Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	19-Feb-2015

Q(β^-)=1610 *SY*; S(n)=5010 *SY*; S(p)=9720 *SY*; Q(α)=2300 *SY* 2012Wa38

Estimated uncertainties in 2012Wa38: 200 for Q(β^-), 220 for S(n) 360 for S(p) and Q(α).

S(2n)=8480 *200*, S(2p)=18280 *450* (syst,2012Wa38).

2010Al24 (also 2009Al32): ^{216}Pb nuclide identified in ^{9}Be(^{238}U,X) reaction with a beam energy of 1 GeV/nucleon produced by the SIS synchrotron at GSI facility. Target=2.5 g/cm^2. The fragment residues were analyzed with the high resolving power magnetic spectrometer Fragment separator (FRS). The identification of nuclei was made on the basis of magnetic rigidity, velocity, time-of-flight, energy loss and atomic number of the fragments using two plastic scintillators and two multisampling ionization chambers. The FRS magnet was tuned to center on ^{210}Au, ^{216}Pb, ^{219}Pb, ^{227}At and ^{229}At nuclei along the central trajectory of FRS.

Unambiguous identification of nuclides required the separation of different charge states of the nuclei passing through the FRS. At 1 GeV/nucleon incident energy of ^{238}U, fraction of fully stripped ^{226}Po nuclei was about 89%. Through the measurement of difference in magnetic rigidity in the two sections of the FRS and the difference in energy loss in the two ionization chambers, the charge state of the transmitted nuclei was determined, especially, that of the singly charged (hydrogen-like) nuclei which preserved their charge in the current experimental setup. Measured production cross sections with 10% statistical and 20% systematic uncertainties.

Criterion established in 2010Al24 for acceptance of identification of a new nuclide: 1. number of events should be compatible with the corresponding mass and atomic number located in the expected range of positions at both image planes of the FRS spectrometer; 2. number of events should be compatible with >95% probability that at least one of the counts does not correspond to a charge-state contaminant. Comparisons of measured σ with model predictions using the computer codes COFRA and EPAX. See also previous report 2009Al32 by the same group as 2010Al24.

Structure calculations:

2013Wa15: calculated pairing energy. Analyzed effects of the optimized pairing force on the pairing energy and binding energy.

2011Bh06: calculated pairing energy, two-neutron separation energy.

2008Ma17: HFB calculations of binding energy, two-neutron separation energy, odd-even mass staggering and pairing gaps.

1992Kr07: calculated potential well depth, rigid moment of inertia, and quadrupole moment from microscopic HF-BCS calculations. Additional information 1.

2003Bo06: calculated $T_{1/2}$ using Shell model and quasiparticle RPA.

^{216}Pb Levels

Cross Reference (XREF) Flags

A ^{9}Be(^{238}U,Xγ)

E(level)†	J^π	$T_{1/2}$	XREF	Comments
0‡	0^+	>300 ns	A	%β^-=? Production σ=14.1 nb (from e-mail reply of Oct 29, 2010 from H. Alvarez-Pol, which also stated that further analysis was in progress). Production cross section measured in 2010Al24, values are given in figure 2, plot of σ versus mass number for Pb isotopes. Statistical uncertainty=10%, systematic uncertainty=20%. From A/Z plot (figure 1 in 2010Al24), a large number (certainly more than few hundreds) of events are assigned to ^{216}Pb. The β^- decay is the only decay mode expected. $T_{1/2}$: lower limit from time-of-flight as given in 2006Ca30 for a similar setup. Actual half-life is expected to be much larger as suggested by the calculated value of >100 s for β decay and >10^{20} s for α decay (1997Mo25), and systematic value of 7 min for β decay (2012Au07).
887‡ *1*	(2^+)		A	
1289‡ *2*	(4^+)		A	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{216}Pb Levels (continued)

E(level)†	J^π	$T_{1/2}$	XREF	Comments
1459‡ *2*	(6+)		A	%IT=100
1459+x?‡	(8+)	0.40 μs *4*	A	%IT=100 E(level): x=20-90 keV. $T_{1/2}$: from γ(t) decay curves (2012Go19).

† From Eγ values, assuming 1 keV uncertainty for each γ ray.
‡ Band(A): Yrast cascade.

γ(^{216}Pb)

E_i(level)	J_i^π	Eγ	E_f	J_f^π	Mult.	α†	Comments
887	(2+)	887	0	0+			
1289	(4+)	402	887	(2+)			
1459	(6+)	170	1289	(4+)	[E2]	0.765 *20*	α: from BrIcc code assuming 1 keV uncertainty in energy.
1459+x?	(8+)	(x)	1459	(6+)	[E2]		B(E2)(W.u.)=0.36 *+3−8* B(E2)=0.00276 *+26−58*. 2012Go19 give B(E2)=0.0026 *4* (numerical value received from A. Gottardo in e-mail reply of Feb 19, 2015). Eγ: transition to (6+) level not seen in γ-ray spectra, energy is estimated as x=20-90 keV (2012Go19) based on the observed intensity of x rays and that expected from large internal conversion of a low-energy E2 transition. Total conversion coefficient=9.98 for 90-keV, 100.9 for 55-keV and 14630 for 20-keV, E2 transitions. B(E2) and B(E2)(W.u.) deduced by evaluator for Eγ=55 keV with the uncertainties overlapping the values B(E2)=0.00218 *22*, B(E2)(W.u.)=0.28 *3* for 90-keV transition, and B(E2)=0.00302 *31*, B(E2)(W.u.)=0.39 *4* for 20-keV transition.

† 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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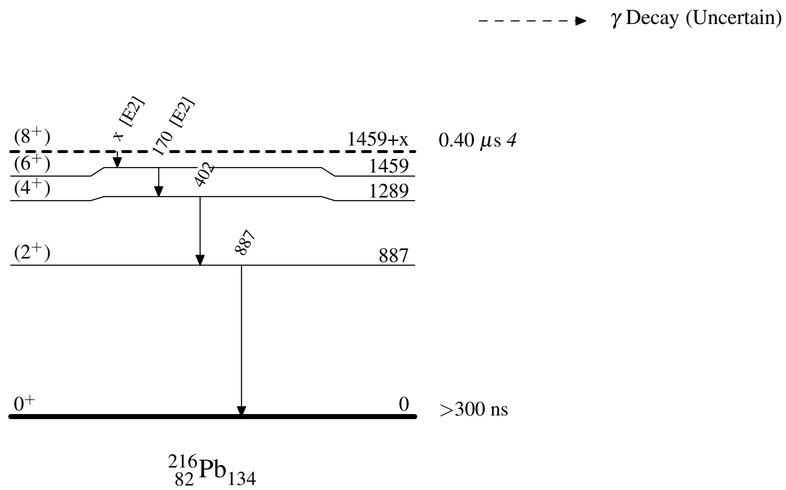
Legend

Level Scheme



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