(HI,xnγ) 2006De09

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	S. -c. Wu	NDS 108, 1057 (2007)	1-Mar-2007

2006De09: ^{208}Pb(^{18}O,2α2nγ), E=91-93 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\alpha\gamma\gamma$ coin, $\gamma(\theta)$, DCO using 8π GASP-ISIS spectrometer, the ISIS array contained 40 telescopic E-ΔE particle detectors.

1987Co11: ^{208}Pb(^{14}C,α2nγ), E=67-68 MeV; measured: $\gamma\gamma$, γX, $\gamma(\theta)$. HPGe, Ge(Li), planar Ge detectors, Compton-suppressed spectrometer.

1987Co11 reported five γ-ray energies, 4 of them are in good agreements with those reported in 2006De09. However, 1987Co11 noted 3 γ-rays from are possibly contaminated by γ's in Ra isotopes. The evaluator has adopted the level scheme of 2006De09.

^{216}Rn Levels

E(level)	J$^{\pi}$†	Comments
0.0‡	0$^+$	
461.4‡ 2	2$^+$	
840.5‡ 3	4$^+$	
1225.9‡ 4	6$^+$	
1645.0‡ 4	8$^+$	
1785.7 4		
1837.5 5	(8$^+$,9$^+$,10$^+$)	E(level): Eγ=102.2 and 192.5 are in cascade from a 1939.7 keV 10$^+$ level, through a level at either 1747.2 keV or 1837.5 keV, to the 1645.0 keV state. The evaluator has adopted the former possibility following the level scheme of 2006De09.
1932.0 5		
1939.7 5	10$^+$	Configuration=$\pi(h^4_{9/2})_0\otimes\nu(g^2_{9/2})_0\otimes(\nu g_{9/2}\otimes\nu i_{11/2})_{10}$.
2342.5 5		
2405.6# 5	12$^+$	
2598.3@ 5	13$^-$	
2826.1# 5	14$^+$	
2965.4 6		
3072.1@ 6	15$^-$	
3238.3# 6	16$^+$	
3469.4@ 6	17$^-$	
3572.4# 6	18$^+$	
3779.7@ 6	19$^-$	
4071.8# 6		
4299.7@ 6		

† Authors′ values, based on measured DCO ratios and deduced band structure.
‡ Band(A): g.s. band.
# Band(B): 12$^+$ band. Bands based on 12$^+$ and 13$^-$ form alternating parity bands connected by enhanced E1 transitions, consistent with octupole vibrational type structure.
@ Band(C): 13$^-$ band. Bands based on 12$^+$ and 13$^-$ form alternating parity bands connected by enhanced E1 transitions, consistent with octupole vibrational type structure.

(HI,xnγ) 2006De09 (continued)

γ(^{216}Rn)

Theoretical conversion coefficients are from 'BrIcc' code.
R(anisotropy)=anisotropy ratio defined as the intensity ratio of transitions observed in the 32°/148° detector rings to those detected in the 90° ring.

