

**Adopted Levels, Gammas**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation		NDS 114, 2023 (2013)	23-Sep-2013

Q(β<sup>-</sup>)=-1487 10; S(n)=4920 12; S(p)=5078 9; Q(α)=8839 8 2012Wa38  
 S(2n)=11613 9, S(2p)=9093 8 (2012Wa38).

<sup>215</sup>Rn evaluated by S.K. Basu, G. Mukherjee, B. Singh, Srijit Bhattacharya, A. De, D. Mondal.

<sup>215</sup>Rn identified as descendent of <sup>227</sup>U (1952Me13,1969Ha32); and descendent of <sup>223</sup>Th (1970Va13).  
 α: Additional information 1.

<sup>215</sup>Rn Levels

Cross Reference (XREF) Flags

- A <sup>219</sup>Ra α decay (10 ms)
- B <sup>207</sup>Pb(<sup>18</sup>O,2α2nγ)

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	T <sub>1/2</sub>	XREF	Comments
0.0 <sup>#</sup>	9/2 <sup>+</sup>	2.30 μs 10	AB	%α=100 RMS charge radius <r <sup>2</sup> > <sup>1/2</sup> =5.620 fm 20; deduced from interpolation of evaluated rms charge radii of <sup>212</sup> Rn to <sup>222</sup> Rn (2013An02), with slope k <sub>z</sub> =0.39 in formula 9 of 2004An14. T <sub>1/2</sub> : from 1970Va13. J <sup>π</sup> : favored α decay (HF≈1.6) to <sup>211</sup> Po (J <sup>π</sup> =9/2 <sup>+</sup> ). %ε<1.0×10 <sup>-11</sup> for log ft>5.9. %ε+%β <sup>+</sup> <3×10 <sup>-7</sup> , theory (1973Ta30). J <sup>π</sup> : 592γ M1(+E2) from (7/2) <sup>+</sup> ; uncertain 214.1γ to 9/2 <sup>+</sup> . Possible configuration=νg <sub>9/2</sub> <sup>3</sup> .
213.97 18	(7/2,9/2) <sup>+</sup>		A	J <sup>π</sup> : 291γ E1 to 9/2 <sup>+</sup> . Possible configuration=νg <sub>9/2</sub> <sup>2</sup> ⊗νj <sub>15/2</sub> .
290.8 3	(7/2,9/2,11/2) <sup>-</sup>		A	J <sup>π</sup> : (7/2,11/2) <sup>+</sup> from αγ(θ) (1989Ha26); 11/2 <sup>+</sup> consistent with (E2) 629.8γ from 946.3, (15/2 <sup>+</sup> ) level. Based on a comparison of decay schemes of α decays of <sup>221</sup> Th to <sup>217</sup> Ra and <sup>219</sup> Ra to <sup>215</sup> Rn, 1994Sh02 assigned 11/2 <sup>+</sup> to this level.
315.82 <sup>@</sup> 4	(11/2) <sup>+</sup>		AB	J <sup>π</sup> : 805γ M1+E2 to 9/2 <sup>+</sup> ; low α hindrance factor (HF=3.3) from <sup>219</sup> Ra (J <sup>π</sup> =(7/2) <sup>+</sup> ). Probable configuration=νg <sub>9/2</sub> <sup>2</sup> ⊗νi <sub>11/2</sub> , same as that of 315.8 level (see discussion in 1994Sh02).
570.14 <sup>#</sup> 17	(13/2 <sup>+</sup> )		B	
805.7 3	(7/2) <sup>+</sup>		A	J <sup>π</sup> : 805γ M1+E2 to 9/2 <sup>+</sup> ; low α hindrance factor (HF=3.3) from <sup>219</sup> Ra (J <sup>π</sup> =(7/2) <sup>+</sup> ). Probable configuration=νg <sub>9/2</sub> <sup>2</sup> ⊗νi <sub>11/2</sub> , same as that of 315.8 level (see discussion in 1994Sh02).
946.33 <sup>@</sup> 19	(15/2 <sup>+</sup> )		B	
1016.49 <sup>#</sup> 23	(17/2 <sup>+</sup> )		B	
1334.28 <sup>@</sup> 23	(19/2 <sup>+</sup> )		B	
1403.8 <sup>#</sup> 3	(21/2 <sup>+</sup> )		B	
1607.8 <sup>@</sup> 3	(23/2 <sup>+</sup> )		B	
1731.1 <sup>#</sup> 3	(25/2 <sup>+</sup> )		B	
1804.8 <sup>@</sup> 3	(27/2 <sup>+</sup> )		B	
1804.8+x		57 ns +21-12	B	%IT=100 T <sub>1/2</sub> : from γ(t) in <sup>9</sup> Be( <sup>238</sup> U,X), E=1 GeV/nucleon reaction (2013Bo18,2012BoZU). E(level): may correspond to 1804.8, 27/2 <sup>+</sup> level, but from available data in 2013Bo18 and 2012BoZU, location of the isomer remains uncertain. Three γ rays of 287, 392 and 656 keV of similar intensities are reported in 2012BoZU, which may be related to the decay of this isomer.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) $^{215}\text{Rn}$  Levels (continued)

