Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh et al. ,	NDS 175, 1 (2021)	19-May-2021

Q(β^-)=−2890 *80*; S(n)=7350 *80*; S(p)=2360 *50*; Q(α)=8830 *50* 2021Wa16
S(2n)=13280 *50*, S(2p)=7320 *50* (2021Wa16).
Additional information 1.
1970Bo13: ^{219}Ac produced in α decay of ^{223}Pa, which was produced in ^{208}Pb(^{19}F,4n), ^{205}Tl(^{22}Ne,4n), and ^{209}Bi(^{20}Ne,α2n),E=90-130 MeV at Berkeley HILAC facility. Measured Eα and half-life of the decay of ^{219}Ac.
^{219}Ac belongs to a transitional region between spherical and deformed nuclei. The main features of the band structure of this nucleus can be reproduced using small (ϵ_2=ϵ_3=0.05) quadrupole and octupole deformations (1988Le13). See ^{209}Bi(^{13}C,3nγ) for an interpretation of the structure in terms of a weak coupling of a proton in the $h_{9/2}$ shell to the ^{218}Ra core. See also 2002Sh19 for a theoretical interpretation of level structure in ^{219}Ac.
Theoretical calculations: 31 primary references in the NSR database (www.nndc.bnl.gov/nsr), five related to structure calculations, and 26 to radioactivity.

^{219}Ac Levels

In band labels, s=simplex quantum number with values of s=+i having 11/2$^-$, 13/2$^+$, 15/2$^-$,... and s=−i having 15/2$^+$, 17/2$^-$, 19/2$^+$, 21/2$^-$..., involved in reflection asymmetric or parity-doublet band structures.

Cross Reference (XREF) Flags

A ^{223}Pa α decay (4.9 ms)
B ^{209}Bi(^{13}C,3nγ)

E(level)†	J$^\pi$#	$T_{1/2}$@	XREF	Comments
0.0[f]	9/2$^-$	11.8 μs *15*	AB	%α=100 Theoretical estimates of %ε+%β^+: ≈1×10^{-6} (1973Ta30), 4.96×10^{-5} (2019Mo01). $T_{1/2}$: from 1989Mi17 (α-decay curve, authors′ weighted average of 12.8 μs *26* for 18030α, 11.0 μs *22* for 9360α, 11.9 μs *33* for 8660α). Others: 7.6 μs *+21−14* (2019Mi08, (ER)-α_1-α_2 correlations for 27 decay ^{223}Pa→^{219}Ac→^{215}Fr decay chains); 7 μs *2* (1970Bo13, α decay curve). Value from 1989Mi17 is preferred as this has the highest statistics. Value from 2019Mi08 is based on only 27 events. In 1970Bo13, the α peak from the decay of ^{219}Ac was mixed with a shorter-lived (2.3 μs) activity of ^{215}Rn, and according to spectral Fig. 10 in this work, statistics seemed weak. Weighted average of all the three values is 9.5 μs *16*. J$^\pi$: favored α decay to g.s. ^{215}Fr (J^π=9/2$^-$). Consistent with shell-model prediction of $h_{9/2}$ configuration for the odd proton.
169 *8*			A	
340.95[d] *8*	(11/2)$^-$		B	J$^\pi$: ΔJ=1, M1+E2 γ to 9/2$^-$.
355.29[f] *8*	(13/2)$^-$		B	J$^\pi$: ΔJ=2, E2 γ to 9/2$^-$; band member.
576.93[e] *9*	(13/2$^+$)		B	J$^\pi$: ΔJ=1 γ to (11/2)$^-$; band member.
631.31[h] *11*	(13/2$^+$)		B	
657.66[d] *9*	(15/2)$^-$		B	B(M1,302.5γ)/B(E2,316.6γ)=0.025 *10* (1994Cr01).
714.62[f] *11*	(17/2)$^-$		B	
866.62[e] *12*	(17/2$^+$)		B	
926.50[h] *11*	(17/2)$^+$		B	
965.31[g] *12*	(19/2)$^+$		B	

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Adopted Levels, Gammas (continued)