E_γ[†]	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	α[c]	Comments
102.2[#] *2*	2.4[@] *4*	1939.7	10⁺	1837.5	(8⁺,9⁺,10⁺)	(E2)[&b]	7.62 *13*	α(K)=0.331 *5*; α(L)=5.38 *9*; α(M)=1.450 *25*; α(N+..)=0.462 *8* α(N)=0.377 *7*; α(O)=0.0761 *13*; α(P)=0.00844 *15*
166.1 *2*	2.7 *4*	3238.3	16⁺	3072.1	15⁻	E1[a]	0.1350	α(K)=0.1077 *16*; α(L)=0.0208 *3*; α(M)=0.00496 *8*; α(N+..)=0.001583 *23* α(N)=0.001277 *19*; α(O)=0.000270 *4*; α(P)=3.59×10⁻⁵ *6*
ˣ185.6	≤1							
192.5[#] *2*	9.2[@] *16*	1837.5	(8⁺,9⁺,10⁺)	1645.0	8⁺	(E2)[&b]	0.600	α(K)=0.178 *3*; α(L)=0.312 *5*; α(M)=0.0835 *13*; α(N+..)=0.0267 *4* α(N)=0.0217 *4*; α(O)=0.00442 *7*; α(P)=0.000507 *8*
192.7 *2*	26[@] *4*	2598.3	13⁻	2405.6	12⁺	E1[&]	0.0941	α(K)=0.0754 *11*; α(L)=0.01424 *21*; α(M)=0.00339 *5*; α(N+..)=0.001083 *16* α(N)=0.000873 *13*; α(O)=0.000185 *3*; α(P)=2.49×10⁻⁵ *4* R(anisotropy)=0.60 *10* for 192.7+192.5.
207.5 *2*	4.1[@] *9*	3779.7	19⁻	3572.4	18⁺	E1[a]	0.0788	α(K)=0.0633 *9*; α(L)=0.01181 *17*; α(M)=0.00281 *4*; α(N+..)=0.000899 *13* α(N)=0.000724 *11*; α(O)=0.0001539 *22*; α(P)=2.08×10⁻⁵ *3* R(anisotropy)=0.70 *11*.
227.9 *2*	7.8 *9*	2826.1	14⁺	2598.3	13⁻	E1[&]	0.0630	α(K)=0.0507 *8*; α(L)=0.00935 *14*; α(M)=0.00222 *4*; α(N+..)=0.000711 *10* α(N)=0.000573 *9*; α(O)=0.0001220 *18*; α(P)=1.655×10⁻⁵ *24*
231.2 *2*	15.8 *11*	3469.4	17⁻	3238.3	16⁺	E1[a]	0.0609	α(K)=0.0490 *7*; α(L)=0.00902 *13*; α(M)=0.00214 *3*; α(N+..)=0.000686 *10* α(N)=0.000552 *8*; α(O)=0.0001177 *17*; α(P)=1.599×10⁻⁵ *23* R(anisotropy)=0.59 *10*.
246.0 *2*	11.7 *10*	3072.1	15⁻	2826.1	14⁺	E1[&]	0.0526	α(K)=0.0424 *6*; α(L)=0.00774 *11*; α(M)=0.00184 *3*; α(N+..)=0.000589 *9* α(N)=0.000474 *7*; α(O)=0.0001011 *15*; α(P)=1.379×10⁻⁵ *20* R(anisotropy)=0.69 *11*.
287.0 *2*	7.0 *20*	1932.0		1645.0	8⁺			
292.7 *2*	6.0 *12*	4071.8		3779.7	19⁻			

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(HI,xnγ) 2006De09 (continued)

