

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 141,327 (2017)	22-Mar-2017

$Q(\beta^-) = -6280$ syst; $S(n) = 8180$ syst; $S(p) = 3014$ 25; $Q(\alpha) = 8926$ 15 [2017Wa10](#)

Estimated $\Delta Q(\beta^-) = 240$, $\Delta S(n) = 120$ ([2017Wa10](#)).

$S(2n) = 15120$ 280 (syst), $S(2p) = 5079$ 20, $Q(\epsilon p) = 126$ 23 ([2017Wa10](#)).

Isotopic identification and assignment:

[1975Og01](#): ²⁰⁸Pb(⁵⁰Ti,2n) excitation function.

[1984Og02](#): ²⁰⁸Pb(⁵⁰Ti,2n); ²⁰⁸Pb(⁴⁹Ti,n) SF observed.

[1984Og02](#), [1985Mu11](#): daughter of ²⁶⁰Sg.

[1985He06](#): ²⁰⁸Pb(⁵⁰Ti,2n), E=4.75-5.15 MeV/nucleon; ²⁰⁷Pb(⁵⁰Ti,n), E=4.85 MeV/nucleon; parent of ²⁵²No (8410 α).

[1985So03](#): ²⁴⁹Cf(¹²C,5n), E=85 MeV, SF observed.

Theoretical calculations: consult the Nuclear Science References (NSR) database for about 125 theory references.

[2014Li15](#), [2012Jo05](#): nuclear structure theory references.

²⁵⁶Rf Levels

Cross Reference (XREF) Flags

- A ²⁶⁰Sg α decay (4.95 ms)
- B ²⁰⁸Pb(⁵⁰Ti,2n γ)

E(level) [†]	J ^π	T _{1/2}	XREF	Comments
0.0 [#]	0 ⁺	6.67 ms 10	AB	$\% \alpha = 0.32$ 17 (1997He29); $\% SF = 99.68$ 17 T _{1/2} : weighted average of 6.9 ms 2 (2013Ri07 , 2012Gr12 from time difference between recoil and fission events), 6.9 ms 4 (2011Ro20 , from time distribution of fission events in SF decay of 783 events), 6.70 ms 9 (2008Dr05), 6.2 ms 2 (1997He29), 6.7 ms 2 (1984Og02). Other measurements: 5 ms (from SF activity, 1975Og01); 7.4 ms +9-7 (from SF activity, 1985He06); 10 ms +47-4 (from α activity, 1985He06); 6.3 ms +27-14 (from SF activity following ²⁶⁰ Sg α decay, 1985Mu11); 9 ms 2 (from SF activity, 1985So03). The α branching was determined by 1997He29 as (0.32±0.17)%. Authors' earlier measurement: (2.2 +7.3-1.8)% (1985He06).
44 [#] 1	(2 ⁺)		AB	E(level): deduced from Harris fit of rotational band members (2012Gr12). Others: ≈ 46 (2009Je01), 51 35 from ²⁶⁰ Sg α decay. J ^π : α hindrance factor; systematics of first excited-state energies of even-even nuclei.
148 [#] 2	(4 ⁺)		B	E(level): deduced from Harris fit of rotational band members (2012Gr12).
309 [#] 2	(6 ⁺)		B	
527 [#] 2	(8 ⁺)		B	
799 [#] 2	(10 ⁺)		B	
≈ 946	(3 ⁻)		B	E(level), J ^π : from (electron)(900 γ) (2009Je01), possible member of K ^π =2 ⁻ band.
≈ 1120 [‡]	(5 ⁻)	25 [‡] μ s 2	B	$\% IT = ?$; $\% SF = ?$ J ^π : assigned by 2013Ri07 as K ^π =(5 ⁻) with possible 2-qp configuration=($\pi 1/2[521] \otimes \pi 9/2[624]$) ₅₋ . T _{1/2} : 2011Ro20 state that their observed isomer of 17 μ s 5 (half-life from time distribution of conversion electrons and maximum likelihood method) may correspond to the 25- μ s 2 isomer in 2009Je01 , although, the isomer population ratio of $\approx 5\%$ 2 (with respect to that of ²⁵⁶ Rf g.s.) is much smaller than $\approx 27\%$ deduced by 2011Ro20 from data in 2009Je01 . Due to its low population and several other arguments against its assignment as a 2-qp isomer, 2011Ro20 suggest that their observed 17- μ s isomer is more likely a 4-qp state.

