	E2	
755.4 *10*	4236.4	2.4 *7*	E2	

Continued on next page (footnotes at end of table)

$^{58}Ni(^{58}Ni,3p\gamma)$ 2001St16,2003Pe10 (continued)

$\gamma(^{113}I)$ (continued)

Eγ	E(level)	Iγ	Mult.	Comments
756.0 5	4497.0	10.7 7	E2	B(E2)(W.u.)=13 4.
764.8 5	5846.4	2.3 4	E2	DCO=1.0 2.
	6712.1	41.8 13	E2	DCO=0.93 14, 1.03 10.
769.0 10	4630.4	1.3 2	E2	
774.3 10	838.2	1.7 2	M1,E2	
775.0 10	1614.4	1.1 2	E2	
779.0 10	5015.4	2.4 2	E2	
793.0 10	5423.5	1.3 2	E2	
800.6 5	4497.0	42.7 14	E2	DCO=0.97 12, 1.04 9. B(E2)(W.u.)=39 11.
806.6 6	4113.3	2.6 4	E2	
818.6 10	6354.0	0.8 2	E2	
823.0 10	5838.6	1.4 4	E2	
825.7 5	3696.2	61.8 20	E2	DCO=0.92 12, 1.05 10. B(E2)(W.u.)=70 30.
831.3 10	5846.4	0.4 1	E2	
838.0 10	838.2	1.6 2	E2	
841.9 5	6688.0	2.2 2	E2	
846.0 5	909.3	2.7 2	M1,E2	
848.6 5	3035.6	10.4 10	E2	DCO=1.01 6.
849.1 10	6688.0	0.5 2	E2	
854.6 10	6278.3	1.3 1	E2	
862.8 5	1616.7	19.5 14	E2	DCO=1.09 6.
867.2 5	5364.3	10.1 5	E2	DCO=0.93 9.
870.9 6	3741.1	2.2 5	E2	
884.0 5	3568.9	7.5 4	E2	
889.1 5	4630.0	3.9 2	E2	
893.1 5	7247.1	0.9 2	E2	
901.9 5	6266.2	6.7 3	E2	
902.6 10	6741.4	0.7 2	E2	DCO=0.97 9.
905.6 5	8586.3	21.1 7	E2	DCO=0.96 10.
909.4 5	909.3	1.6 2	E2	
922.1 5	7610.0	3.1 2	E2	
933.9 5	4630.0	13.4 7	E2	DCO=0.92 18, 1.00 8.
936.0 10	7214.6	1.1 1	E2	
951.3 5	8198.4	1.1 1	E2	
958.0 10	7699.5	0.3 2	E2	
968.6 5	7680.7	32.3 10	E2	DCO=0.97 14, 1.08 10.
983.0 5	7249.2	5.8 3	E2	DCO=0.98 9.
983.0 10	8198.4	0.2 1	E2	
984.5 10	1614.4	0.5 2	E2	
999.0 10	8213.6	1.0 2	E2	
1003.6 5	8613.6	3.1 2	E2	DCO=1.0 2.
1024.7 5	9611.0	12.0 4	E2	DCO=1.09 10.
1031.3 5	9229.7	1.6 2	E2	
1039.0 10	8738.6	0.5 2	E2	
1046.9 5	8296.2	3.0 2	E2	
1066.0 10	9279.6	0.3 2	E2	
1068.3 5	2684.9	20.1 9	E2	DCO=1.03 6.
1073.0 5	9686.6	2.8 2	E2	
1081.7 5	3766.8	2.3 4	E2	
1086.1 10	1098.0+x	1.2 2	E2	
1098.0 10	1098.0+x	1.1 2	E2	
1098.5 5	8347.6	3.2 2	E2	
1103.0 5	10332.7	1.6 2	E2	
1107.3 5	3792.0	1.2 4	E2	
1120.1 9	3306.6	2.0 2	E2	
1120.8 10	2218.8+x	1.7 4	E2	
1147.7 5	10834.3	2.2 2	E2	
1149.1 3	9496.6	2.4 2	E2	
1173.7 10	3392.5+x	1.4 2	E2	
1177.4 10	11510.1	1.8 2	E2	
1184.1 10	2176+x	0.8 2	E2	