^{219}Ac Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
1017.64[d] *11*	19/2⁻	B	
1116.08[f] *12*	(21/2)⁻	B	B(E1,150.8γ)/B(E2,401.5γ) in W.u.=0.00011 *2* (1986Dr07).
1180.71[&] *14*	(19/2⁻)	B	
1183.05[e] *13*	(21/2)⁺	B	B(M1,217.8γ)/B(E2,316.5γ)=0.048 *17* (1994Cr01).
1292.65[h] *14*	(21/2)⁺	B	
1301.01[g] *13*	(23/2)⁺	B	B(E1,185.0γ)/B(E2,335.7γ) in W.u.=0.00011 *1* (1986Dr07).
1413.74[d] *13*	(23/2⁻)	B	
1461.51?[‡] *19*		B	
1547.04[e] *13*	(25/2)⁺	B	B(M1,246.0γ)/B(E2,364.0γ)=0.075 *4* (1994Cr01). B(E1,133.3γ)/B(E2,364.0γ) in W.u.=0.000072 *5* (1986Dr07).
1551.57[f] *14*	(25/2)⁻	B	
1551.67[&] *16*	(23/2⁻)	B	
1698.82[g] *14*	(27/2)⁺	B	B(E1,147.3γ)/B(E2,397.7γ) in W.u.=0.000036 *7* (1986Dr07).
1698.82+x[c]	J	B	
1699.90?[a] *17*	(25/2⁺)	B	
1710.42[h] *16*	(25/2)⁺	B	
1813.04[d] *14*	(27/2⁻)	B	Stretched configuration=$\nu(g_{9/2},i_{11/2})\otimes\pi f_{7/2}$ (1994Cr01).
1959.32[e] *14*	(29/2)⁺	B	B(M1,260.5γ)/B(E2,412.3γ)=0.116 *12* (1994Cr01). B(E1,146.5γ)/B(E2,412.3γ) in W.u.=0.000065 *15* (1986Dr07). Stretched configuration=$\nu g^2_{9/2}\otimes\pi i_{13/2}$ (1994Cr01).
2023.91[f] *15*	(29/2⁻)	B	
2113.76?[a] *20*	(29/2⁺)	B	
2129.5?[‡] *4*	(29/2⁻)	B	
2149.32[g] *16*	(31/2)⁺	B	
2178.0+x[c] *1*	(J+2)	B	
2244.86[d] *15*	(31/2⁻)	B	
2351.21[e] *18*	(33/2)⁺	B	Stretched configuration=$\nu(g_{9/2},i_{11/2})\otimes\pi i_{13/2}$ (1994Cr01).
2401.30[i] *18*	(33/2⁻)	B	
2427.62[b] *24*	(33/2⁺)	B	
2444.55[b] *17*	(33/2⁺)	B	
2734.1+x[c] *2*	(J+4)	B	
2806.15[e] *19*	(37/2⁺)	B	
2834.85[i] *22*	(37/2⁻)	B	
2836.8[b] *3*	(37/2⁺)	B	
3249.07[e] *22*	(41/2⁺)	B	
3254.21[i] *24*	(41/2⁻)	B	Stretched configuration=$\nu(g_{9/2},i_{11/2})\otimes\pi h_{9/2}$ (1994Cr01).
3720.5[i] *3*	(45/2⁻)	B	

[†] Deduced by evaluators from a least-squares fit to γ-ray energies, by assuming a minimum uncertainty of 0.10 keV in Eγ value with the result that reduced χ^2 of the fit is 3.4 somewhat higher than critical χ^2 of 1.7 at 95% confidence level, but with no γ-ray energies deviating by more than 3σ values. Without this adjustment, least-squares fit is unacceptable, resulting in reduced χ^2 of 32 and many γ rays deviating in energy by more than 3 or 4 σ values. In the opinion of evaluators, quoted uncertainties in 1994Cr01 (several Eγ values with 0.01 keV uncertainty and many with below 0.1 keV) are atypical of general uncertainties in literature for gamma-ray spectroscopy in heavy-ion fusion reactions. Perhaps, the uncertainties given in 1994Cr01 are only from statistical fit of gamma-ray peaks, and do not include systematic uncertainties.