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Adopted Levels, Gammas (continued)

²⁵⁶Rf Levels (continued)

E(level) [†]	J ^π	T _{1/2}	XREF	Comments
1122 [#] 3	(12 ⁺)		B	
≈1400 [‡]	(8 ⁻)	17 [‡] μs 2	B	%IT=?; %SF=? E(level): isomer not found in 2011Ro20 , perhaps due to low statistics. J ^π : assigned by 2013Ri07 as K ^π =(8 ⁻) with possible 2-qp configuration=(π7/2[514]⊗π9/2[624]) ₈₋ . T _{1/2} : other: 13.2 μs 33 (2010Be16).
1493 [#] 3	(14 ⁺)		B	
1910 [#] 4	(16 ⁺)		B	
>2200 [‡]		27 [‡] μs 5	B	%IT=?; %SF=? E(level): isomer not found in 2011Ro20 , perhaps due to low statistics. T _{1/2} : other: 36.5 μs 86 (2010Be16). Possible 4-qp state (2009Je01,2013Ri07).
2369 [#] 4	(18 ⁺)		B	
2868 [#] 5	(20 ⁺)		B	

[†] From E_γ data in [2012Gr12](#), unless otherwise stated.

[‡] From [2009Je01](#). Level energy deduced from (electron)(900γ) coin. Half-life from recoil-electron-electron-electron-fission(t).

Isomers at ≈1120 and ≈1400 keV interpreted by [2009Je01](#) as possible 2-qp states, while the one at >2000 keV is interpreted as possible 4-qp state. See also [2011Ro20](#) where only one isomer of 17 μs 5 was seen and interpreted as possible 4-qp state.

[#] Band(A): K^π=0⁺ band. Band assignment from [2012Gr12](#).

γ(²⁵⁶Rf)

E _i (level)	J _i ^π	E _γ	I _γ	E _f	J _f ^π	Mult.	α [‡]	Comments
44	(2 ⁺)	(44 [†] I)	100	0.0	0 ⁺	[E2]	1.83×10 ³ 22	α(L)=1.30×10 ³ 16; α(M)=3.8×10 ² 5 α(N)=111 14; α(O)=29 4; α(P)=4.9 6; α(Q)=0.0157 16
148	(4 ⁺)	(104 [†] I)	100	44	(2 ⁺)	[E2]	31.5 15	α(L)=22.4 11; α(M)=6.6 4 α(N)=1.91 9; α(O)=0.502 24; α(P)=0.086 4; α(Q)=0.000476 20
309	(6 ⁺)	161 I	100	148	(4 ⁺)	[E2]	4.51 14	α(K)=0.093 3; α(L)=3.15 10; α(M)=0.92 3 α(N)=0.266 9; α(O)=0.0701 22; α(P)=0.0121 4; α(Q)=9.78×10 ⁻⁵ 25
527	(8 ⁺)	218 I	100	309	(6 ⁺)	[E2]	1.33 3	α(K)=0.1204 17; α(L)=0.861 21; α(M)=0.249 6 α(N)=0.0721 18; α(O)=0.0190 5; α(P)=0.00334 8; α(Q)=3.68×10 ⁻⁵ 8
799	(10 ⁺)	272 I	100	527	(8 ⁺)	[E2]	0.589 12	α(K)=0.1016 15; α(L)=0.349 8; α(M)=0.1003 21 α(N)=0.0290 6; α(O)=0.00767 16; α(P)=0.00136 3; α(Q)=1.93×10 ⁻⁵ 4
≈946	(3 ⁻)	900 I		44	(2 ⁺)			E _γ : from 2009Je01 .
1122	(12 ⁺)	323 I	100	799	(10 ⁺)	[E2]	0.333 6	α(K)=0.0832 12; α(L)=0.179 4; α(M)=0.0510 10 α(N)=0.0147 3; α(O)=0.00390 8; α(P)=0.000701 13; α(Q)=1.213×10 ⁻⁵ 20
1493	(14 ⁺)	371 I	100	1122	(12 ⁺)	[E2]	0.218 4	α(K)=0.0692 10; α(L)=0.1069 19; α(M)=0.0302 6 α(N)=0.00870 15; α(O)=0.00231 4; α(P)=0.000419 8; α(Q)=8.51×10 ⁻⁶ 14
1910	(16 ⁺)	417 2	100	1493	(14 ⁺)			
2369	(18 ⁺)	459 2	100	1910	(16 ⁺)			
2868	(20 ⁺)	499 2	100	2369	(18 ⁺)			

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Adopted Levels, Gammas (continued) $\gamma(^{256}\text{Rf})$ (continued)

† Calculated value from Harris fit in a rotational band.