Continued on next page (footnotes at end of table)

^{58}Ni(^{58}Ni,3pγ) 2001St16,2003Pe10 (continued)

γ(^{113}I) (continued)

Eγ	E(level)	Iγ	Mult.
1200.4 5	9496.6	1.9 1	E2
1212.5 10	1258.0+z	0.5 1	E2
1235.5 10	1235.5+y	0.5 2	E2
1239.0 10	1258.0+z	0.3 1	E2
1249.1 10	12083.4	0.5 1	E2
1257.4 10	3433+x	0.7 2	E2
1258.0 10	1258.0+z	0.3 1	E2
1259.4 10	12769.5	1.7 2	E2
1270.5 5	10767.2	1.9 1	E2
1295.1 10	2553.1+z	1.0 1	E2
1299.9 10	3518.7+x	0.3 2	
1331.4 10	13414.8	0.6 1	E2
1340.6 10	4773.8+x	0.6 1	E2
1344.0 10	2579.5+y	0.6 2	E2
1344.8 10	4737.3+x	1.3 2	E2
1347.9 10	14117.4	1.6 2	E2
1352.9 10	12120.1	1.5 2	E2
1360.6 10	1360.6+v	0.2 1	E2
1380.7 10	3933.8+z	1.0 1	E2
1394.6 10	4913.3+x	0.3 2	
1410.0 20	6184.8+x	0.3 2	E2
1426.6 10	14841.4	0.5 1	E2
1431.4 10	6344.7+x	0.2 1	
1434.4 15	13554.5	1.3 2	E2
1438.5 15	14993	1.3 2	E2
1441.9 10	15559.3	1.3 2	E2
1443.0 15	16436	0.8 2	E2
1447.8 10	6184.8+x	1.2 2	E2
1453.4 10	4032.9+y	0.5 1	E2
1455.9 10	11066.9	11.1 11	E2
1457.1 10	6230.6+x	0.6 1	E2
1478.4 10	2839.0+v	0.3 1	E2
1493.0 10	6230.6+x	0.2 1	E2
1504.5 10	5438.3+z	0.9 1	E2
1525.5 10	16366.9	0.4 1	E2
1543.7 10	1543.7+u	0.3 1	E2
1544.8 10	17104	1.2 2	E2
1554.0 10	17990	0.8 2	E2
1579.2 10	4418.2+v	0.4 1	E2
1591.2 10	5624.1+y	0.5 1	E2
1593.3 10	7778.2+x	0.9 2	E2
1627.1 10	7857.7+x	0.6 1	E2
1629.6 10	3173.4+u	0.3 1	E2
1638.2 10	18005	0.4 1	E2
1651.8 10	18756	1.1 2	E2
1662.7 10	7101.0+z	0.5 1	E2
1680.4 10	19670	0.7 2	E2
1680.5 10	1680.5+w	0.2 1	E2
1684.3 10	6102.5+v	0.3 1	E2
1731.4 10	7355.6+y	0.4 1	E2
1742.2 10	4915.6+u	0.3 1	E2
1758.4 10	9537+x	0.5 1	E2
1766.9 10	20523	0.9 2	E2
1767.7 10	19773	0.4 1	E2
1770.9 10	7873.5+v	0.3 1	E2
1778.1 10	3458.7+w	0.3 1	E2
1786.4 10	9644+x	0.4 1	E2
1844.2 10	21514	0.4 1	E2
1866.9 10	6782.5+u	0.3 1	E2
1869.7 10	8970.8+z	0.3 1	E2
1870.6 10	5329.3+w	0.4 1	E2
1895.8 10	22419	0.6 2	E2
1905.8 10	9261.4+y	0.3 1	E2
1915.3 10	21688	0.3 1	E2
1923.6 10	12990.5	2.1 3	E2
1944.0 10	9817.5+v	0.2 1	E2
1970.8 10	11615+x	0.3 1	E2
1972.1 10	7301.4+w	0.4 1	E2
1984.1 10	23498	0.2 1	E2
2003.2 10	11540+x	0.2 1	E2
2039.4 20	8822+u	0.3 1	E2
2039.9 10	24459	0.4 1	E2
2046.6 20	23561	0.2 1	E2
2049.0 20	11310+y	0.1 1	E2
2075.8 10	23764	0.2 1	E2
2101.2 20	9403+w	0.3 1	E2
2112.3 20	11930+v	0.1 1	E2
2113.1 20	11375+y	0.1 1	E2
2118.9 20	11090+z	0.2 1	E2
2156.9 20	13772+x	0.2 2	E2
2181.6 20	25743	0.1 1	E2
2201.0 10	26660	0.2 1	E2
2202.9 20	11025+u	0.2 1	E2
2241.2 20	26005	0.2 1	E2
2244.5 20	25743	0.1 1	E2
2256.7 20	11659+w	0.2 1	E2
2296.9 20	13837+x	0.1 1	E2
2363.0 20	13903+x	0.1 1	E2
2379.5 20	29039	0.2 1	E2
2426.6 20	28432	0.1 1	E2
2432.7 20	14092+w	0.1 1	E2
2442.2† 20	28185	0.1 1	E2
2581.1† 20	31013	0.1 1	E2
2582.0† 20	31621	0.2 1	E2

† Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Q(β⁻)=–10420 *60*; S(n)=10230 *60*; S(p)=2430 *12*; Q(α)=3090 *9* 2003Au03,2009AuZZ.

Production and identification: 290–MeV ^{58}Ni on ^{58}Ni. Chemical and mass separation (1978Ro19,1979Sc22). 600–MeV p on cerium. Chemical and mass separation (1973Ha37). p on lanthanum, 290–MeV ^{58}Ni on ^{58}Ni. Chemical and mass separation (1979Ew02).

^{113}Xe Levels

Cross Reference (XREF) Flags

A ^{58}Ni(^{58}Ni,2pnγ)

E(level)†§	Jπ‡	XREF	$T_{1/2}$	Comments
0.0	(5/2+)	A	2.74 s *8*	%ε+%β⁺≈100; %α≈0.011; %εp=7 *4*; %β⁺α≈0.007 *4*. %α: from 1985Ti02, based on estimated limit for the reduced width. εp and β+α derived from εp/α=500–1500 in 1985Ti02. Other: εp=4.2 (1978Ro19). E(level): tentative g.s. assignment for 2.8–s activity (1973Ha37), the proton–to–α intensity in β–delayed particle is 830 *50* (1979Ew02). $T_{1/2}$: from 1985Ti02. Other: 2.8 s *2* (1973Ha37). Jπ: tentative Jπ from syst.
125.91[d] *18*	7/2+	A		
146.19[c] *18*	5/2+	A		
404.8[&] *4*	11/2–	A		
549.09[c] *20*	9/2+	A		
711.14[d] *23*	11/2+	A		
820.0[&] *4*	15/2–	A		
1242.17[c] *23*	13/2+	A		
1472.34[d] *25*	15/2+	A		
1476.3[&] *3*	19/2–	A		
2023.2[c] *3*	17/2+	A		
2141.8[a] *3*	17/2+	A		
2285.1[e] *3*	19/2+	A		
2301.9[&] *4*	23/2–	A		
2378.6[d] *3*	19/2+	A		
2393.3 *11*		A		
2542.1[a] *3*	21/2+	A		
2787.6[c] *4*	21/2+	A		
2968.1[d] *3*	23/2+	A		
3022.4[e] *4*	23/2+	A		
3067.6[a] *4*	25/2+	A		
3242.5[&] *5*	27/2–	A		
3288.5[c] *4*	25/2+	A		
3288.6 *5*	25/2–	A		
3584.6[e] *4*	27/2+	A		
3587.2[a] *4*	29/2+	A		
3604.9[d] *4*	27/2+	A		
4241.7[#] *5*	31/2–	A		
4263.5[a] *5*	33/2+	A		
4277.1[e] *5*	31/2+	A		
4277.6[&] *5*	31/2–	A		
4315.2[d] *4*	31/2+	A		
5028.2[b] *5*	(33/2+)	A		
5069.4[#] *5*	35/2–	A		
5092.4[a] *5*	37/2+	A		
5097.8[e] *5*	35/2+	A		
5149.8 *5*	35/2+	A		
5166.5 *5*	35/2–	A		
5389.6[&] *5*	(35/2–)	A		
5610.6[b] *5*	(37/2+)	A		
6040.6[#] *6*	39/2–	A		
6077.1[a] *6*	(41/2+)	A		
6218.5[b] *5*	(41/2+)	A		
6646.5 *6*		A		
6661.6[&] *6*	(39/2–)	A		
6957.5[b] *6*	(45/2+)	A		
7109.2[#] *6*	43/2–	A		
7243.4[a] *6*	(45/2+)	A		
7832.4[b] *6*	(49/2+)	A		
7845.6[@] *6*	(43/2–)	A		
8098.6[&] *6*	(43/2–)	A		
8341.3[#] *21*	(47/2–)	A		
8566.4[a] *21*	(49/2+)	A		
8896.1[b] *6*	(53/2+)	A		
9189.6[@] *7*	(47/2–)	A		
9711.3[#] *21*	(51/2–)	A		
10084.1[b] *7*	(57/2+)	A		
10694.6[@] *7*	(51/2–)	A		
11513.1[b] *7*	(61/2+)	A		
12473.6[@] *7*	(55/2–)	A		
13218.1[b] *7*	(65/2+)	A		

