Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. Kumar and F. G. Kondev	NDS 147, 382 (2018)	1-Dec-2017

Q(β^-)=−1575 *10*; S(n)=6728 *8*; S(p)=3227 *9*; Q(α)=8469 *4* 2017Wa10
S(2n)=12146 *9*; S(2p)=9008 *9* (2017Wa10).

^{217}Fr evaluated by F.G. Kondev and S. Kumar.

^{217}Fr Levels

Cross Reference (XREF) Flags

A ^{221}Ac α decay
B ^{210}Pb(^{11}B,4nγ)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	XREF	Comments
0.0[@]	9/2$^-$	22 μs *5*	AB	%α=100 J$^\pi$: Favored α decay to the ground state of ^{213}At (J$^\pi$=9/2$^-$). T$_{1/2}$: From α(t) in 1970Bo13. Others (from the same group): 16 μs *2* (1990An19,1993AnZS, not considered as Eα not measured due to pileup) and 15 μs *3* (1990AnZU). configuration: $\pi h_{9/2}$.
210[#] *4*			A	
274[#] *4*			A	
363.6[@] *3*	13/2$^-$		B	J$^\pi$: 363.9γ stretched E2 to 9/2$^-$. E(level): the ordering of the 363.6γ and 340.6γ transitions in ^{210}Pb(^{11}B,4nγ) (1988Ai02) is uncertain. Thus, the level energy of this state could be E(13/2$^-$)=340.6 keV.
482[#] *8*			A	
704.2[@] *5*	17/2$^-$		B	J$^\pi$: 340.6γ stretched E2 to 13/2$^-$.
1077.0[@] *6*	21/2$^-$		B	J$^\pi$: 373.8γ stretched E2 to 17/2$^-$.
1256.2[a] *6*			B	J$^\pi$: 21/2$^+$, 23/2$^+$ was suggested by 1988Ai02 from 179.1γ to 21/2$^-$ and the non-observation of a transition to the 17/2$^-$ level of the g.s. band.
1355.0[&] *6*	23/2$^+$		B	J$^\pi$: 278.0γ E1 to 21/2$^-$.
1509.7[@] *6*	25/2$^-$		B	J$^\pi$: 432.8γ E2 to 21/2$^-$.
1688.9[a] *6*			B	
1713.7[&] *6*	27/2$^+$		B	J$^\pi$: 358.8γ E2 to 23/2$^+$; band assignment.
1988.5[@] *6*	29/2$^-$		B	J$^\pi$: 478.8γ E2 to 25/2$^-$; band assignment.
2111.0[&] *7*	31/2$^+$		B	J$^\pi$: 397.4γ E2 to 27/2$^+$; band assignment.
2154.5[a] *7*			B	
2516.4[&] *7*	(35/2$^+$)		B	J$^\pi$: 405.4γ (E2) to 31/2$^+$; band assignment.
2582.0[a] *8*			B	
2618.0? *7*			B	
3002.2[&] *8*	(39/2$^+$)		B	J$^\pi$: 485.9γ E2 to (35/2$^+$); band assignment.

[†] From a least-squares fit to Eγ data, unless otherwise stated.
[‡] From 1988Ai02 ^{210}Pb(^{11}B,4nγ), based on deduced γ-ray transition multipolarities and the established band structures, unless

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Adopted Levels, Gammas (continued)

^{217}Fr Levels (continued)

otherwise stated.
[#] From ^{221}Ac α decay.
[@] Band(A): ground state band.
[&] Band(B): positive parity band.
[a] Band(C): side band.