<u>E(level)<sup>†</sup></u>	<u>J<sup>π</sup><sup>‡</sup></u>	<u>XREF</u>	<u>Comments</u>
2287.1 <sup>@</sup> 4	(29/2 <sup>+</sup> )	B	
y		B	Additional information 2.
383.5+y 20		B	
542.2+y 3		B	

<sup>†</sup> From least squares fit to Adopted gamma-ray energies.

<sup>‡</sup> For high-spin ( $J > 11/2$ ) levels, assignments are based on  $\gamma(\theta)$  data, multipolarity assignments, band structures, and systematics of similar bands in  $^{213}\text{Rn}$ ,  $^{217}\text{Rn}$  and  $^{219}\text{Th}$ . These assignments are the same as the ones in [2012De11](#), except that parentheses have been added by the evaluators since strong arguments seem lacking.

# Band(A):  $\nu g_{9/2}^3$  band.

@ Band(B):  $\nu g_{9/2}^2 \otimes \nu i_{11/2}$  band.

**Adopted Levels, Gammas (continued)**

$\gamma(^{215}\text{Rn})$									
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_f$	$J_f^\pi$	Mult. <sup>†</sup>	$\delta^\dagger$	$\alpha$	Comments
213.97	(7/2,9/2) <sup>+</sup>	214.1 <sup>#</sup> 2	100	0.0	9/2 <sup>+</sup>	(M1+E2)		1.0 6	
290.8	(7/2,9/2,11/2) <sup>-</sup>	290.8 3	100	0.0	9/2 <sup>+</sup>	E1		0.0357	
315.82	(11/2) <sup>+</sup>	315.82 4	100	0.0	9/2 <sup>+</sup>	M1(+E2)	<0.2	0.503	E <sub>γ</sub> : from <sup>219</sup> Ra α decay.
570.14	(13/2 <sup>+</sup> )	570.2 2	100	0.0	9/2 <sup>+</sup>	(E2)		0.0259	
805.7	(7/2) <sup>+</sup>	489 <sup>#</sup> 1	≤42	315.82	(11/2) <sup>+</sup>				
		592.0 3	100 17	213.97	(7/2,9/2) <sup>+</sup>	M1(+E2)	<0.7	0.0721	
		805.2 4	58 17	0.0	9/2 <sup>+</sup>	M1+E2		0.028 <sup>‡</sup> 16	
946.33	(15/2 <sup>+</sup> )	376.4 2	<7.7	570.14	(13/2 <sup>+</sup> )				
		629.8 2	100 12	315.82	(11/2) <sup>+</sup>	(E2)		0.0208	
1016.49	(17/2 <sup>+</sup> )	446.2 2	100	570.14	(13/2 <sup>+</sup> )	(E2)		0.0464	
1334.28	(19/2 <sup>+</sup> )	317.7 2	40 8	1016.49	(17/2 <sup>+</sup> )	(M1+E2)		0.31 <sup>‡</sup> 20	
		388.1 2	1.0×10 <sup>2</sup> 3	946.33	(15/2 <sup>+</sup> )	[E2]		0.0665	
1403.8	(21/2 <sup>+</sup> )	387.2 2	100	1016.49	(17/2 <sup>+</sup> )	(E2)		0.0670	
1607.8	(23/2 <sup>+</sup> )	203.9 2	100 22	1403.8	(21/2 <sup>+</sup> )	(M1)		1.743	
		273.6 2	89 19	1334.28	(19/2 <sup>+</sup> )	(E2)		0.183	
1731.1	(25/2 <sup>+</sup> )	123.2 2	50 10	1607.8	(23/2 <sup>+</sup> )	(M1)		7.25	Mult.: from γ-ray intensity balance (2012De11).
		327.4 2	100 20	1403.8	(21/2 <sup>+</sup> )	[E2]		0.1067	
1804.8	(27/2 <sup>+</sup> )	197.0 2	100	1607.8	(23/2 <sup>+</sup> )	(E2)		0.552	
2287.1	(29/2 <sup>+</sup> )	482.3 2	100	1804.8	(27/2 <sup>+</sup> )	[M1+E2]		0.10 <sup>‡</sup> 7	
383.5+y		383.5 2	100	y					
542.2+y		158.7 2	100	383.5+y					