γ(^{216}Rn) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[c]	Comments
294.7 *2*	43[@] *4*	1939.7	10+	1645.0	8+	E2[&]	0.1456	α(K)=0.0716 *10*; α(L)=0.0549 *8*; α(M)=0.01445 *21*; α(N+..)=0.00463 *7* α(N)=0.00376 *6*; α(O)=0.000774 *11*; α(P)=9.26×10^{-5} *14* Eγ=294.8 from 1987Co11, assigned as coming from ^{219}Ra. R(anisotropy)=1.16 *26*.
310.5 *2*	23[@] *3*	3779.7	19−	3469.4	17−	E2	0.1246	α(K)=0.0639 *9*; α(L)=0.0450 *7*; α(M)=0.01180 *17*; α(N+..)=0.00378 *6* α(N)=0.00307 *5*; α(O)=0.000633 *9*; α(P)=7.63×10^{-5} *11* R(anisotropy)=1.26 *22*.
333.9 *2*	7.0[@] *14*	3572.4	18+	3238.3	16+	E2[&]	0.1008	α(K)=0.0547 *8*; α(L)=0.0343 *5*; α(M)=0.00896 *13*; α(N+..)=0.00287 *4* α(N)=0.00233 *4*; α(O)=0.000482 *7*; α(P)=5.86×10^{-5} *9*
379.1 *2*	97[@] *4*	840.5	4+	461.4	2+	E2	0.0709	α(K)=0.0417 *6*; α(L)=0.0217 *3*; α(M)=0.00562 *8*; α(N+..)=0.00181 *3* α(N)=0.001464 *21*; α(O)=0.000304 *5*; α(P)=3.76×10^{-5} *6* Eγ=378.9 *2*, Iγ=67 *4* from 1987Co11, may be contaminated by a γ in ^{219}Ra. R(anisotropy)=1.04 *16*.
385.4 *2*	95 *6*	1225.9	6+	840.5	4+	E2	0.0678	α(K)=0.0403 *6*; α(L)=0.0205 *3*; α(M)=0.00530 *8*; α(N+..)=0.001703 *24* α(N)=0.001380 *20*; α(O)=0.000287 *4*; α(P)=3.55×10^{-5} *5* Eγ=385.4 *2*, Iγ=59 *3* from 1987Co11. A_2=0.27 *6*, A_4=−0.11*14* (1987Co11). R(anisotropy)=1.13 *21*.
397.4 *2*	17.0 *21*	3469.4	17−	3072.1	15−	E2	0.0625	α(K)=0.0378 *6*; α(L)=0.0184 *3*; α(M)=0.00475 *7*; α(N+..)=0.001528 *22* α(N)=0.001238 *18*; α(O)=0.000257 *4*; α(P)=3.20×10^{-5} *5* R(anisotropy)=1.18 *17*.
410.5 *2*	6.0 *20*	2342.5		1932.0				
412.1 *2*	37[@] *3*	3238.3	16+	2826.1	14+	E2	0.0568	α(K)=0.0350 *5*; α(L)=0.01625 *23*; α(M)=0.00419 *6*; α(N+..)=0.001346 *19* α(N)=0.001091 *16*; α(O)=0.000227 *4*; α(P)=2.84×10^{-5} *4* R(anisotropy)=1.12 *16*.
419.1 *2*	95[@] *6*	1645.0	8+	1225.9	6+	E2	0.0544	α(K)=0.0338 *5*; α(L)=0.01535 *22*; α(M)=0.00395 *6*; α(N+..)=0.001270 *18* α(N)=0.001029 *15*; α(O)=0.000214 *3*; α(P)=2.69×10^{-5} *4* Eγ=419.4 *2*, Iγ=56 *3* from 1987Co11, may be contaminated by a γ in ^{218}Ra. R(anisotropy)=1.18 *20*.
420.5 *2*	42[@] *5*	2826.1	14+	2405.6	12+	E2	0.0540	α(K)=0.0336 *5*; α(L)=0.01518 *22*; α(M)=0.00391 *6*; α(N+..)=0.001255 *18* α(N)=0.001017 *15*; α(O)=0.000212 *3*; α(P)=2.66×10^{-5} *4* R(anisotropy)=1.16 *23*.
461.4 *2*	100 *4*	461.4	2+	0.0	0+	E2	0.0427	α(K)=0.0278 *4*; α(L)=0.01116 *16*; α(M)=0.00285 *4*;

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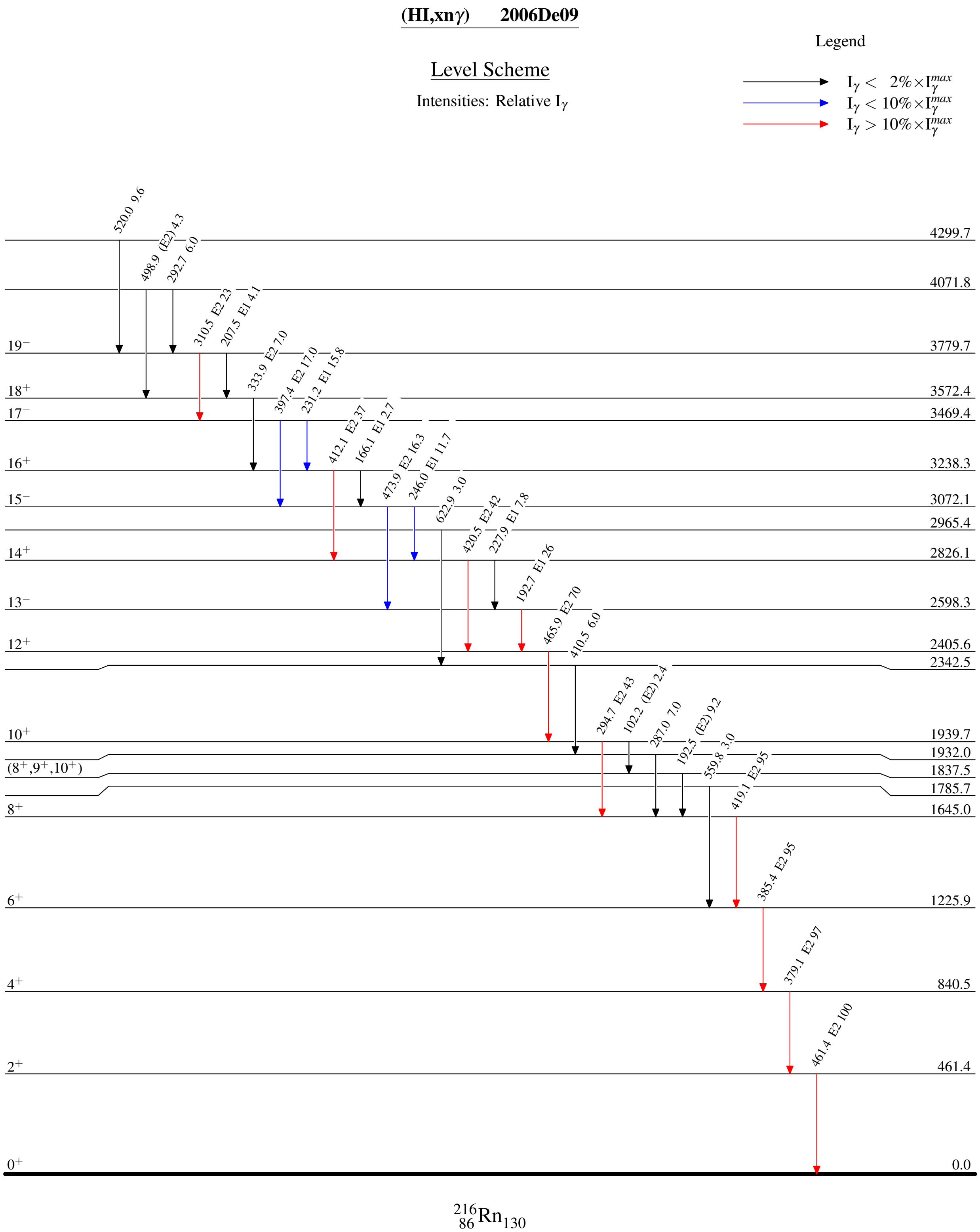
(HI,xnγ) 2006De09 (continued)