† From least–squares fit to Γ energies.
‡ From the deduced transitions multipolarities and band assignments.
§ From least–squares fit to Eγ's.
\# (A): Band based on 31/2–.
@ (B): Band based on (43/2–).
& (C): ν3/2[541] band, α=–1/2.
a (D): Band based on 17/2+.
b (E): Band based on (33/2+).
c (F): ν5/2[413] band, α=+1/2.
d (G): ν5/2[413] band, α=–1/2.
e (H): Band based on 19/2+.

γ(^{113}Xe)

E(level)	Eγ	Iγ	Mult.†
125.91	126.0 *2*	100	M1,E2
146.19	146.1 *2*	100	M1,E2
549.09	402.8 *2*	40	E2
	423.3 *2*	100	M1,E2
711.14	585.2 *2*	100	E2
820.0	415.2 *2*	100	E2
1242.17	530.8 *2*	45	
1242.17	693.1 *2*	100	E2
1472.34	230.0 *2*	19	M1,E2
	761.4 *2*	100	E2
1476.3	656.7 *2*	100	E2
2023.2	551.0 *2*	8	M1,E2
	780.8 *2*	100	E2
2141.8	899.8 *2*	100	E2

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{113}Xe) (continued)

E(level)	Eγ	Iγ	Mult.†
2141.8	1321.3 *2*	20	E1
2285.1	812.8 *2*	100	E2
2301.9	825.6 *2*	100	E2
2378.6	355.6 *2*	41	M1+E2
	906.1 *2*	100	E2
2393.3	917		
2542.1	163.7 *2*	31	M1,E2
	256.9 *2*	9	M1,E2
	400.1 *2*	56	E2
	518.6 *2*	51	E2
	1066.3 *2*	100	E1
2787.6	764.4 *2*	100	E2
2968.1	589.3 *2*	31	E2
	683.7‡ *2*	100	E2
3022.4	736.7 *2*	100	E2
3067.6	525.5 *2*	100	E2
3242.5	940.6 *2*	100	E2
3288.5	500.9 *2*	100	E2
3288.6	986.7 *2*	100	
3584.6	562.2 *2*	100	E2
3587.2	519.6 *2*	100	E2
3604.9	581.9 *2*	20	E2
	637.4 *2*	100	E2
4241.7	999.2 *2*	100	E2
4263.5	676.3 *2*	100	E2
4277.1	692.5 *2*	100	E2
4277.6	1035.1 *2*	100	E2
4315.2	710.3 *2*	100	E2
5028.2	1441.0 *2*		
5069.4	827.7 *2*	100	E2
5092.4	828.9 *2*	100	E2
5097.8	820.7 *2*	100	E2
5149.8	872.7 *2*	100	E2
5166.5	924.8 *2*	100	E2
5389.6	1112.0 *2*	100	
5610.6	582.4 *2*		E2
	1347.0 *2*		
6040.6	971.2 *2*	100	E2
6077.1	984.6 *2*	100	E2
6218.5	607.9 *2*	100	E2
6646.5	605.9 *2*	100	
6661.6	1272.0 *2*		
6957.5	739.0 *2*	100	E2
7109.2	1068.6 *2*		
7243.4	1166.3 *2*	100	E1
7832.4	874.9 *2*	100	E2
7845.6	1184.0 *2*	100	
8098.6	1437.0 *2*	100	
8341.3	1232 *2*	100	
8566.4	1323 *2*	100	E1
8896.1	1063.7 *2*	100	
9189.6	1344.0 *2*	100	
9711.3	1370.0 *2*	100	
