^{208}Pb(^{11}B,3nγ) 1990De12

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

E=53-74 MeV; measured: α and γ excit, ce, $\gamma\gamma$, γ(t), DCO ratios.

^{216}Fr Levels

E(level)†	J$^\pi$‡	Comments
x#	(9$^-$)	J$^\pi$: from syst.
527.70+x# *20*	(11$^-$)	
762.6+x@ *3*	(12$^+$)	
969.4+x# *3*	(13$^-$)	
1261.1+x@ *3*	(14$^+$)	
1383.2+x# *3*	(15$^-$)	
1659.9+x@ *4*	(16$^+$)	
1834.8+x# *4*	(17$^-$)	
1973.0+x@ *4*	(18$^+$)	

† From least squares fit to Eγ; the uncertainty does not include the uncertainty in the energy of the bandhead.
‡ Based on E1 and E2 character of deexciting transitions, band structure, unless otherwise noted. Although the relative J and π are well established, J^π=(9$^-$) for the bandhead is based on syst.
# Band(A): π=− band.
@ Band(B): π=+ band.

γ(^{216}Fr)

E$_\gamma$	I$_\gamma$†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.‡	α&	Comments
121.9 *2*	2.2 *4*	1383.2+x	(15$^-$)	1261.1+x	(14$^+$)	E1@	0.293	α(K)=0.229 *4*; α(L)=0.0481 *7*; α(M)=0.01154 *17*; α(N+..)=0.00372 *6* α(N)=0.00299 *5*; α(O)=0.000640 *10*; α(P)=9.27×10^{-5} *14*; α(Q)=3.56×10^{-6} *6*
138.2 *2*	1.7 *5*	1973.0+x	(18$^+$)	1834.8+x	(17$^-$)	E1@	0.216	α(K)=0.1701 *25*; α(L)=0.0347 *5*; α(M)=0.00830 *12*; α(N+..)=0.00268 *4* α(N)=0.00215 *4*; α(O)=0.000462 *7*; α(P)=6.76×10^{-5} *10*; α(Q)=2.68×10^{-6} *4*
175.2 *2*	5.9 *6*	1834.8+x	(17$^-$)	1659.9+x	(16$^+$)	E1@	0.1212	α(K)=0.0965 *14*; α(L)=0.0188 *3*; α(M)=0.00449 *7*; α(N+..)=0.001454 *21* α(N)=0.001163 *17*; α(O)=0.000252 *4*; α(P)=3.74×10^{-5} *6*; α(Q)=1.567×10^{-6} *23*
206.7 *2*	8.8 *7*	969.4+x	(13$^-$)	762.6+x	(12$^+$)	E1@	0.0815	α(K)=0.0652 *10*; α(L)=0.01236 *18*; α(M)=0.00295 *5*; α(N+..)=0.000957 *14* α(N)=0.000765 *11*; α(O)=0.0001663 *24*; α(P)=2.49×10^{-5} *4*; α(Q)=1.083×10^{-6} *16*
235.0 *2*	38# *3*	762.6+x	(12$^+$)	527.70+x	(11$^-$)	E1	0.0601	α(K)=0.0483 *7*; α(L)=0.00899 *13*; α(M)=0.00214 *3*; α(N+..)=0.000696 *10* α(N)=0.000556 *8*; α(O)=0.0001211 *18*; α(P)=1.83×10^{-5} *3*; α(Q)=8.15×10^{-7} *12* Mult.: α(L)exp=0.009 *2*.
276.8 *2*	21 *2*	1659.9+x	(16$^+$)	1383.2+x	(15$^-$)	E1	0.0411	α(K)=0.0331 *5*; α(L)=0.00604 *9*; α(M)=0.001434 *21*; α(N+..)=0.000467 *7*

Continued on next page (footnotes at end of table)

^{208}Pb(^{11}B,3nγ) 1990De12 (continued)