<sup>†</sup> From either <sup>219</sup>Ra α decay or <sup>207</sup>Pb(<sup>18</sup>O,2α2nγ). Only the 315.8 level is populated in both datasets.

<sup>‡</sup> Value overlaps M1 and E2.

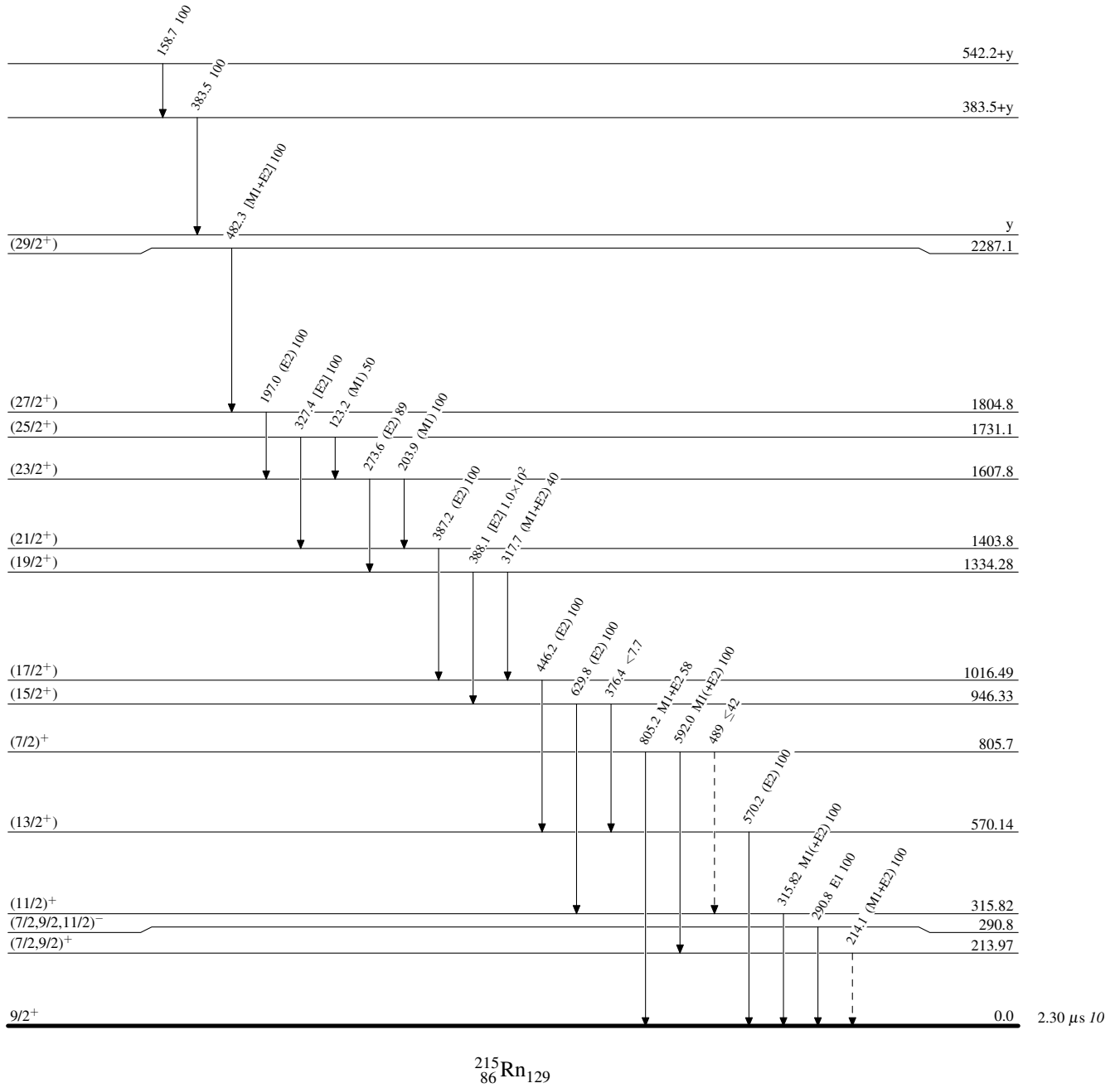
<sup>#</sup> Placement of transition in the level scheme is uncertain.