10084.1	1188.0 *2*	100	
10694.6	1505.0 *2*	100	
11513.1	1429.0 *2*	100	
12473.6	1779.0 *2*	100	
13218.1	1705.0 *2*	100	

† From DCO Measurements.

‡ Level–energy difference=683.2.

^{58}Ni(^{58}Ni,2pnγ) 2000Sc23

E=210 and 250 MeV. At a beam energy of 210, measured Eγ, Iγ, $\gamma\gamma$, and $\gamma\gamma(\theta)$(R) using the JUROSPHERE spectrometer equipped with 7 TESSA–type, 5 NORDBALL–type and 14–EUROGRAM type HPGe detectors. At beam energy of 250 MeV, measured Eγ, Iγ, $\gamma\gamma$ and $\gamma\gamma(\theta)$(R) using GAMMASPHERE spectrometer consisting of 83 HPGe detectors, used in conjunction with MICROBALL and neutron detector.

Preliminary data was given by 1995Pa01. They show Band C up to 35/2–.

^{113}Xe Levels

E(level)[†]	Jπ	E(level)[†]	Jπ	E(level)[†]	Jπ
0.0[a]	5/2+	3242.5[#] *5*	27/2–	6218.5[&] *5*	(41/2+)
125.91[b] *18*	7/2+	3288.5[a] *4*	25/2+	6646.5 *6*	
146.19[a] *18*	5/2+	3288.6 *5*	25/2–	6661.6[#] *6*	(39/2–)
404.8[#] *4*	11/2–	3584.6[c] *4*	27/2+	6957.5[&] *6*	(45/2+)
549.09[a] *20*	9/2+	3587.2[@] *4*	29/2+	7109.2[‡] *6*	43/2–
711.14[b] *23*	11/2+	3604.9[b] *4*	27/2+	7243.4[@] *6*	(45/2+)
820.0[#] *4*	15/2–	4241.7[‡] *5*	31/2–	7832.4[&] *6*	(49/2+)
1242.17[a] *23*	13/2+	4263.5[@] *5*	33/2+	7845.6[§] *6*	(43/2–)
1472.34[b] *25*	15/2+	4277.1[c] *5*	31/2+	8098.6[#] *6*	(43/2–)
1476.3[#] *3*	19/2–	4277.6[#] *5*	31/2–	8341.3[‡] *21*	(47/2–)
2023.2[a] *3*	17/2+	4315.2[b] *4*	31/2+	8566.4[@] *21*	(49/2+)
2141.8[@] *3*	17/2+	5028.2[&] *5*	(33/2+)	8896.1[&] *6*	(53/2+)
2285.1[c] *3*	19/2+	5069.4[‡] *5*	35/2–	9189.6[§] *7*	(47/2–)
2301.9[#] *4*	23/2–	5092.4[@] *5*	37/2+	9711.3[‡] *21*	(51/2–)
2378.6[b] *3*	19/2+	5097.8[c] *5*	35/2+	10084.1[&] *7*	(57/2+)
2393.3 *11*		5149.8 *5*	35/2+	10694.6[§] *7*	(51/2–)
2542.1[@] *3*	21/2+	5166.5 *5*	35/2–	11513.1[&] *7*	(61/2+)
2787.6[a] *4*	21/2+	5389.6[#] *5*	(35/2–)	12473.6[§] *7*	(55/2–)
2968.1[b] *3*	23/2+	5610.6[&] *5*	(37/2+)	13218.1[&] *7*	(65/2+)
3022.4[c] *4*	23/2+	6040.6[‡] *6*	39/2–		
3067.6[@] *4*	25/2+	6077.1[@] *6*	(41/2+)		

