Adopted Levels, Gammas 1993Ti07

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, D. R. Tilley, H. R. Weller and C. M. Cheves	NP 564 1 (1993)	31-Dec-1992

Q(β^-)=−15417 *9*; S(n)=15663.9 *5*; S(p)=1.213×10^4; Q(α)=−7162 2012Wa38
Note: Current evaluation has used the following Q record −15417 8 *15663.7 5* 12127.41 *1*−7161.91 *1* 1997Au04.
See other reaction references in 1993Ti07.

^{16}O Levels

Cross Reference (XREF) Flags

A	^{12}C(α,X)	G	^{15}N(p,n)	M	^{16}O(d,d′)
B	^{13}C(^{3}He,X)	H	^{15}N(d,n)	N	^{16}O(^{3}He,^{3}He)
C	^{13}C(^{6}Li,t)	I	^{15}N(^{3}He,d)	O	^{16}O(α,α)
D	^{14}N(d,X)	J	^{16}N β^- decay	P	^{17}O(d,t)
E	^{14}N(^{3}He,p)	K	^{16}O(e,e′)	Q	^{17}O(^{3}He,α)
F	^{15}N(p,X)	L	^{16}O(p,p′)		

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	0$^+$	stable	ABCDEF HIJKLMNOPQ	T=0
6049.4 *10*	0$^+$	67 ps *5*	ABC EF IJK M P	T=0
6129.89 *4*	3$^-$	18.4 ps *5*	ABC EF HIJKL NOPQ	T=0; μ=+1.668 *12* (1989Ra17)
6917.1 *6*	2$^+$	4.70 fs *13*	ABC EF HI KLMNOPQ	T=0
7116.85 *14*	1$^-$	8.3 fs *5*	AB EF HIJKLM OPQ	T=0
8871.9 *5*	2$^-$	125 fs *11*	A C E HIJKLMNOPQ	T=0
9585 *11*	1$^-$	420 keV *20*	A E IJ LMNO	%IT=6.7×10^{-6} *10*; %α=100 Γ_γ=0.028 eV *4*; T=0
9844.5 *5*	2$^+$	0.62 keV *10*	A C E HIJKLMNO Q	%IT=0.0016 *3*; %α=100 Γ_γ=0.0098 eV *8*; T=0
10356 *3*	4$^+$	26 keV *3*	A C E I KLMNO Q	%IT=2.4×10^{-4} *4*; %α=100 Γ_γ=0.062 eV *6*; T=0
10957 *1*	0$^-$	5.5 fs *35*	E HI LM Q	T=0
11080 *3*	3$^+$	<12 keV	E HI Q	T=0
11096.7 *16*	4$^+$	0.28 keV *5*	A C E KLMNO	%IT=0.0020 *6*; %α=100 Γ_γ=0.0056 eV *14*; T=0
11260?	(0$^+$)	2500 keV	A I	%α=100 T=(0) α decay mode is tentative.
11520 *4*	2$^+$	71 keV *3*	A C E KLMNO	%IT=9.4×10^{-5} *3*; %α=100 Γ_γ=0.67 eV *2*; T=0
11600 *20*	3$^-$	800 keV *100*	A	%α=100 T=0
12049 *2*	0$^+$	1.5 keV *5*	A C E KLMNO	%IT=?; %α=100 T=0
12440 *2*	1$^-$	91 keV *6*	A EF HI K M O	%IT=0.0132 *24*; %p=0.9 *1*; %α=99.1 *1* Γ_γ=12 eV *2*; T=0
12530 *1*	2$^-$	0.111 keV *10*	C EF HI KLM OP	%IT=3.2 *3*; %p=14 *7*; %α=83 *3* Γ_γ=3.5 eV *2*; T=0 Γ,%IT,%p,%α: from 1986Zi08. 1993Ti07 adopt Γ=0.097 keV 10.
12796 *4*	0$^-$	40 keV *4*	EF HI L	%IT=0.0062 *8*; %p=100 Γ_γ=2.5 eV *2*; T=1
12968.6 *4*	2$^-$	1.34 keV *4*	C EF HI K PQ	%IT=0.28 *3*; %p=78 *4*; %α=22 *4* Γ_γ=3.7 eV *3*; T=1 %IT,%p,%α: from 1986Zi08.