$\gamma(^{216}Fr)$ (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[&]	Comments
								α(N)=0.000373 *6*; α(O)=8.15×10^{-5} *12*; α(P)=1.241×10^{-5} *18*; α(Q)=5.71×10^{-7} *8* Mult.: α(K)exp=0.018 *10*.
291.5 *2*	13.7[#] *9*	1261.1+x	(14$^+$)	969.4+x	(13$^-$)	E1	0.0365	α(K)=0.0295 *5*; α(L)=0.00533 *8*; α(M)=0.001267 *18*; α(N+..)=0.000413 *6* α(N)=0.000329 *5*; α(O)=7.21×10^{-5} *11*; α(P)=1.100×10^{-5} *16*; α(Q)=5.11×10^{-7} *8* Mult.: α(K)exp=0.030 *6*, α(L)exp=0.006 *2*.
313.0 *2*	7.3 *8*	1973.0+x	(18$^+$)	1659.9+x	(16$^+$)	E2	0.1276	α(K)=0.0639 *9*; α(L)=0.0472 *7*; α(M)=0.01244 *18*; α(N+..)=0.00405 *6* α(N)=0.00326 *5*; α(O)=0.000690 *10*; α(P)=9.48×10^{-5} *14*; α(Q)=1.535×10^{-6} *22* Mult.: α(K)exp=0.14 *6*.
398.9 *2*	7.9 *9*	1659.9+x	(16$^+$)	1261.1+x	(14$^+$)	E2[@]	0.0648	α(K)=0.0385 *6*; α(L)=0.0196 *3*; α(M)=0.00509 *8*; α(N+..)=0.001660 *24* α(N)=0.001335 *19*; α(O)=0.000284 *4*; α(P)=4.01×10^{-5} *6*; α(Q)=8.96×10^{-7} *13*
414.0 *2*	45 *4*	1383.2+x	(15$^-$)	969.4+x	(13$^-$)	E2[@]	0.0588	α(K)=0.0357 *5*; α(L)=0.01726 *25*; α(M)=0.00447 *7*; α(N+..)=0.001458 *21* α(N)=0.001172 *17*; α(O)=0.000250 *4*; α(P)=3.54×10^{-5} *5*; α(Q)=8.27×10^{-7} *12*
441.6 *2*	72 *8*	969.4+x	(13$^-$)	527.70+x	(11$^-$)	E2	0.0499	α(K)=0.0313 *5*; α(L)=0.01389 *20*; α(M)=0.00358 *5*; α(N+..)=0.001169 *17* α(N)=0.000939 *14*; α(O)=0.000201 *3*; α(P)=2.86×10^{-5} *4*; α(Q)=7.20×10^{-7} *11* Mult.: α(K)exp=0.039 *9*.
451.3 *2*	6.2[#] *9*	1834.8+x	(17$^-$)	1383.2+x	(15$^-$)	[E2]	0.0473	α(K)=0.0299 *5*; α(L)=0.01293 *19*; α(M)=0.00333 *5*; α(N+..)=0.001087 *16* α(N)=0.000873 *13*; α(O)=0.000187 *3*; α(P)=2.67×10^{-5} *4*; α(Q)=6.88×10^{-7} *10*
498.6 *2*	52 *6*	1261.1+x	(14$^+$)	762.6+x	(12$^+$)	E2	0.0371	α(K)=0.0245 *4*; α(L)=0.00939 *14*; α(M)=0.00240 *4*; α(N+..)=0.000784 *11* α(N)=0.000629 *9*; α(O)=0.0001351 *19*; α(P)=1.95×10^{-5} *3*; α(Q)=5.58×10^{-7} *8* Mult.: α(K)exp=0.030 *15*, α(L)exp=0.012 *6*.
527.7 *2*	100 *6*	527.70+x	(11$^-$)	x	(9$^-$)	E2	0.0325	α(K)=0.0220 *3*; α(L)=0.00787 *11*; α(M)=0.00200 *3*; α(N+..)=0.000655 *10* α(N)=0.000525 *8*; α(O)=0.0001130 *16*; α(P)=1.642×10^{-5} *23*; α(Q)=4.96×10^{-7} *7* Mult.: α(K)exp=0.044 *10*.

[†] Relative Iγ.
[‡] Based on DCO and/or α(K)exp, α(L)exp.
[#] Contaminated line, intensity deduced from coin spectra.
[@] D or Q from DCO. D transitions are E1 from level scheme, Q transition are assumed to be E2.
[&] 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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Level Scheme