[‡] Level is not confirmed by 1994Cr01 by γγ coincidence, although the authors observe a 535-668 γ cascade, and it is in coincidence with a 348.5γ but not in coincidence with 236γ and 269γ as would be expected if the placement of the cascade in

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Adopted Levels, Gammas (continued)

^{219}Ac Levels (continued)

1986Dr07 were correct.

[#] As proposed by 1994Cr01 based on multipolarities deduced from $\gamma\gamma(\theta)$(DCO) data, band structures, decay pattern of yrast-type population of levels in heavy-ion fusion reactions, and previously suggested J^{π} values in 1986Dr07 and 1985Kh01. Parentheses are added by evaluators for most spin values since strong and unique arguments for bandheads are still lacking.

[@] For excited states, no lifetime of ≥10 ns was observed (1985Kh01). The authors probably meant mean lifetime.

[&] Group of two levels with $J^{\pi}=(19/2^-)$ and $(21/2^-)$; connected to members of side band based on $(13/2^+)$.

[a] Group of two tentative levels of $J^{\pi}=(25/2^+)$ and $(29/2^+)$.

[b] Group of three levels with $J^{\pi}=33/2^+$, $33/2^+$ and $37/2^+$; two of which may be part of a band.

[c] γ cascade.

[d] Band(A): (s=+i,π=−) band. B(E1)/B(E2) values in fm^{-2} units range from 0.4×10^{-6} to 3.0×10^{-6} for 15/2 to 31/2 levels (1994Cr01).

[e] Band(a): (s=+i,π=+) band. B(E1)/B(E2) values in fm^{-2} units range from 0.4×10^{-6} to 3.0×10^{-6} for 15/2 to 31/2 levels (1994Cr01).

[f] Band(B): (s=−i,π=−) band. B(E1)/B(E2) values in fm^{-2} units range from 0.4×10^{-6} to 3.0×10^{-6} for 21/2 to 29/2 levels (1994Cr01).

[g] Band(b): (s=−i,π=+) band. B(E1)/B(E2) values in fm^{-2} units range from 0.4×10^{-6} to 3.0×10^{-6} for 21/2 to 29/2 levels, except for 31/2 level for which value is 5.0×10^{-6} (1994Cr01).

[h] Band(C): Side band based on $(13/2^+)$. This band has interconnecting transitions to $(19/2^-)$ and $(21/2^-)$ levels.

[i] Band(D): Band based on $(33/2^-)$.

Adopted Levels, Gammas (continued)