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Adopted Levels, Gammas 1993Ti07 (continued)

^{16}O Levels (continued)

E(level)	J^{π}	$T_{1/2}$	XREF	Comments
13020 *10*	2^+	150 keV *10*	A KLMNO	%IT=?; %p=?; %α=? T=0
13090 *8*	1^-	130 keV *5*	A E HI K Q	%IT=0.026 *4*; %p=71; %α=29 Γ_γ=34 eV *5*; T=1
13129 *10*	3^-	110 keV *30*	A E I	%IT=?; %p=1; %α=99 T=0
13259 *2*	3^-	21 keV *1*	A EF HI KL PQ	%IT=?; %p=?; %α=? T=1
13664 *3*	1^+	64 keV *3*	EF M	%IT<0.0015; %p=14; %α=86 T=0
13869 *2*	4^+	89 keV *2*	A EF K NO	%IT=?; %p=0.6; %α=99.4 T=0 E(level): uncertainty taken from table 16.21 (M. J. Martin). Table 16.13 gives ΔE=20 keV.
13980 *2*	2^-	20 keV *2*	EF	%p=?; %α=?
14032 *15*	0^+	185 keV *35*	A K	%IT=?; %α=100
1410×10[1] *10*	3^-	750 keV *200*	A	%α=100
14302† *3*	$4^{(-)}$	34 keV *12*	C E	
14399† *2*	5^+	27 keV *5*	C E	
14620 *20*	$4^{(+)}$	490 keV *15*	A	%α=100
14660 *20*	5^-	670 keV *15*	A	%α=100
14815.3 *16*	6^+	70 keV *8*	A C E NO	%α=100 T=0
14926 *2*	2^+	54 keV *5*	EF K	%p=?; %α=?
15097 *5*	0^+	166 keV *30*	A EF	%p=?; %α=?
15196 *3*	2^-	63 keV *4*	EF KL N PQ	%p=?; %α=? T=0
15260 *50*	2^+	300 keV *100*	F KL N	%p=?; %α=? T=(0)
15408 *2*	3^-	132 keV *7*	A EF KL OPQ	%p=?; %α=? T=0
15785† *5*	3^+	40 keV *10*	C E	
15828 *30*	3^-	700 keV *120*	A K	%α=100
16200 *90*	1^-	580 keV *60*	A EF	%IT=?; %p=?; %α=? T=0
16209 *2*	1^+	19 keV *3*	EFG K	%IT=?; %n=?; %p=? T=1
16275 *7*	6^+	420 keV *20*	A	%α=100
16352 *8*	(2^+)	61 keV *8*	A EF L NO	%p=?; %α=?
16442.3 *16*	2^+	25 keV *2*	A EF K	%IT=?; %n=?; %p=?; %α=? T=1
16817 *2*	(3^+)	28 keV *3*	C EF	%IT=?; %p=?; %α=? T=(1)
16844 *21*	4^+	570 keV *60*	A	%α=100
16930 *50*	2^+	≈280 keV	A	%α=?; %^{8}Be=?
17090 *40*	1^-	380 keV *40*	F	%IT=?; %p=100 T=1
17129 *5*	2^+	107 keV *14*	A	%n=?; %p=?; %α=?
17140 *10*	1^+	34 keV *3*	A FG K	%IT=?; %n=?; %p=?; %α=? T=1
17197 *17*	2^+	160 keV *60*	A I L NO	%α=?; %^{8}Be=?
17282 *11*	1^-	78 keV *5*	A FG K	%IT=?; %n=?; %p=?; %α=? T=1
17510 *26*	1^-	180 keV *60*	A	%α=100
17555 *21*	(6^+)	180 keV *70*	A	%n=?; %α=?

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Adopted Levels, Gammas 1993Ti07 (continued)

^{16}O Levels (continued)