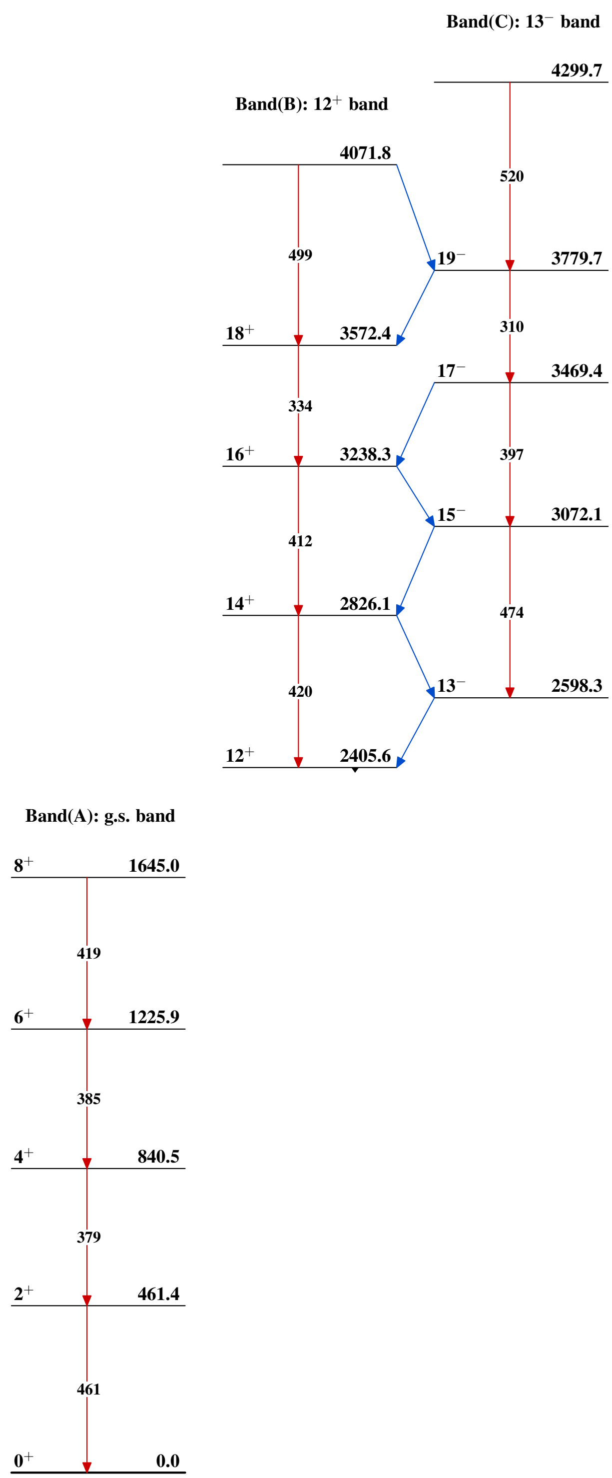
γ(^{216}Rn) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[c]	Comments
								α(N+..)=0.000918 *13* α(N)=0.000743 *11*; α(O)=0.0001554 *22*; α(P)=1.97×10^{-5} *3* Eγ=461.9 *2*, Iγ=100 *5* from 1987Co11. A_2=0.10 *4*, A_4=−0.089 (1987Co11). R(anisotropy)=1.12 *16*.
465.9 *2*	70 *4*	2405.6	12$^+$	1939.7	10$^+$	E2	0.0417	α(K)=0.0272 *4*; α(L)=0.01082 *16*; α(M)=0.00276 *4*; α(N+..)=0.000889 *13* α(N)=0.000720 *11*; α(O)=0.0001505 *22*; α(P)=1.91×10^{-5} *3* Eγ=465.9 *2*, Iγ=132 from 1987Co11, assigned as deexciting a 10$^+$ state at 2111.5 keV. R(anisotropy)=1.26 *23*.
473.9 *2*	16.3 *21*	3072.1	15$^-$	2598.3	13$^-$	E2	0.0400	α(K)=0.0263 *4*; α(L)=0.01024 *15*; α(M)=0.00261 *4*; α(N+..)=0.000841 *12* α(N)=0.000680 *10*; α(O)=0.0001424 *20*; α(P)=1.82×10^{-5} *3*
498.9 *2*	4.3 *8*	4071.8		3572.4	18$^+$	(E2)[b]	0.0354	α(K)=0.0237 *4*; α(L)=0.00870 *13*; α(M)=0.00221 *4*; α(N+..)=0.000712 *10* α(N)=0.000576 *8*; α(O)=0.0001208 *17*; α(P)=1.551×10^{-5} *22*
520.0 *2*	9.6 *19*	4299.7		3779.7	19$^-$			
559.8 *2*	3.0 *10*	1785.7		1225.9	6$^+$			
622.9 *2*	3.0 *10*	2965.4		2342.5				