$\gamma(^{219}Ac)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	α[@]	$I_{(\gamma+ce)}$	Comments
340.95	$(11/2)^-$	341.01 *1*	100	0.0	$9/2^-$	M1+E2	−0.26 *2*	0.516 *9*		α(K)=0.413 *7*; α(L)=0.0784 *12*; α(M)=0.0188 *3* α(N)=0.00499 *8*; α(O)=0.001159 *17*; α(P)=0.000214 *4*; α(Q)=1.85×10^{-5} *3*
355.29	$(13/2)^-$	355.23 *1*	100	0.0	$9/2^-$	E2		0.0978		
576.93	$(13/2^+)$	221.63 *7*	35 *3*	355.29	$(13/2)^-$	(E1)		0.0725		
		235.86 *3*	100 *5*	340.95	$(11/2)^-$	(E1)		0.0627		
631.31	$(13/2^+)$	290.61 *4*	100	340.95	$(11/2)^-$	(E1)		0.0388		
657.66	$(15/2)^-$	80.86 *2*	15.3 *8*	576.93	$(13/2^+)$	(E1)		0.200		α(L)=0.1511 *22*; α(M)=0.0367 *6* α(N)=0.00957 *14*; α(O)=0.00212 *3*; α(P)=0.000349 *5*; α(Q)=1.783×10^{-5} *25*
		302.53 *5*	62.8 *25*	355.29	$(13/2)^-$	M1+E2	−1.0 *4*	0.46 *15*		α(K)=0.34 *13*; α(L)=0.088 *12*; α(M)=0.0219 *25* α(N)=0.0058 *7*; α(O)=0.00133 *16*; α(P)=0.00023 *4*; α(Q)=1.54×10^{-5} *56*
		316.64 *1*	100 *4*	340.95	$(11/2)^-$	E2		0.1362		
714.62	$(17/2)^-$	57.24 *3*		657.66	$(15/2)^-$	(M1+E2)		82 *65*	33.6 *11*	α(L)=61 *48*; α(M)=16 *14* α(N)=4.3 *35*; α(O)=0.95 *76*; α(P)=0.15 *12*; α(Q)=0.0020 *13*
		359.11 *3*	100 *7*	355.29	$(13/2)^-$	E2		0.0949		
866.62	$(17/2^+)$	(153)		714.62	$(17/2)^-$					
		209.01 *1*	100.0 *7*	657.66	$(15/2)^-$	(E1)		0.0832		
		289.09 *13*	6.8 *7*	576.93	$(13/2^+)$	(E2)		0.179		
926.50	$(17/2)^+$	268.77 *3*	100 *3*	657.66	$(15/2)^-$	(E1)		0.0464		
		295.45 *6*	26 *3*	631.31	$(13/2^+)$	(E2)		0.1677		
		349.39 *4*	64 *5*	576.93	$(13/2^+)$	E2		0.1025		
965.31	$(19/2)^+$	250.72[&] *1*	100	714.62	$(17/2)^-$	(E1)		0.0544		
1017.64	$19/2^-$	150.99 *2*	100 *10*	866.62	$(17/2^+)$	(E1)		0.181		α(K)=0.1419 *20*; α(L)=0.0294 *5*; α(M)=0.00708 *10* α(N)=0.00186 *3*; α(O)=0.000418 *6*; α(P)=7.19×10^{-5} *10*; α(Q)=4.44×10^{-6} *7*
		303.6 *5*	15 *4*	714.62	$(17/2)^-$					
		359.96 *7*	90 *14*	657.66	$(15/2)^-$	E2		0.0943		
1116.08	$(21/2)^-$	150.78 *5*	77 *13*	965.31	$(19/2)^+$	(E1)		0.181		α(K)=0.1424 *20*; α(L)=0.0295 *5*; α(M)=0.00711 *10* α(N)=0.00186 *3*; α(O)=0.000419 *6*; α(P)=7.21×10^{-5} *11*; α(Q)=4.46×10^{-6} *7*
		401.46 *1*	100.0 *16*	714.62	$(17/2)^-$	E2		0.0702		
1180.71	$(19/2^-)$	253.98 *1*	100	926.50	$(17/2)^+$	(E1)		0.0528		
1183.05	$(21/2)^+$	(67)		1116.08	$(21/2)^-$					
		165.29 *1*	100.0 *15*	1017.64	$19/2^-$	(E1)		0.1454		α(K)=0.1146 *16*; α(L)=0.0233 *4*; α(M)=0.00561 *8* α(N)=0.001471 *21*; α(O)=0.000332 *5*; α(P)=5.74×10^{-5} *8*; α(Q)=3.63×10^{-6} *5*
		217.87 *23*	13 *4*	965.31	$(19/2)^+$	(M1+E2)	−0.19 *9*	1.83 *6*		α(K)=1.46 *6*; α(L)=0.280 *5*; α(M)=0.0673 *10* α(N)=0.0179 *3*; α(O)=0.00415 *7*; α(P)=0.000764 *13*; α(Q)=6.61×10^{-5} *25*

$^{219}_{89}Ac_{130}$-4

Adopted Levels, Gammas (continued)