$\gamma(^{217}Fr)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[#]	Comments
363.6	13/2$^-$	363.6 *3*	100	0.0	9/2$^-$	E2	0.0832	E_γ: $\gamma\gamma$ coin analysis in ^{210}Pb(^{11}B,4nγ) (1988Ai02) reveals that 363.6γ is multiplet and, therefore, the ordering of 340.6γ and 363.6γ is not unambiguous. Mult.: DCO=1.32 11; A_2=0.24 *6*, A_4=−0.13 *8*.
704.2	17/2$^-$	340.6 *3*	100	363.6	13/2$^-$	E2	0.0999	Mult.: A_2=0.34 *5*, A_4=−0.17 *7*; DCO=1.37 *8*.
1077.0	21/2$^-$	372.8 *3*	100	704.2	17/2$^-$	E2	0.0777	Mult.: A_2=0.34 *5*; DCO=1.28 *6*.
1256.2		179.1 *3*	100	1077.0	21/2$^-$	D		Mult.: DCO=0.85 11.
1355.0	23/2$^+$	278.0 *3*	100	1077.0	21/2$^-$	E1	0.0407	Mult.: DCO=0.63 6, A_2=−0.24 *3*. Total intensity for 278.0γ suggests E1 rather than M1 assignment, when considering the intensity balance at the 1077-keV level by gating on the preceding 154.4γ and 358.8γ.
1509.7	25/2$^-$	154.4 *3*	35 *9*	1355.0	23/2$^+$	E1	0.1647	I_γ: from B(E1)/B(E2)=1.1×10^{-6} *4* (1988Ai02). Mult.: A_2=−0.28 *14*; DCO=0.80 14.
		432.8 *3*	100 *9*	1077.0	21/2$^-$	E2	0.0525	I_γ: from B(E1)/B(E2)=1.1×10^{-6} *4* (1988Ai02). Mult.: DCO=1.31 31, but it may be associated with 432.6γ, depopulating the 1688.9-keV level.
1688.9		334.0 *3*		1355.0	23/2$^+$	(E2)		Mult.: DCO=1.59 30, but it is also in agreement with a possible ΔJ=0, J to J transition.
		432.6 *3*		1256.2		E2	0.0526	Mult.: DCO=1.31 31, but it may be associated with 432.8γ, depopulating the 1509.7-keV level.
1713.7	27/2$^+$	204.0 *3*	100 *8*	1509.7	25/2$^-$	E1		I_γ: from B(E1)/B(E2)=0.9×10^{-6} *2* (1988Ai02). Mult.: DCO=0.75 8, A_2=−0.19 *6*. Doublet consisting of 202.3γ and 204.0γ transition, the former is E1 in ^{215}Fr (1984Sc25).
		358.8 *4*	61 *8*	1355.0	23/2$^+$	E2	0.0863	I_γ: from B(E1)/B(E2)=0.9×10^{-6} *2* (1988Ai02). Mult.: DCO=1.28 23, A_2=0.34 *5*, A_4=−0.17 *7*.
1988.5	29/2$^-$	274.7 *3*	100 *15*	1713.7	27/2$^+$	[E1]		I_γ: from B(E1)/B(E2)=1.0×10^{-6} *3* (1988Ai02). Mult.: DCO=0.61 8.
		478.8 *3*	92 *15*	1509.7	25/2$^-$	E2	0.0409	I_γ: from B(E1)/B(E2)=1.0×10^{-6} *3* (1988Ai02). Mult.: DCO=1.30 11.
2111.0	31/2$^+$	122.5 *3*	24 *7*	1988.5	29/2$^-$	[E1]	0.289 *5*	I_γ: from B(E1)/B(E2)=1.1×10^{-6} *4* (1988Ai02). Mult.: DCO=0.54 21.
		397.4 *3*	100 *7*	1713.7	27/2$^+$	E2	0.0655	I_γ: from B(E1)/B(E2)=1.1×10^{-6} *4* (1988Ai02). Mult.: DCO=1.58 20, A_2=0.37 *8*.
2154.5		465.6 *3*	100	1688.9				Mult.: DCO=1.58 *20*.
2516.4	(35/2$^+$)	405.4 *3*	100	2111.0	31/2$^+$	(E2)	0.0621	Mult.: DCO=1.14 *16*.
2582.0		427.5 *3*	100	2154.5		E2	0.0542	Mult.: DCO=1.46 *19*.
2618.0?		507.0[@] *3*	100	2111.0	31/2$^+$			
3002.2	(39/2$^+$)	485.8 *3*	100	2516.4	(35/2$^+$)	E2	0.0395	Mult.: DCO=1.46 12.