E(level)	J^{π}	$T_{1/2}$	XREF	Comments
17609 *7*	2^+	114 keV *14*	A F	%α=? T=(1)
17720	$(0^+,2^+)$	≈75 keV	A	%p=?; %α=?; %^{8}Be=?
17775 *11*	4^-	45 keV *7*	C KL NOPQ	%p=100 T=0
17784 *15*	4^+	400 keV *40*	A K	%n=?; %α=?; %^{8}Be=?
17877 *6*	$(2)^-$	24 keV *3*	F	%IT=?; %p=?; %α=? T=(1) The α decay mode is tentative.
18016 *1*	4^+	14 keV *2*	A C	%n=?; %p=?; %α=?; %^{8}Be=? T=(0)
18029 *5*	$3^{(-)}$	26 keV *4*	C FG K P	%IT=?; %n=?; %p=?; %α=? T=1
18089 *25*	(0^+)	288 keV *44*	A G L O	%IT=?; %n=?; %p=?; %α=? The IT decay mode is tentative.
18202 *8*	2^+	220 keV *50*	F KL O	%IT=?; %p=100
18290		≈380 keV	A	%IT=?; %p=?; %α=?
18404 *12*	5^-	550 keV *40*	A	%α=100
18430 *15*	2^+	90 keV *40*	F L NO	%p=100 T=0
18484 *6*	$(1^-,2^-)$	35 keV *6*	F	%p=100
18600	$(1^-,5^-)$	≈150 keV	A	%α=100
18600	(4^+)	≈300 keV	A	%α=?; %^{8}Be=?
18640 *15*	(5^+)	22 keV *7*	C K	%n=?; %p=? The neutron and proton decay modes are tentative.
18773 *22*	1^-	215 keV *45*	A	%p=?; %α=?
18785 *6*	4^+	260 keV *20*	A	%n=?; %p=?; %α=?; %^{8}Be=?
18790 *10*	1^+	120 keV *20*	F K	%IT=?; %p=100 T=1
18977 *6*	4^-	8 keV *4*	C F KL N PQ	%IT=?; %p=?; %α=? T=1
19001 *24*	2^-	420 keV *50*	F K	%IT=?; %p=100 T=1
19080 *30*	2^+	≈120 keV	A F	%IT=?; %n=?; %p=?; %α=? T=(1) The neutron decay mode is tentative.
19206† *12*	3^-	68 keV *10*	K PQ	T=1
19253 *30*	(5^-)	50 keV *45*	A	%n=?; %α=?
19257 *9*	2^+	155 keV *25*	A F	%IT=?; %p=?; %α=? T=(1)
19319 *14*	(6^+)	65 keV *35*	A	%p=?; %α=?; %^{8}Be=?
19375 *2*	4^+	23 keV *4*	A	%p=?; %α=?
19470 *30*	1^-	200 keV *70*	F K	%IT=?; %p=100 T=1
19539 *19*	2^+	255 keV *75*	A L O	%n=?; %α=? T=0
19754 *16*	2^+	290 keV *50*	A	%p=?; %α=?
19808† *11*	4^-	32 keV *4*	C L PQ	T=0
19895 *7*	3	42 keV *9*	F	%IT=?; %p=?; %α=? T=1
20055 *13*	2^+	400 keV *32*	A NO	%IT=?; %n=?; %p=?; %α=? T=0
20412 *17*	$(2^-,4^+)$	190 keV *20*	FG K PQ	%IT=?; %n=?; %p=? T=1
20510 *25*	(4^-)	50 keV *30*	K	%IT=100