γ(^{219}Ac) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	α[@]	Comments
1183.05	(21/2)$^+$	316.5	54 *5*	866.62	(17/2$^+$)	E2		0.1363	
1292.65	(21/2)$^+$	111.67 *11*	40 *4*	1180.71	(19/2$^-$)	[E1]		0.371	α(K)=0.286 *4*; α(L)=0.0644 *10*; α(M)=0.01557 *23* α(N)=0.00407 *6*; α(O)=0.000910 *13*; α(P)=0.0001537 *22*; α(Q)=8.72×10^{-6} *13*
		366.37 *4*	100 *4*	926.50	(17/2)$^+$	E2		0.0898	
1301.01	(23/2)$^+$	185.02 *1*	100.0 *21*	1116.08	(21/2)$^-$	(E1)		0.1110	
		335.68 *4*	19.8 *17*	965.31	(19/2)$^+$	E2		0.1148	
1413.74	(23/2$^-$)	230.59 *2*	100.0 *24*	1183.05	(21/2)$^+$	(E1)		0.0660	
		396.19 *3*	23.9 *6*	1017.64	19/2$^-$	(E2)		0.0727	
1461.51?		535.01[‡a] *15*	100	926.50	(17/2)$^+$	D			
1547.04	(25/2)$^+$	133.27 *1*	96.2 *11*	1413.74	(23/2$^-$)	(E1)		0.244	α(K)=0.190 *3*; α(L)=0.0406 *6*; α(M)=0.00979 *14* α(N)=0.00257 *4*; α(O)=0.000576 *8*; α(P)=9.83×10^{-5} *14*; α(Q)=5.87×10^{-6} *9*
		246.04 *2*	26.6 *11*	1301.01	(23/2)$^+$	M1+E2	−0.23 *5*	1.29 *3*	α(K)=1.03 *3*; α(L)=0.197 *3*; α(M)=0.0475 *7* α(N)=0.01260 *19*; α(O)=0.00292 *5*; α(P)=0.000538 *9*; α(Q)=4.63×10^{-5} *12*
		364.01 *2*	100.0 *27*	1183.05	(21/2)$^+$	E2		0.0914	
1551.57	(25/2)$^-$	250.72[&] *1*	100 *4*	1301.01	(23/2)$^+$	(E1)		0.0544	
		435.42 *5*	46 *3*	1116.08	(21/2)$^-$	E2		0.0570	
1551.67	(23/2$^-$)	259.01 *6*	100	1292.65	(21/2)$^+$	(E1)		0.0505	
1698.82	(27/2)$^+$	147.26 *16*	42 *16*	1551.57	(25/2)$^-$	(E1)		0.192	α(K)=0.1505 *22*; α(L)=0.0314 *5*; α(M)=0.00755 *11* α(N)=0.00198 *3*; α(O)=0.000445 *7*; α(P)=7.65×10^{-5} *11*; α(Q)=4.70×10^{-6} *7*
		397.74 *3*	100.0 *23*	1301.01	(23/2)$^+$	E2		0.0720	
1698.82+x	J	(x)		1698.82	(27/2)$^+$				
1699.90?	(25/2$^+$)	407.25[a] *3*	100	1292.65	(21/2)$^+$	(E2)		0.0676	
1710.42	(25/2)$^+$	158.74 *8*	39 *4*	1551.67	(23/2$^-$)	(E1)		0.1603	α(K)=0.1261 *18*; α(L)=0.0259 *4*; α(M)=0.00622 *9* α(N)=0.001632 *23*; α(O)=0.000368 *6*; α(P)=6.35×10^{-5} *9*; α(Q)=3.97×10^{-6} *6*
		417.78 *2*	100 *4*	1292.65	(21/2)$^+$	E2		0.0633	
1813.04	(27/2$^-$)	265.96 *1*	100.0 *13*	1547.04	(25/2)$^+$	(E1)		0.0475	
		399.31 *6*	16.7 *9*	1413.74	(23/2$^-$)	(E2)		0.0712	
1959.32	(29/2)$^+$	146.53 *6*	99 *14*	1813.04	(27/2$^-$)	(E1)		0.194	α(K)=0.1523 *22*; α(L)=0.0318 *5*; α(M)=0.00765 *11* α(N)=0.00201 *3*; α(O)=0.000451 *7*; α(P)=7.75×10^{-5} *11*; α(Q)=4.75×10^{-6} *7*
		260.50 *5*	31.6 *19*	1698.82	(27/2)$^+$	M1+E2	−0.50 *10*	0.96 *6*	α(K)=0.75 *6*; α(L)=0.159 *5*; α(M)=0.0388 *9* α(N)=0.01029 *23*; α(O)=0.00237 *6*; α(P)=0.000431 *13*; α(Q)=3.41×10^{-5} *24*
		412.30 *1*	100.0 *19*	1547.04	(25/2)$^+$	E2		0.0655	
2023.91	(29/2$^-$)	325.04 *5*	100 *8*	1698.82	(27/2)$^+$	(E1)		0.0303	
		472.57 *18*	26 *6*	1551.57	(25/2)$^-$				
2113.76?	(29/2$^+$)	413.86[a] *10*	100	1699.90?	(25/2$^+$)	(E2)		0.0649	