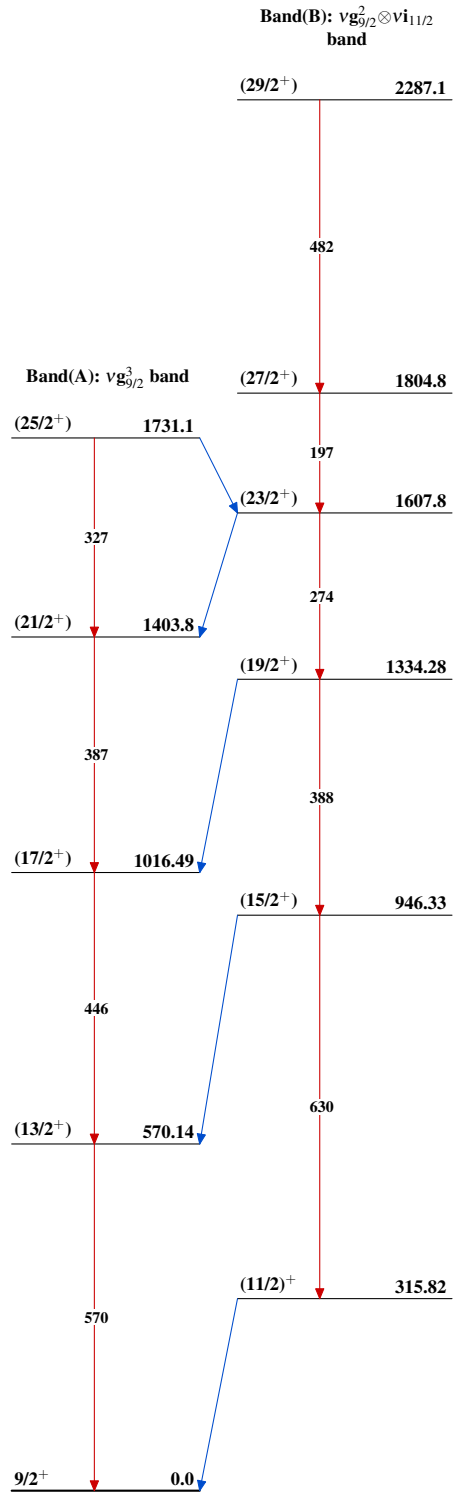
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

-----►  $\gamma$  Decay (Uncertain)

**Adopted Levels, Gammas** $^{215}_{86}\text{Rn}_{129}$