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Adopted Levels, Gammas 1993Ti07 (continued)

^{16}O Levels (continued)

E(level)	J^{π}	$T_{1/2}$	XREF	Comments
				T=(1)
20541 *2*	5^-	11 keV *2*	A	%p=?; %α=?
				T=1
20560 *2*	‡	<5 keV	A	%p=?; %α=?
20615 *3*	‡	<10 keV	A	%α=100
20800?		≈60 keV	A	%n=?; %p=?; %α=?
				$T_{1/2}$: author quotes Γ=(≈60).
20857 *14*	7^-	900 keV *60*	A	%α=100
20945 *20*	1^-	300 keV *10*	FG K	%IT=?; %n=?; %p=?
				T=1
21050† *50*	(2^+)	298 keV *43*	L O	T=(0)
21052 *6*	6^+	205 keV *15*	A	%α=100
21175† *15*				
21500	(1 to 4)	120 keV	F	%p=100
21623 *11*	7^-	60 keV *30*	A	%n=?; %p=?; %α=?
21648 *3*	6^+	115 keV *8*	A	%n=?; %α=?
21776 *9*	3^-	43 keV *20*	A	%n=?; %p=?; %α=?
22040	0^+	60 keV	A	%n=?; %d=?; %α=?
22150 *10*	1^-	680 keV *10*	D FG	%IT=?; %n=?; %p=?; %d=?; %α=?
				T=1
22350	2^+	175 keV	D	%n=?; %d=?; %α=?
2250×10[1] *10*	3^-	400 keV *50*	D O	%p=?; %d=?; %α=?
22650 *30*		60 keV	A	%n=?; %α=?; %^{8}Be=?
22721 *3*	0^+	12.5 keV *25*	A D	%n=?; %p=?; %d=?; %α=?
				T=2
22890 *10*	1^-	300 keV *10*	D F	%IT=?; %p=?; %d=?
				T=1
2300×10[1] *10*	6^+	≤500 keV	D	%d=?; %α=?; %^{8}Be=?
				The deuteron decay mode is tentative.
23100		≈20 keV	A D	%n=?; %d=?; %α=?; %^{8}Be=?
				The neutron decay mode is tentative.
23235 *62*	(1^-)	560 keV *150*	D G L	%n=?; %p=?; %d=?
				T=(1)
23510 *30*	(5^-)	300 keV	A D N	%p=?; %d=?; %α=?
23879 *6*	6^+	26 keV *4*	A	%p=?; %α=?; %^{8}Be=?
24070 *30*	1^-	550 keV *40*	B F L	%IT=?; %p=?; %^{3}He=?
				T=1
24360 *70*	$(2^+,3^-)$	424 keV *45*	G O	%n=?; %p=?
				T=0
24522† *11*	2^+	<50 keV		T=2
24760 *50*	$(2,4)^+$	340 keV *60*	FG	%IT=?; %n=?; %p=?
				T=1
25120 *50*	1^-	3000 keV *300*	B F	%IT=?; %p=?; %^{3}He=?; %α=?
				T=1
2550×10[1] *15*	1^-	1300 keV *300*	KL N	%IT=?
				T=1
25600	(3^-)	450 keV	AB	%^{3}He=?; %α=?
				T=1
2600×10[1] *10*	1^-	750 keV *250*	B	%IT=?; %^{3}He=?; %α=?
				T=(1)
				$T_{1/2}$: author quotes Γ=500-1000.
26363 *62*	$(2,4)^+$	550 keV *70*	A FG	%IT=?; %n=?; %p=?; %α=?
				T=1