$^{219}_{89}Ac_{130}$-5

Adopted Levels, Gammas (continued)

γ(^{219}Ac) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	α[@]	Comments
2129.5?	(29/2$^-$)	668.0[‡a] *3*		1461.51?				
2149.32	(31/2)$^+$	125.43 *3*	68 *3*	2023.91	(29/2$^-$)	(E1)	0.282	α(K)=0.219 *3*; α(L)=0.0475 *7*; α(M)=0.01147 *16* α(N)=0.00300 *5*; α(O)=0.000673 *10*; α(P)=0.0001145 *16*; α(Q)=6.73×10^{-6} *10*
		450.47 *3*	100 *5*	1698.82	(27/2)$^+$	E2	0.0523	
2178.0+x	(J+2)	(x)		2149.32	(31/2)$^+$			
		479.17 *3*	100 *4*	1698.82+x	J	E2		
2244.86	(31/2$^-$)	285.73 *2*	100 *4*	1959.32	(29/2)$^+$	(E1)	0.0404	
		431.53 *10*	44 *3*	1813.04	(27/2$^-$)	[E2]	0.0583	
2351.21	(33/2)$^+$	106.01 *2*		2244.86	(31/2$^-$)	[E1]	0.0976	
		391.98 *2*	100 *3*	1959.32	(29/2)$^+$	E2	0.0748	
2401.30	(33/2$^-$)	156.44 *6*	100	2244.86	(31/2$^-$)	(M1+E2)	3.2 *16*	α(K)=2.0 *18*; α(L)=0.85 *14*; α(M)=0.22 *5* α(N)=0.059 *13*; α(O)=0.013 *3*; α(P)=0.0022 *3*; α(Q)=9.7×10^{-5} *78*
2427.62	(33/2$^+$)	468.3 *2*	100	1959.32	(29/2)$^+$	(E2)	0.0475	
2444.55	(33/2$^+$)	485.23 *8*	100	1959.32	(29/2)$^+$	(E2)	0.0436	
2734.1+x	(J+4)	556.07 *2*	100	2178.0+x	(J+2)	(E2)		
2806.15	(37/2$^+$)	454.94 *3*	100	2351.21	(33/2)$^+$	(E2)		
2834.85	(37/2$^-$)	433.55 *12*	100	2401.30	(33/2$^-$)	(E2)	0.0576	
2836.8	(37/2$^+$)	409.14 *6*	100	2427.62	(33/2$^+$)	(E2)	0.0668	
3249.07	(41/2$^+$)	442.92 *6*	100	2806.15	(37/2$^+$)	(E2)	0.0546	
3254.21	(41/2$^-$)	419.36 *6*	100	2834.85	(37/2$^-$)	(E2)	0.0627	
3720.5	(45/2$^-$)	466.27 *8*	100	3254.21	(41/2$^-$)	(E2)	0.0481	

[†] From ^{209}Bi(^{13}C,3nγ).

[‡] Placement not confirmed by 1994Cr01 by γγ coincidence, although the authors observe a 535-668 γ cascade, and it is in coincidence with a 348.5γ but not in coincidence with 236γ and 269γ as would be expected if the placement of the cascade in 1986Dr07 were correct. 1994Cr01 mention that the 535 and 668 gamma rays may not belong to ^{219}Ac level scheme.

[#] From γ(θ) and DCO values in ^{209}Bi(^{13}C,3nγ), combined with the statement in 1985Kh01 that no level lifetimes of ≥10 ns were observed, and intensity balances for low-energy transitions, where conversion coefficients are significant.

