^{189}Pb ε decay (39 s) 2009Sa09

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	T. D. Johnson, Balraj Singh	NDS 142, 1 (2017)	15-Apr-2017

Parent: ^{189}Pb: E=0; J^π=(3/2$^-$); $T_{1/2}$=39 s *8*; Q(ε)=6772 *16*; %ε+%β^+ decay≈100.0

^{189}Pb-J^π,$T_{1/2}$: From ^{189}Pb Adopted Levels.

^{189}Pb-Q(ε): from 2017Wa10.

^{189}Pb-%ε+%β^+ decay: %α≤0.40 (from ^{189}Pb Adopted Levels).

Tentative level scheme according to 2009Sa09.

^{189}Pb source was formed in U(p,X) reaction (UC_x target) with a beam energy of 1.4 GeV. ^{189}Pb was also excited using a laser beam at resonant frequencies from RILIS at the ISOLDE facility at CERN.

Two experiments were performed:

1. Measured βγ coin using 4π β plastic scintillator and three Ge detectors (one planar HPGe and two Ge detectors). The γ rays in ^{189}Pb were also identified in hyperfine laser spectroscopy from low-lying levels.
2. Measured Eγ, Iγ, γγ coin using two HPGe detectors with Be window. Hyperfine laser spectroscopy was also carried out.

Comparison with rotor plus particle model calculations.

^{189}Tl Levels

Expected configurations are from 2009Sa09 based on axial-rotor coupled to one quasiparticle (Hartree-Fock+BCS) calculations for oblate and prolate deformations.

E(level)†	J^π‡	Comments
0.0	(1/2$^+$)	Expected configuration π1/2[400] (prolate).
318.8? *2*	(3/2$^+$)	Expected configuration π1/2[400] (prolate).
462.8? *5*	(3/2$^+$)	Expected configuration=π3/2[402] (prolate).
667.4? *2*	(3/2$^-$)	Expected configuration=π3/2[532] (prolate).
884.9? *5*		
1032.5? *5*		
1368.9? *5*		
1489.8? *11*		
1716.7? *5*		

† From least-squares fit to Eγ data.

‡ From Adopted Levels.

γ(^{189}Tl)

E_γ†	I_γ‡	E_i(level)	J_i^π	E_f	J_f^π	Comments
217.5@ *4*	1.7 *3*	884.9?		667.4?	(3/2$^-$)	
318.8@ *2*	29# *10*	318.8?	(3/2$^+$)	0.0	(1/2$^+$)	
365.1@ *4*	2.3 *3*	1032.5?		667.4?	(3/2$^-$)	
422.1@ *2*	5.0 *8*	884.9?		462.8?	(3/2$^+$)	
463.7@ *2*	13# *3*	462.8?	(3/2$^+$)	0.0	(1/2$^+$)	
667.4@ *2*	9.6 *15*	667.4?	(3/2$^-$)	0.0	(1/2$^+$)	
1050.1@ *4*	2.8 *4*	1368.9?		318.8?	(3/2$^+$)	
1171@ *1*	≈2.6	1489.8?		318.8?	(3/2$^+$)	E_γ,I_γ: from γγ coin data.
1397.9@ *4*	1.0 *2*	1716.7?		318.8?	(3/2$^+$)	

Continued on next page (footnotes at end of table)

^{189}Pb ε decay (39 s) 2009Sa09 (continued)

γ(^{189}Tl) (continued)

† General uncertainty is quoted by 2009Sa09 as 0.2 keV for Iγ>3 and 0.4 keV for weaker lines. Uncertainty of 1 keV is assigned by the evaluators when Eγ quoted to nearest keV.
‡ General uncertainty is quoted by 2009Sa09 as 15%.
# From hyperfine spectrum in laser spectroscopy. Doublet, one component from the decay of the high-spin isomer and the other from the decay of the low-spin isomer of ^{189}Pb.
@ Placement of transition in the level scheme is uncertain.

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