^{98}Zr IT decay (1.9 μs) 2006Si36

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen, Balraj Singh	NDS 164, 1 (2020)	15-Feb-2020

Parent: ^{98}Zr: E=6603.7 *3*; J^{π}=(17$^-$); $T_{1/2}$=1.9 μs *2*; %IT decay=100.0

^{98}Zr-E: 6601.9 *11* in the Adopted Levels.

2006Si36: ^{98}Zr isomer was produced in ^{239}Pu(n,Fγ) reaction using thermal neutrons from high-flux reactor of the ILL, Grenoble. Fission fragments were selected based on mass-to-ionic charge using the Lohengrin mass spectrometer and detected using an ionization chamber; γ rays were detected with a Clover Ge detector and three single Ge crystals. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma$(t) relative to the arrival of the fission fragments. Deduced levels, J, π, half-life, band structure, configuration. Decay of a 1.9−μs high-spin isomer studied in this work. Also 2007Si16 conference paper from the same group.

^{98}Zr Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$	Comments
0.0	0$^+$		
(853.4[#])	0$^+$		E(level): level expected to be populated from decay of 1223 level.
1222.71[#] *20*	2$^+$		
1805.90 *23*	3$^-$		
1843.12[#] *23*	4$^+$		
2046.6 *3*	4$^+$		
2490.14[#] *24*	6$^+$		
2799.8 *3*	5$^-$		
3064.0[@] *3*	5$^{(-)}$		
3215.6[#] *3*	8$^+$		
3575.8[@] *3*	(7$^-$)		
3984.0[#] *3*	(10$^+$)		
4198.4[@] *3*	(9$^-$)		
4754.0[#] *3*	(12$^+$)		
4916.1[@] *3*	(11$^-$)		
5588.6[#] *3*	(14$^+$)		
5720.4[@] *3*	(13$^-$)		
6540.7[@] *3*	(15$^-$)		E(level): 2006Si36 suggest that this level is most likely different from a 16$^+$ level at 6539.8 decaying by a 950γ proposed by 2004Wu08, as no 820γ was reported in 2004Wu08.
6603.7 *3*	(17$^-$)	1.9 μs *2*	%IT=100 E(level): 6601.9 *11* in the Adopted Levels. Configuration=$\pi g^2_{9/2}\otimes\nu(g_{7/2}h_{11/2})$. $T_{1/2}$: from sum of time spectra when gated on 952γ+835γ+820γ+804γ+770γ+768γ+725γ+718γ (2006Si36). Other: 1.4 μs *5* (2013RuZX, 1223γ(t)).

[†] From least-squares fit to Eγ data. The uncertainties of 240.1γ, 752.6γ and 994.2γ were increased to 0.3 keV to get an acceptable fit.

[‡] From the Adopted Levels.

[#] Band(A): Band based on 853, 0$^+$.

[@] Seq.(B): γ cascade based on 5$^{(-)}$.

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γ(^{98}Zr)

