

$^{208}\text{Pb}(^{36}\text{S}, ^{35}\text{S}\gamma)$ **2010WaZT,2022Gr07**

2022Gr07: A 215-MeV ^{36}S beam was produced from the XTU-Tandem ALPI-superconducting linear accelerator complex at the INFN Legnaro National Laboratory, Italy. The target was 1 mg/cm² 99.7% enriched ^{208}Pb with 1 mg/cm² Nb backing and mounted onto the Cologne differential plunger. Projectile-like fragments produced in binary grazing reactions were separated and identified by the PRISMA spectrometer. γ rays were detected using the AGATA demonstrator array of five triple cluster modules of 36-fold segmented Ge crystals covering backward angles from 135° to 175°. Measured E_γ with Doppler corrections, (^{35}S) γ -coin, and level lifetimes using the differential recoil-distance method (DRDM). Compared with shell-model calculations. Measured E_γ , I_γ , fragment- γ -coin, recoil distance. Deduced levels, lifetimes. Compared with shell-model calculations with PSDPF, SDPF-U, and FSU effective interactions.

2010WaZT,2010Wa20: A 215-MeV $^{36}\text{S}^9$ beam was produced from the XTU-Tandem ALPI-superconducting linear accelerator complex at the INFN Legnaro National Laboratory, Italy. The target was 300 $\mu\text{g}/\text{cm}^2$ 99.7% enriched ^{208}Pb with 20 $\mu\text{g}/\text{cm}^2$ carbon backing. Projectile-like fragments produced in binary grazing reactions were separated and identified by the PRISMA spectrometer. γ rays were detected using the CLARA array of 22 escape-suppressed Ge clover detectors covering the azimuthal angles from 98° to 180°. Measured E_γ with Doppler corrections, I_γ , and (^{35}S) γ -coin. Deduced levels. Compared with shell-model calculations.

2010WaZT states that the observed γ -ray transitions are consistent with previous published work and no attempt has been made here to construct an independent level scheme.

 ^{35}S Levels

E(level)	J^π	$T_{1/2}$	Comments
0	$3/2^+$		2022Gr07 shell-model calculated configuration: $\pi(1d_{5/2})^6(2s_{1/2})^2 \otimes \nu(1d_{5/2})^6(2s_{1/2})^2(1d_{3/2})^3$ (77%).
1572.0 9	$1/2^+$	2.29 ps 14	2022Gr07 shell-model calculated configuration: $\pi(1d_{5/2})^6(2s_{1/2})^2 \otimes \nu(1d_{5/2})^6(2s_{1/2})^2(1d_{3/2})^4$ (44%). $T_{1/2}$: Lifetime=3.3 ps 2 from 2022Gr07 using the recoil-distance method with decay-curve analysis.
1991.1 9	$7/2^-$		
2347.1 13	$3/2^-$		
2717.1 14	$5/2^+$		
3421 2	$5/2^+$		
3558.1 14	$(3/2^-, 5/2^-)$		
3593 2	$(1/2^+, 7/2^+)$		
3818.1 14	$(9/2^-, 11/2^-)$		
4023.1 22	$(9/2^-, 11/2^-)$		

 $\gamma(^{35}\text{S})$

E_γ^\dagger	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
370 1	3.2 6	2717.1	$5/2^+$	2347.1	$3/2^-$	
1211 [‡] 2	1.7 7	3558.1	$(3/2^-, 5/2^-)$	2347.1	$3/2^-$	
^x 1227 1	5.2 9					
1567 [‡] 2	9.6 9	3558.1	$(3/2^-, 5/2^-)$	1991.1	$7/2^-$	
1572 1	100.0 24	1572.0	$1/2^+$	0	$3/2^+$	2022Gr07 shell-model calculated $B(E2; 1/2^+ \text{ to } 3/2^+) = 35.2 \text{ e}^2 \text{ fm}^4$ (5.2 W.u.), $B(M1; 1/2^+ \text{ to } 3/2^+) = 0.0204 \mu_N^2$ (1.14×10^{-2} W.u.), and mixing ratio [$\delta^2 = \lambda(E2)/\lambda(M1)$] = 0.30.
1827 1	12.9 11	3818.1	$(9/2^-, 11/2^-)$	1991.1	$7/2^-$	
1986 [‡] 2	3.7 6	3558.1	$(3/2^-, 5/2^-)$	1572.0	$1/2^+$	
1991 1	37.2 18	1991.1	$7/2^-$	0	$3/2^+$	
2032 2	13.1 12	4023.1	$(9/2^-, 11/2^-)$	1991.1	$7/2^-$	
2347 2	6.5 9	2347.1	$3/2^-$	0	$3/2^+$	
2717 2	14.5 15	2717.1	$5/2^+$	0	$3/2^+$	
^x 3034 3	7.2 9					

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²⁰⁸Pb(³⁶S, ³⁵Sγ) [2010WaZT,2022Gr07](#) (continued)

γ(³⁵S) (continued)

<u>E_γ[†]</u>	<u>I_γ</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>
3421 2	8.6 10	3421	5/2 ⁺	0	3/2 ⁺
3593 2	8.8 11	3593	(1/2 ⁺ , 7/2 ⁺)	0	3/2 ⁺

[†] From [2010WaZT](#).

[‡] Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

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Legend

Level Scheme
 Intensities: Relative I_γ

- \longrightarrow $I_\gamma < 2\% \times I_\gamma^{\max}$
 \longrightarrow $I_\gamma < 10\% \times I_\gamma^{\max}$
 \longrightarrow $I_\gamma > 10\% \times I_\gamma^{\max}$
 $\cdots\cdots\cdots\longrightarrow$ γ Decay (Uncertain)