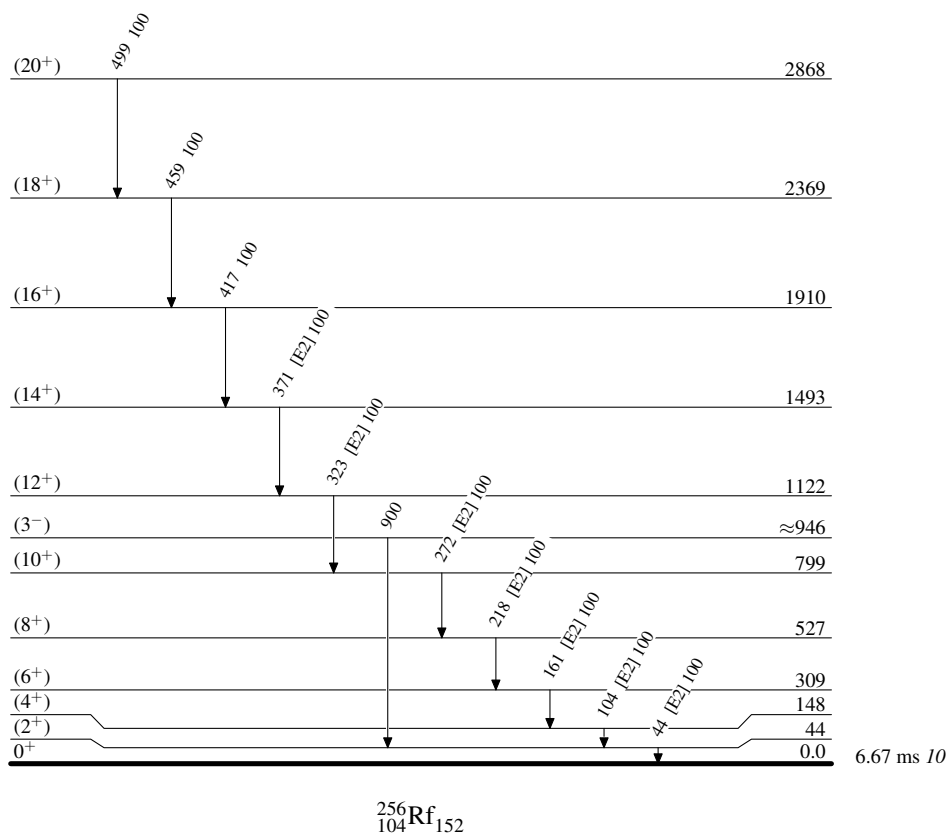
‡ Theoretical values from BrIcc code (2008Ki07) using “Frozen orbital” approximation.

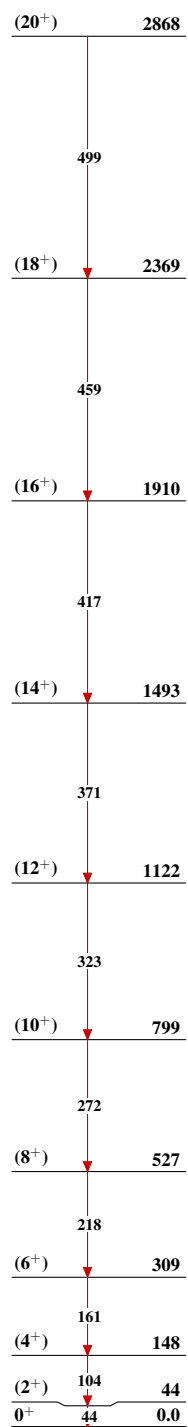
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain) $^{256}_{104}\text{Rf}_{152}$

Adopted Levels, GammasBand(A): $K^\pi=0^+$ band $^{256}_{104}\text{Rf}_{152}$