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Adopted Levels, Gammas (continued)

$\gamma(^{217}Fr)$ (continued)

† From 1988Ai02 in $^{210}Pb(^{11}B,4n\gamma)$.

‡ From $^{210}Pb(^{11}B,4n\gamma)$ based on angular distributions and angular correlations data analysis, and on intensity balance consideration which allowed to differentiate between E1 from M1 alternatives. Since no delayed components were observed, M2 assignments were ruled out for quadrupole transitions. DCO ratios were obtained by gating on known stretched E2 transitions; expected values are >1 for stretched Q and <1 for stretched D.

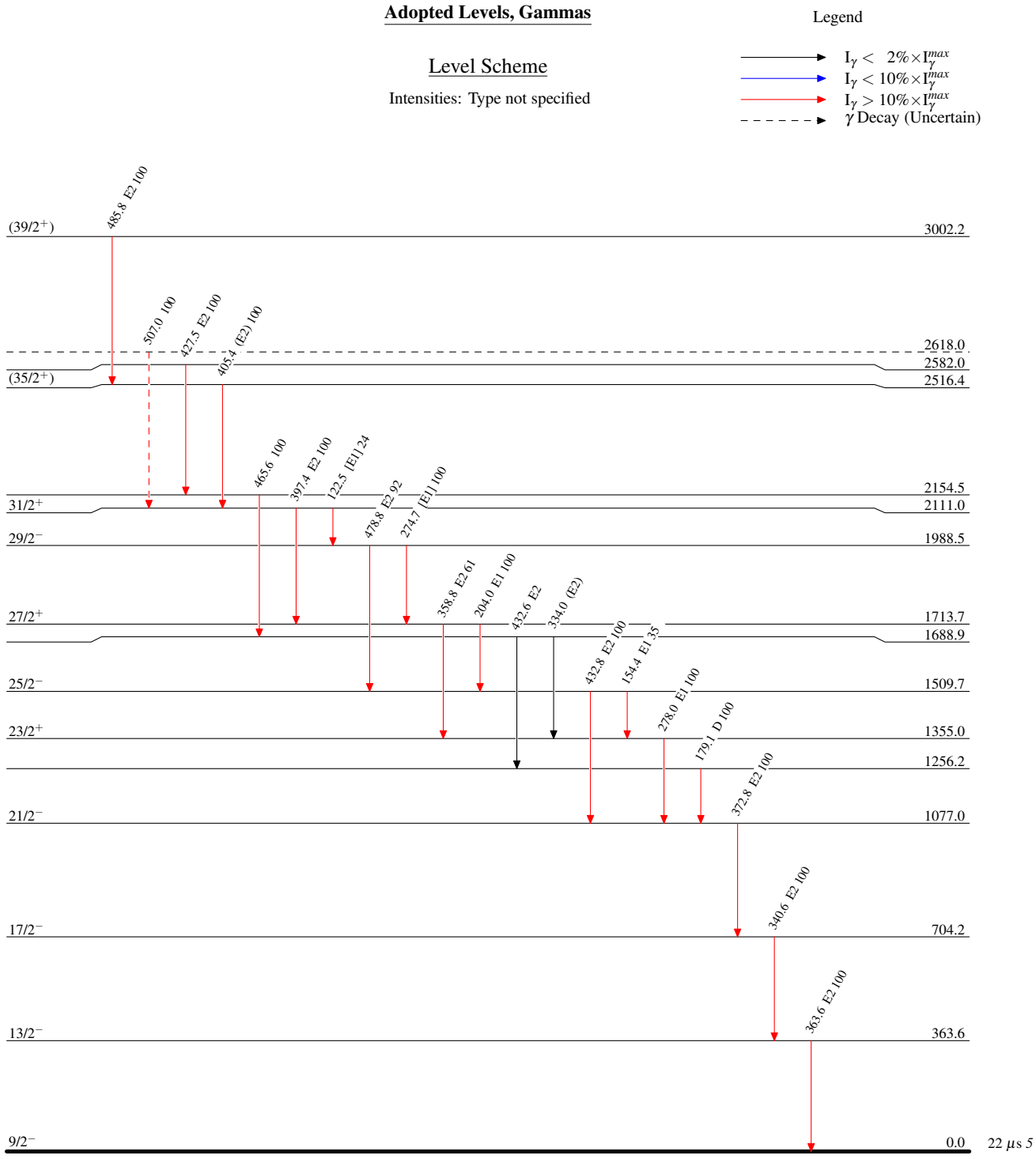
Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

@ Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

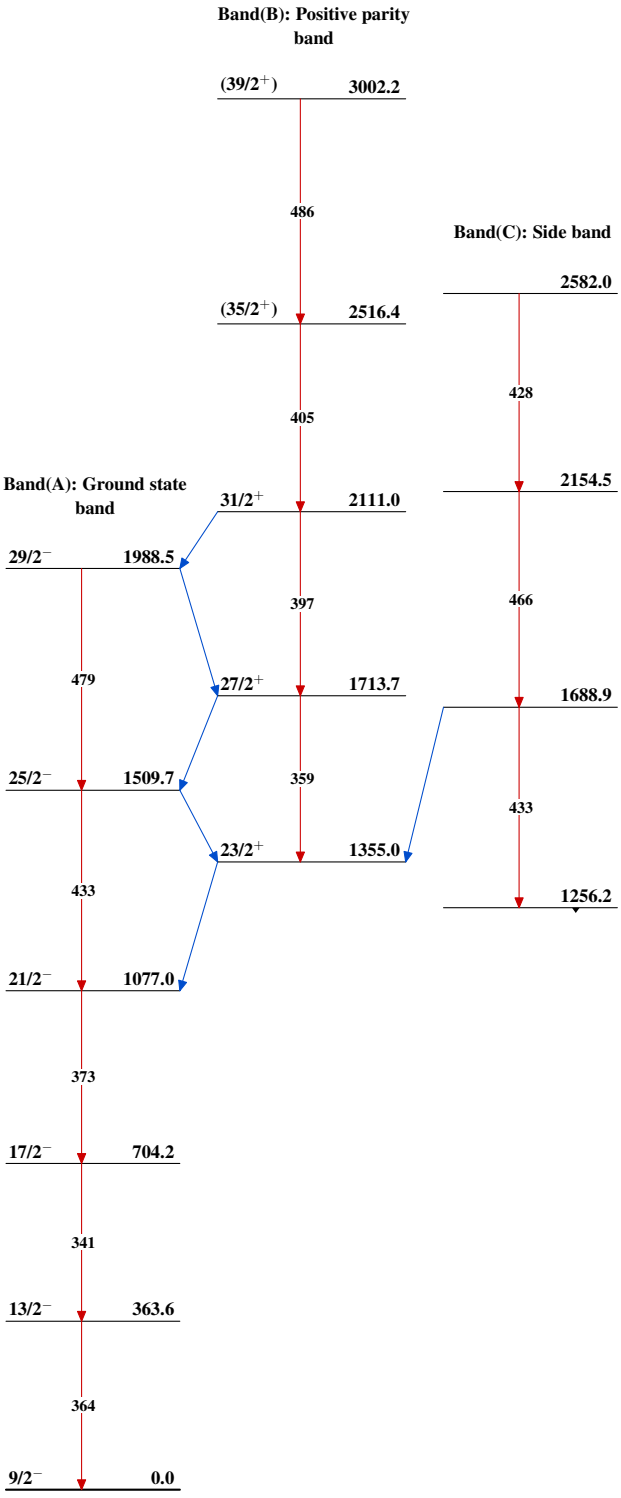
Level Scheme

Intensities: Type not specified



$^{217}_{87}Fr_{130}$

Adopted Levels, Gammas



$^{217}_{87}Fr_{130}$