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Adopted Levels, Gammas 1993Ti07 (continued)

^{16}O Levels (continued)

E(level)	J^{π}	$T_{1/2}$	XREF	Comments
2735×10[1] *10*	(2,4)$^{+}$	830 keV *110*	B F	%IT=?; %p=?; %^{3}He=?; %α=?; %^{8}Be=? T=1
27500	(3^{-})	≈2500 keV	B	%IT=?; %^{3}He=100 T=(0)
28200	7^{-}	1000 keV	A	%α=100
2860×10[1] *20*			B	%IT=?; %^{3}He=100
29000	7^{-}	1000 keV	A	%p=?; %α=?
2980×10[1] *10*	9^{-} & 8^{+}	750 keV *250*	B	%^{3}He=?; %α=? $T_{1/2}$: author quotes Γ=500-1000.
3180×10[1] *60*				%IT=?; %α=?
34000	10^{+},(9^{-})	2300 keV	A	%α=100
35000			A	%α=100

† Decay mode not specified.
‡ π=even.

$\gamma(^{16}O)$

E_i(level)	J_i^{π}	E_γ	I_γ	E_f	J_f^{π}	Mult.	δ‡	$I_{(\gamma+ce)}$	Comments
6049.4	0^{+}	6048.2 *10*		0.0	0^{+}	[E0]		100	
6129.89	3^{-}	6128.63 *4*	100	0.0	0^{+}	[E3]			B(E3)(W.u.)=13.5 *7*
6917.1	2^{+}	787.2 *6*	≤0.008	6129.89	3^{-}	[E1]			B(E1)(W.u.)≤4×10^{-5}
		867.7 *12*	0.027 *3*	6049.4	0^{+}	[E2]			B(E2)(W.u.)=27 *3*
		6915.5 *6*	100	0.0	0^{+}	[E2]			B(E2)(W.u.)=3.1 *1*
7116.85	1^{-}	986.93 *15*	0.070 *14*	6129.89	3^{-}	[E2]			B(E2)(W.u.)=21 *5*
		1067.5 *10*	<6×10^{-4}	6049.4	0^{+}	[E1]			B(E1)(W.u.)≤6×10^{-7}
		7115.15 *14*	100	0.0	0^{+}	[E1]			B(E1)(W.u.)=3.5×10^{-4} *2*
8871.9	2^{-}	1754.9 *6*	14.7 *7*	7116.85	1^{-}	[M1+E2]	2.1 *4*		B(M1)(W.u.)=7×10^{-4} *3*; B(E2)(W.u.)=10.3 *15*
		1954.7 *8*	4.6 *7*	6917.1	2^{+}	[E1]			B(E1)(W.u.)=4.7×10^{-5} *9*
		2741.5 *5*	100 *21*	6129.89	3^{-}	[M1+E2]	2.9 *2*		B(M1)(W.u.)=6.9×10^{-4} *9*; B(E2)(W.u.)=8.2 *7*
		2822.2 *12*	0.15 *5*	6049.4	0^{+}	[M2]			B(M2)(W.u.)=0.18 *6*
		8869.3 *5*	9.3 *10*	0.0	0^{+}	[M2]			B(M2)(W.u.)=0.050 *8*
9585	1^{-}	2688 *11*	12 *4*	6917.1	2^{+}	[E1]			B(E1)(W.u.)=3.5×10^{-4} *12*
		9582 *11*	100 *16*	0.0	0^{+}	[E1]			B(E1)(W.u.)=6.6×10^{-5} *11*
9844.5	2^{+}	2927.1 *8*	34 *7*	6917.1	2^{+}	[M1]			B(M1)(W.u.)=0.0042 *8*
		3794.6 *12*	30 *7*	6049.4	0^{+}	[E2]			B(E2)(W.u.)=1.2 *3*
		9841.2 *5*	100 *7*	0.0	0^{+}	[E2]			B(E2)(W.u.)=0.031 *3*
10356	4^{+}	3439 *3*	100 *10*	6917.1	2^{+}	[E2]			B(E2)(W.u.)=65 *6*
		4225 *3*	<1.6	6129.89	3^{-}	[E1]			B(E1)(W.u.)<3×10^{-5}
		10352 *3*	9×10^{-5} *3*	0.0	0^{+}	[E4]			B(E4)(W.u.)=3.7 *13*
10957	0^{-}	3839.6 *10*	100	7116.85	1^{-}	[M1]			B(M1)(W.u.)=0.07 *4*
11096.7	4^{+}	4179.0 *17*	81 *20*	6917.1	2^{+}	[E2]			B(E2)(W.u.)=1.0 *3*
		4966.0 *16*	100 *42*	6129.89	3^{-}	[E1]			B(E1)(W.u.)=5.9×10^{-5} *25*
11520	2^{+}	4402 *4*	≤0.9	7116.85	1^{-}	[E1]			B(E1)(W.u.)≤1×10^{-4}
		4602 *4*	4.4 *11*	6917.1	2^{+}	[M1]			B(M1)(W.u.)=0.014 *4*
		5470 *5*	4.6 *8*	6049.4	0^{+}	[E2]			B(E2)(W.u.)=3.1 *5*
		11516 *4*	100.0 *13*	0.0	0^{+}	[E2]			B(E2)(W.u.)=1.5 *5*
12049	0^{+}	12044.1 *20*		0.0	0^{+}	[E0]		100	
12440	1^{-}	6389.2 *23*	1.2 *4*	6049.4	0^{+}	[E1]			B(E1)(W.u.)=0.0011 *4*

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Adopted Levels, Gammas 1993Ti07 (continued)

$\gamma(^{16}O)$ (continued)