† From 2006De09, except as noted.
‡ From intensity balance and anisotropy ratios (2006De09).
# Order of the 102.2 and 192.5 transitions can not be established from intensity balance. See the discussion for the 1837.5 level.
@ Contaminated line. Intensity from γγ coin data (2006De09).
& From total intensity balance in γγ coin spectrum (2006De09).
a E1 assignment is from ΔJ^π in level scheme, it is consistent with coincidence intensity data (2006De09).
b Assignment not confirmed.
c 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.
x γ ray not placed in level scheme.


(HI,xnγ) 2006De09
Level Scheme
Intensities: Relative Iγ
Legend
Iγ < 2%×Iγ^max
Iγ < 10%×Iγ^max
Iγ > 10%×Iγ^max
4299.7
4071.8
19− 3779.7
18+ 3572.4
17− 3469.4
16+ 3238.3
15− 3072.1
2965.4
14+ 2826.1
13− 2598.3
12+ 2405.6
2342.5
10+ 1939.7
1932.0
(8+,9+,10+) 1837.5
1785.7
8+ 1645.0
6+ 1225.9
4+ 840.5
2+ 461.4
0+ 0.0
520.0 9.6
498.9 (E2) 4.3
292.7 6.0
310.5 E2 23
207.5 E1 4.1
333.9 E2 7.0
397.4 E2 17.0
231.2 E1 15.8
412.1 E2 37
166.1 E1 2.7
473.9 E2 16.3
246.0 E1 11.7
622.9 3.0
420.5 E2 42
227.9 E1 7.8
192.7 E1 26
465.9 E2 70
410.5 6.0
294.7 E2 43
102.2 (E2) 2.4
287.0 7.0
192.5 (E2) 9.2
559.8 3.0
419.1 E2 95
385.4 E2 95
379.1 E2 97
461.4 E2 100
$^{216}_{86}Rn_{130}$

(HI,xnγ) 2006De09



$^{216}_{86}Rn_{130}$