[†] From least–squares fit to Eγ's.
[‡] (A): Band based on 31/2–.
[§] (B): Band based on (43/2–).
[#] (C): ν3/2[541] band, α=–1/2.
[@] (D): Band based on 17/2+.
[&] (E): Band based on (33/2+).
[a] (F): ν5/2[413] band, α=+1/2.
[b] (G): ν5/2[413] band, α=–1/2.
[c] (H): Band based on 19/2+.

γ(^{113}Xe)

R=Angular intensity ratio (from several spectra gated by low–spin quadrupole transitions).

Eγ	E(level)	Iγ[†]	Mult.	Comments
126.0 *2*	125.91	51	M1,E2	R=0.72 *3*.
146.1 *2*	146.19	8.9	M1,E2	R=0.62 *4*.
163.7 *2*	2542.1	5.1	M1,E2	R=0.56 *3*.
230.0 *2*	1472.34	4.4	M1,E2	R=0.64 *8*.
256.9 *2*	2542.1	1.5	M1,E2	R=0.79 *8*.
355.6 *2*	2378.6	2.6	M1,E2	R=0.72 *8*.
400.1 *2*	2542.1	9.2	E2	R=0.95 *4*.
402.8 *2*	549.09	9.0	E2	R=1.12 *16*.
415.2 *2*	820.0	100	E2	R=1.02 *3*.
423.3 *2*	549.09	22.4	M1,E2	R=0.52 *2*.
500.9 *2*	3288.5	2.4	E2	R=1.19 *9*.
518.6 *2*	2542.1	8.3	E2	R=0.97 *3*.
519.6 *2*	3587.2	34.3	E2	R=1.03 *4*.
525.5 *2*	3067.6	43.6	E2	R=1.02 *4*.
530.8 *2*	1242.17	6.9		
551.0 *2*	2023.2	1.2	M1,E2	R=0.65 *1*.
562.2 *2*	3584.6	6.2	E2	R=1.01 *8*.
581.9 *2*	3604.9	7.1	E2	R=0.89 *10*.
582.4 *2*	5610.6	2.3	E2	R=0.92 *7*.

Continued on next page (footnotes at end of table)

^{58}Ni(^{58}Ni,2pnγ) 2000Sc23 (continued)

γ(^{113}Xe) (continued)