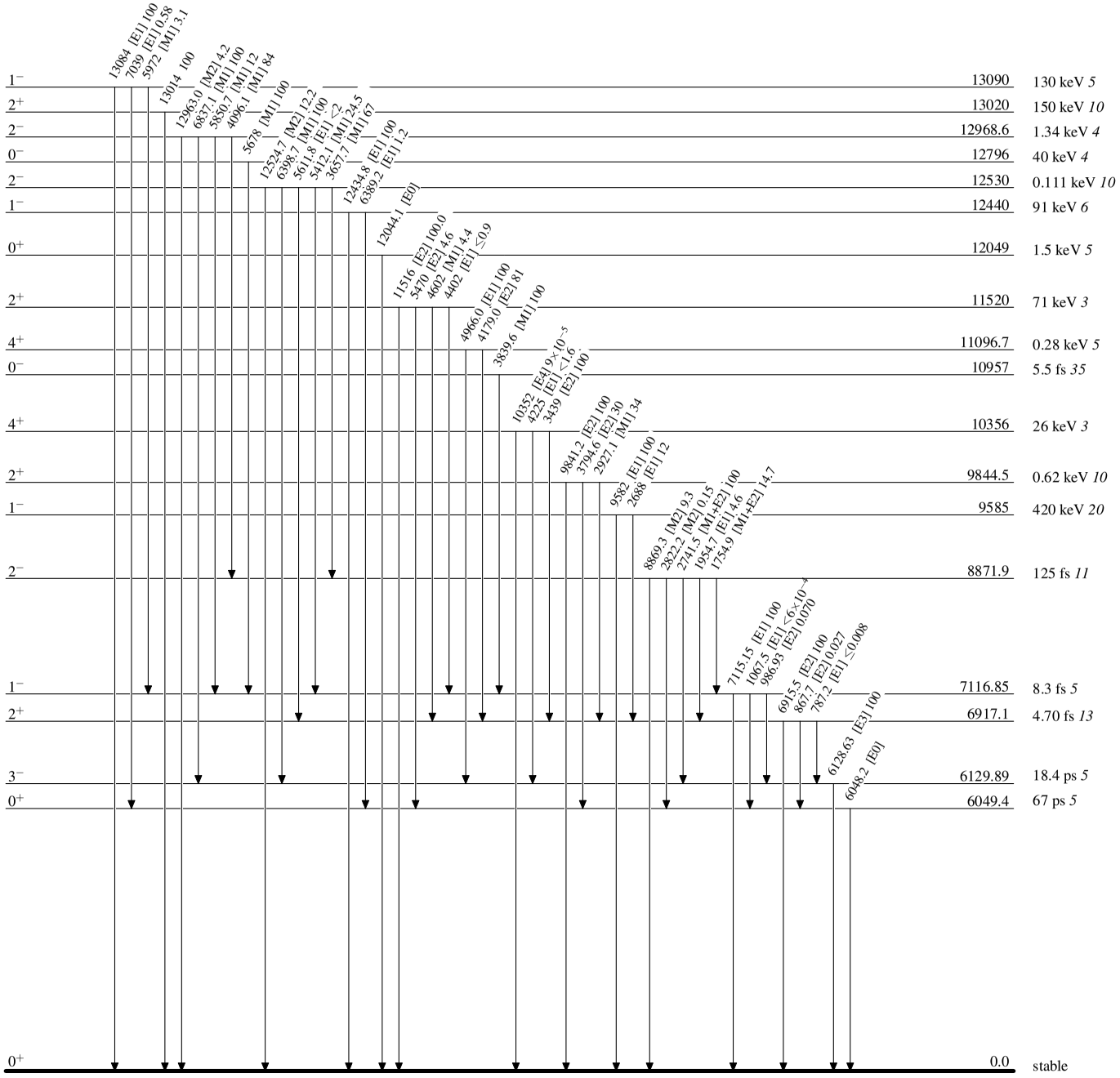
E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	Comments
12440	1^-	12434.8 *20*	100	0.0	0^+	[E1]	B(E1)(W.u.)=0.014 *2*
12530	2^-	3657.7 *12*	67† *4*	8871.9	2^-	[M1]	B(M1)(W.u.)=1.2 *1*
		5412.1 *10*	24.5† *14*	7116.85	1^-	[M1]	B(M1)(W.u.)=0.12 *1*
		5611.8 *12*	<2†	6917.1	2^+	[E1]	B(E1)(W.u.)<4.5×10^{-4}
		6398.7 *10*	100† *4*	6129.89	3^-	[M1]	B(M1)(W.u.)=0.31 *2*
		12524.7 *10*	12.2† *12*	0.0	0^+	[M2]	B(M2)(W.u.)=1.12 *17*
12796	0^-	5678 *4*	100	7116.85	1^-	[M1]	B(M1)(W.u.)=0.65 *6*
12968.6	2^-	4096.1 *7*	84† *4*	8871.9	2^-	[M1]	B(M1)(W.u.)=1.04 *12*
		5850.7 *5*	12† *2*	7116.85	1^-	[M1]	B(M1)(W.u.)=0.05 *1*
		6837.1 *4*	100† *4*	6129.89	3^-	[M1]	B(M1)(W.u.)=0.27 *3*
		12963.0 *4*	4.2† *8*	0.0	0^+	[M2]	B(M2)(W.u.)=1.0 *3*
13020	2^+	13014 *10*	100	0.0	0^+		$\Gamma_{\gamma0}$=0.7 eV *2*.
13090	1^-	5972 *8*	3.1 *8*	7116.85	1^-	[M1]	B(M1)(W.u.)=0.31 *9*
		7039 *8*	0.58 *12*	6049.4	0^+	[E1]	B(E1)(W.u.)=0.0017 *6*
		13084 *8*	100	0.0	0^+	[E1]	B(E1)(W.u.)=0.033 *5*

† From 1986Zi08.
‡ The signature has been changed, where necessary, from that given in 1993Ti07 in order to conform to the convention used in the nuclear data sheets.

Adopted Levels, Gammas 1993Ti07

Level Scheme

Intensities: Relative photon branching from each level



$^{16}_{8}O_{8}$