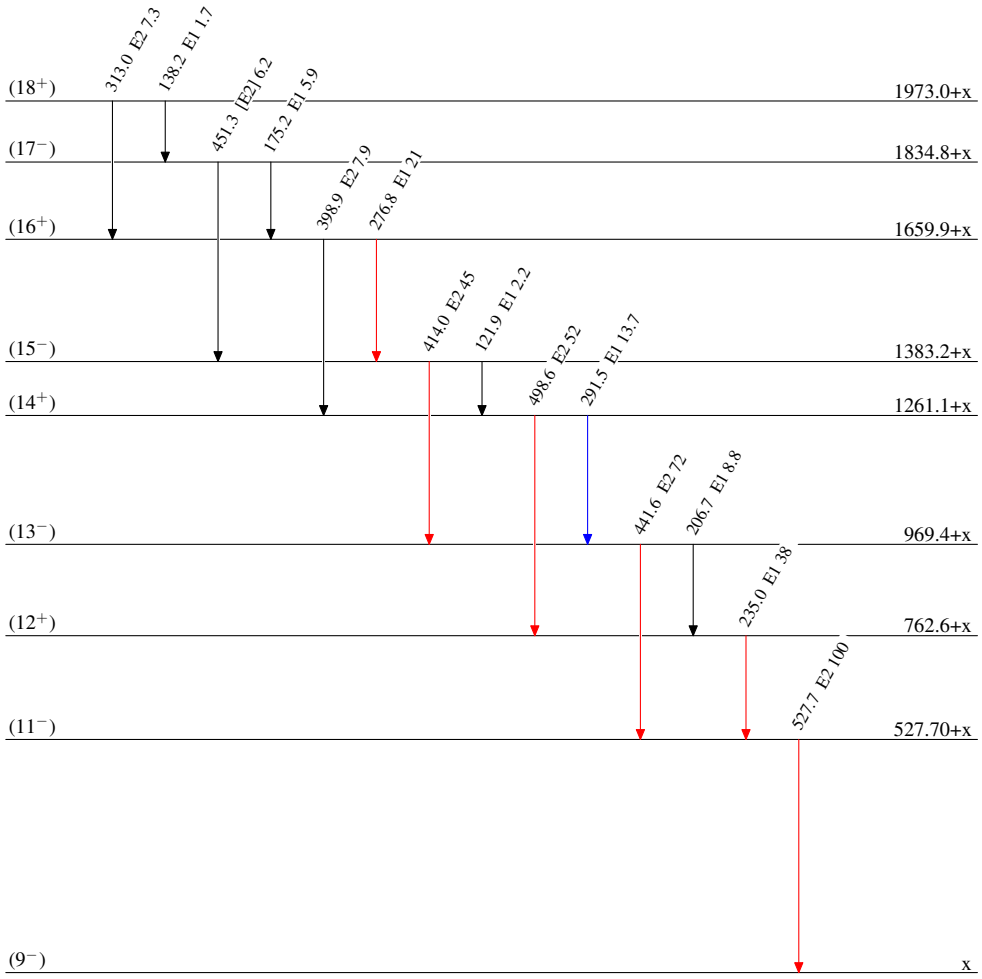
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{216}_{87}Fr_{129}$

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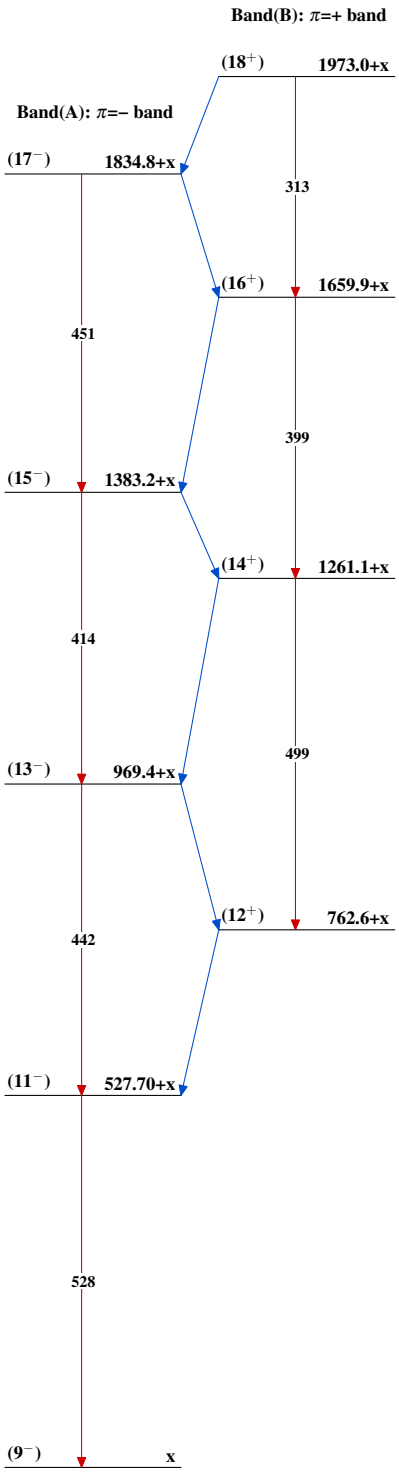

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