Eγ	E(level)	Iγ†	Mult.	Comments
585.2 2	711.14	50	E2	R=1.13 5.
589.3 2	2968.1	3.8	E2	R=1.03 10.
605.9 2	6646.5	2.6		R=0.86 4.
607.9 2	6218.5	4.9	E2	R=1.40 12.
637.4 2	3604.9	35.4	E2	R=1.22 4.
656.7 2	1476.3	62.6	E2	R=1.02 4.
676.3 2	4263.5	21.9	E2	R=1.1] 3.
683.7 2	2968.1	12.4	E2	Eγ: level–energy difference=683.2. R=1.09 4.
692.5 2	4277.1	10.6	E2	R=1.20 14.
693.1 2	1242.17	15.3	E2	R=0.97 3.
710.3 2	4315.2	3.5	E2	R=0.92 14.
736.7 2	3022.4	11.9	E2	R=0.92 5.
739.0 2	6957.5	1.2	E2	R=0.83 8.
761.4 2	1472.34	23.0	E2	R=1.02 6.
764.4 2	2787.6	10.6	E2	R=1.06 5.
780.8 2	2023.2	14.5	E2	R=1.03 5.
812.8 2	2285.1	15.9	E2	R=1.12 6.
820.7 2	5097.8	3.0	E2	R=0.89 9.
825.6 2	2301.9	53.0	E2	R=1.25 3.
827.7 2	5069.4	8.4	E2	R=1.15 8.
828.9 2	5092.4	12.2	E2	R=0.92 4.
872.7 2	5149.8	2.1	E2	R=0.96 5.
874.9 2	7832.4	1.2	E2	R=1.19 14.
899.8 2	2141.8	4.9	E2	R=1.13 9.
906.1 2	2378.6	6.3	E2	R=0.98 7.
917	2393.3			
924.8 2	5166.5	1.2	E2	R=0.90 8.
940.6 2	3242.5	10.5	E2	R=1.19 7.
971.2 2	6040.6	6.9	E2	R=0.89 6.
984.6 2	6077.1	4.9	E2	R=1.15 6.
986.7 2	3288.6	7.0		R=0.64 5.
999.2 2	4241.7	7.8	E2	R=1.10 13.
1035.1 2	4277.6	1.6	E2	R=1.10 8.
1063.7 2	8896.1			
1066.3 2	2542.1	16.4	E1	R=0.60 4.
1068.6 2	7109.2			
1112.0 2	5389.6			
1166.3 2	7243.4	16.4	E1	R=0.60 4.
1184.0 2	7845.6			
1188.0 2	10084.1			
1232 2	8341.3			
1272.0 2	6661.6			
1321.3 2	2141.8	1.0	E1	Dc0=0.67 8.
1323 2	8566.4	1.0	E1	R=0.67 8.
1344.0 2	9189.6			
1347.0 2	5610.6			
1370.0 2	9711.3			
1429.0 2	11513.1			
1437.0 2	8098.6			
1441.0 2	5028.2			
1505.0 2	10694.6			
1705.0 2	13218.1			
1779.0 2	12473.6			

† Uncertainties are less than 5%.

Adopted Levels

S(n)=13560 *SY*; S(p)=−974 *3*; Q(α)=3484 *7* 2003Au03,2009AuZZ.
Production and identification:
250 MeV ^{58}Ni on ^{58}Ni (1987Gi02).
Analyzed by a gas–detector system in a backward position during the beam pause.
The identification is based on the fact that the ^{116}Ba compound nucleus with low excitation energy allows only 2 channels: p2n giving ^{113}Cs and αp2n giving ^{109}I. The proton line of ^{109}I has another energy. It can be produced by ^{54}Fe(^{58}Ni,p2n).
Preliminary $T_{1/2}$ measurement of 1 μs (1984Fa04) was not confirmed in the last experiment (1987Gi02) with better statistics and new results of 1994Pa12.

^{113}Cs Levels

E(level)	Jπ	$T_{1/2}$	Comments
0.0	(3/2+)	16.7 μs *7*	%p=100; %α=0. %α from 1994Pa12. $T_{1/2}$: from 1998Ba13. Others: 17 μs *2* (1994Pa12), 28 μs *7* (1995Ho26). Jπ: from 2000Bb02. However, a 1/2+ assignment is also possible (1998Ma42). E(p)=960 keV 3, Q(p)=978 keV 3 (1995Ho26), B(p)=1, $T_{1/2}$(p)=16.7 μs *7*. Other E(p)=959 *6* (1994Pa12). σ≈30 μb (1987Gi02). Jπ: from shell model (1987Gi02).

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