E_γ	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[@]	Comments
63.0 *1*	17 *4*	6603.7	(17^-)	6540.7	(15^-)	(E2)	5.91 *9*	α(K)=4.52 *7*; α(L)=1.157 *19*; α(M)=0.204 *4*; α(N)=0.0260 *4*; α(O)=0.000682 *11* α(exp)=5.5 *16* (2006Si36) α(exp): from intensity balance. E_γ: 2006Si36 discussed another scenario for the placement of 63.0γ: two closely-spaced 63.0-keV gamma rays, an E1 to 6540, (16^+) level (from 2004Wu08) and E2 to 6541, (15^-) level. Based on intensity-balance arguments, this scenario is considered unlikely. Mult.: from α(expt) deduced from intensity balance. Value is consistent with E2(+M1), δ>1.25 or E2(+M3), δ<0.09.
203.6		2046.6	4^+	1843.12	4^+			E_γ: from figure 3 of 2006Si36, not listed in authors′ table I.
240.1[†] *1*	10 *10*	2046.6	4^+	1805.90	3^-			
511.9 *1*	31 *7*	3575.8	(7^-)	3064.0	$5^{(-)}$			
583.2 *1*	39 *8*	1805.90	3^-	1222.71	2^+	E1		
620.4 *1*	67 *13*	1843.12	4^+	1222.71	2^+	E2		
622.6 *1*	56 *11*	4198.4	(9^-)	3575.8	(7^-)			
647.0 *1*	55 *11*	2490.14	6^+	1843.12	4^+	E2		
717.7 *1*	59 *11*	4916.1	(11^-)	4198.4	(9^-)			
725.4 *1*	53 *10*	3215.6	8^+	2490.14	6^+	E2		
752.6[†] *1*	16 *3*	2799.8	5^-	2046.6	4^+			
768.4 *1*	40 *8*	3984.0	(10^+)	3215.6	8^+			
770.0 *1*	44 *9*	4754.0	(12^+)	3984.0	(10^+)			
776.0 *1*	28 *6*	3575.8	(7^-)	2799.8	5^-			
804.3 *1*	72 *14*	5720.4	(13^-)	4916.1	(11^-)			
820.4 *1*	68 *13*	6540.7	(15^-)	5720.4	(13^-)			
834.6 *1*	37 *7*	5588.6	(14^+)	4754.0	(12^+)			
952.1 *1*	40 *8*	6540.7	(15^-)	5588.6	(14^+)			E_γ: this γ is different from 949.6γ from a 16^+ level at 6539.8 in 2004Wu08.
994.2[†] *2*	8 *3*	2799.8	5^-	1805.90	3^-			
1221.0 *5*	13 *8*	3064.0	$5^{(-)}$	1843.12	4^+			
1222.7 *2*	100 *18*	1222.71	2^+	0.0	0^+	E2		
1258.2 *2*	21 *5*	3064.0	$5^{(-)}$	1805.90	3^-	Q		Mult.: ΔJ=2, Q from (1258γ)(583γ)(θ): A_2=−0.08 *3*, A_4=+0.04 *4*. From Iγ(1221)/Iγ(1258)=0.6 *4*, 2006Si36 suggest E2 for 1258γ and E1 for 1221γ.

[†] Uncertainty increased to 0.3 keV in the fitting procedure, the listed uncertainty of 0.1 or 0.2 keV gives a poor fit.
[‡] From Adopted Gammas.
[#] Absolute intensity per 100 decays.
[@] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

