^{149}Ba β^- decay (352 ms) 2004Sy01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 185, 2 (2022)	23-Aug-2022

Parent: ^{149}Ba: E=0.0; J^π=(5/2$^-$,3/2$^-$); $T_{1/2}$=352 ms *6*; Q(β^-)=7.39×10^3 *20*; %β^- decay=100.0

^{149}Ba-J^π,$T_{1/2}$: From ^{149}Ba Adopted Levels.

^{149}Ba-Q(β^-): From 2021Wa16.

^{149}Ba-%β^- decay: %β^-=100; %β^-n=2.2 *17*.

2004Sy01 (also 2007SyZZ thesis): radioactive beam of mass A=149 was produced at the OSIRIS online fission-product mass separator by thermal-neutron induced fission of a ^{235}U target, which consisted of about 1 g of uranium dispersed in graphite, at T=2300°. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$ with two Compton-suppressed NORDBALL Ge spectrometers. Low-energy photons were measured with a high-purity X-ray detector (LEP). The $\gamma\gamma$ coincidence events were performed in a second measurement in which the BGO shields of both Ge detectors had been removed. Transitions belonging to ^{149}Ba decay were identified on the basis of coincidences with the x rays of La and $\gamma\gamma$ coincidences. 1987MaZY was an earlier brief report of production of ^{149}Ba isotope with the observation of γ and x rays, without any details of level population.

2004Sy01 proposed two bands of opposite parities based on (3/2$^-$) for g.s. and multipolarities of 46.0 and 81.5 transitions, but 2007Ur03 conclude that both 3/2$^+$ and 3/2$^-$ are possible, which precludes the band assignments.

The decay scheme is incomplete due to a large gap of about 6.5 MeV between Q-value and the highest observed level.

^{149}La Levels

Two possible bands of opposite parities are proposed in 2004Sy01: a negative-parity band consisting of 46, 226, 357, 517 and 844 levels; and a positive-parity band consisting of 83, 165, 286, 506 and 894 levels.

E(level)†	J^π‡	$T_{1/2}$‡	Comments
0.0	(3/2)	1.091 s *34*	J^π: (3/2$^-$) in 2004Sy01.
45.97 *8*	(1/2,3/2,5/2)		J^π: From the Adopted Levels.
			π=(−) in 2004Sy01.
83.00 *10*			π=(+) in 2004Sy01.
164.50 *18*			π=(+) in 2004Sy01.
226.03 *8*			π=(−) in 2004Sy01.
286.30 *17*			π=(+) in 2004Sy01.
357.32 *15*			π=(−) in 2004Sy01.
505.7 *3*			π=(+) in 2004Sy01.
516.53 *22*			π=(−) in 2004Sy01.
843.6 *5*			π=(−) in 2004Sy01.
893.9 *3*			π=(+) in 2004Sy01.

† From a least-squares fit to Eγ values.

‡ From the Adopted Levels.

$\gamma(^{149}La)$

E$_\gamma$†	I$_\gamma$†	E$_i$(level)	J_i^π	E$_f$	J_f^π	Mult.‡	α#	Comments
46.0 *1*	16 *2*	45.97	(1/2,3/2,5/2)	0.0	(3/2)	M1+E2	23 *13*	α(K)=7.8 *9*; α(L)=12 *11*; α(M)=2.7 *24* α(N)=0.6 *5*; α(O)=0.08 *7*; α(P)=0.00055 *13* α(exp)>3.6 if mult(180.1γ)=E1; >4.3 if mult(180.1γ)=M1; >4.5 if mult(180.1γ)=E2 suggest that mult(46.0γ) not E1.
81.5 *2*	7 *2*	164.50		83.00		M1,E2	3.0 *11*	α(K)=1.93 *27*; α(L)=0.9 *7*; α(M)=0.19 *15* α(N)=0.041 *31*; α(O)=0.006 *4*; α(P)=0.000122 *8* α(exp)=1.7 *5* if mult(83.0γ)=E1; 4.6 *15* if mult(83.0γ)=M1.

Continued on next page (footnotes at end of table)

^{149}Ba β^- decay (352 ms) 2004Sy01 (continued)

$\gamma(^{149}La)$ (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Comments
83.0 *1*	14 *2*	83.00		0.0	(3/2)	
121.8 *2*	16 *4*	286.30		164.50		
131.3 *2*	12 *2*	357.32		226.03		E_γ,I_γ: average value from singles and $\gamma\gamma$ coincidence spectra.
180.1 *1*	79 *4*	226.03		45.97	(1/2,3/2,5/2)	
219.4 *2*	25 *4*	505.7		286.30		
226.0 *1*	69 *5*	226.03		0.0	(3/2)	
286.3 *2*	100 *24*	286.30		0.0	(3/2)	I_γ: from $\gamma\gamma$ spectra.
290.5 *2*	12 *4*	516.53		226.03		
357.3 *2*	45 *7*	357.32		0.0	(3/2)	
607.6 *2*	10 *2*	893.9		286.30		E_γ,I_γ: from $\gamma\gamma$ coin data.
617.6 *5*	8 *2*	843.6		226.03		E_γ,I_γ: from $\gamma\gamma$ coin data.

[†] From γ-ray singles spectra, unless otherwise stated.
[‡] From conversion coefficients, deduced based on I(γ+ce) intensity balance by 2004Sy01.
[#] 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: Relative I_γ