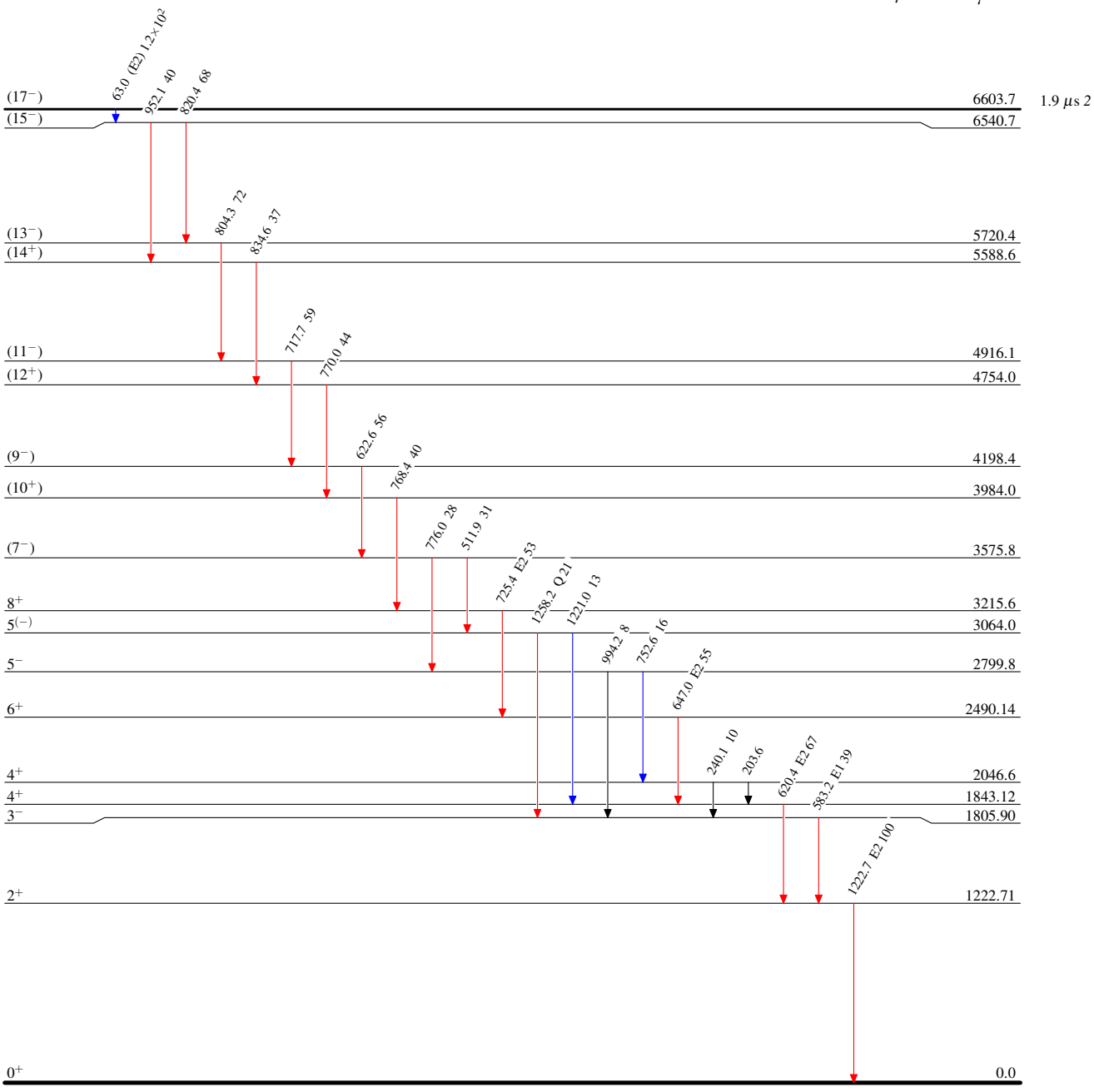
%IT=100.0

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{98}_{40}Zr_{58}$

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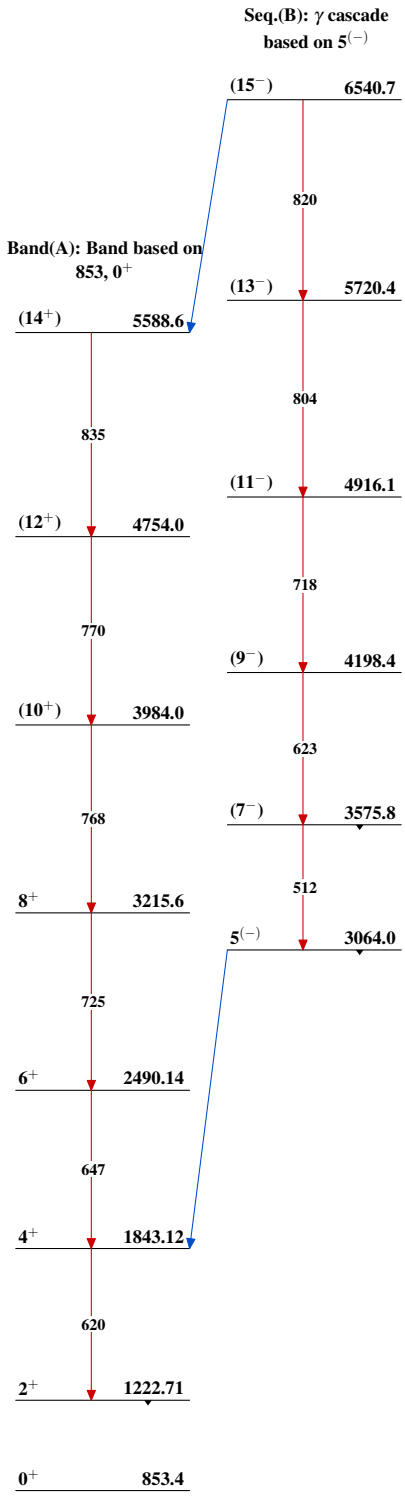

$^{98}_{40}Zr_{58}$