[@] 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.

[&] Multiply placed.

[a] Placement of transition in the level scheme is uncertain.

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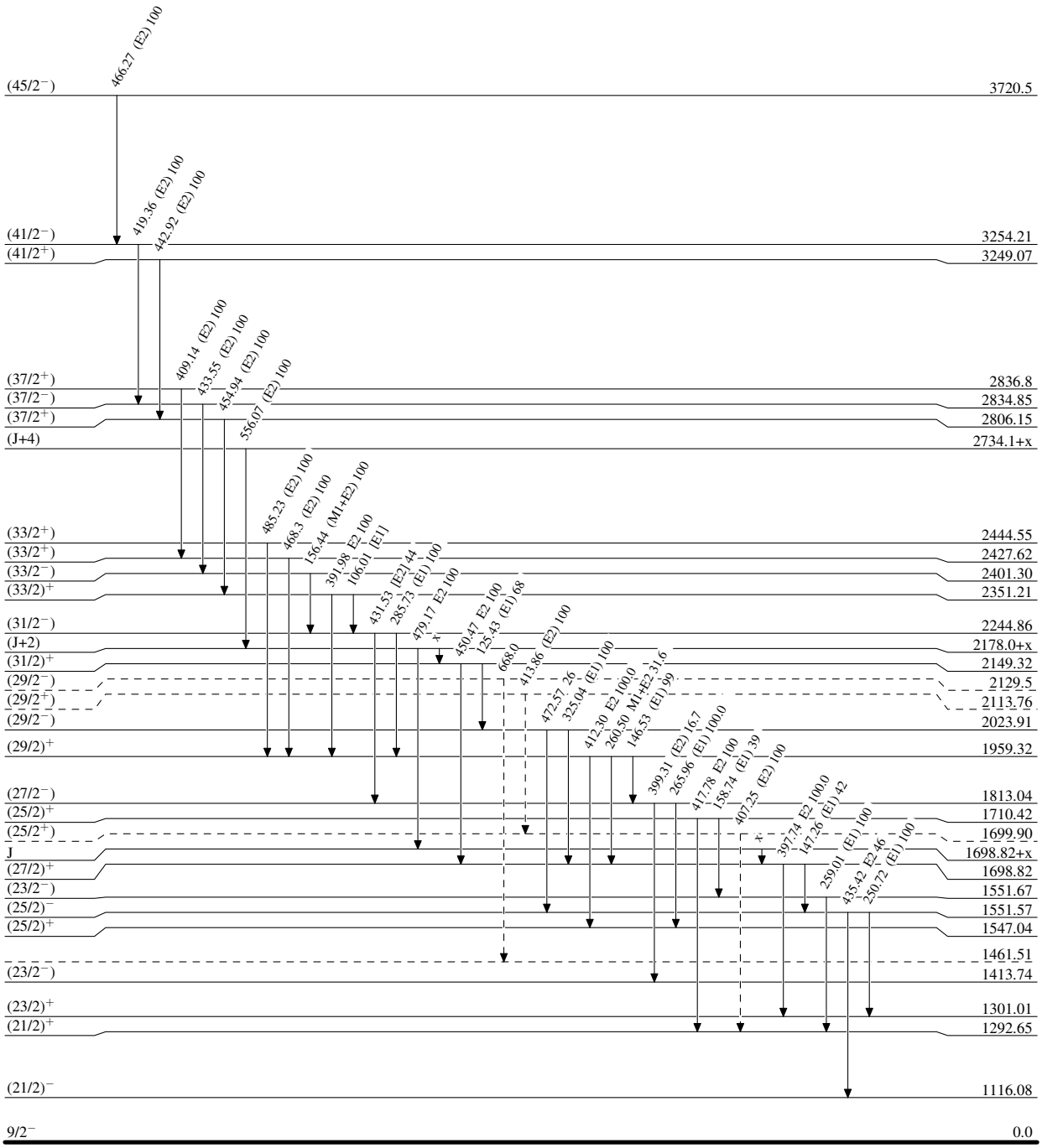
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{219}_{89}Ac_{130}$

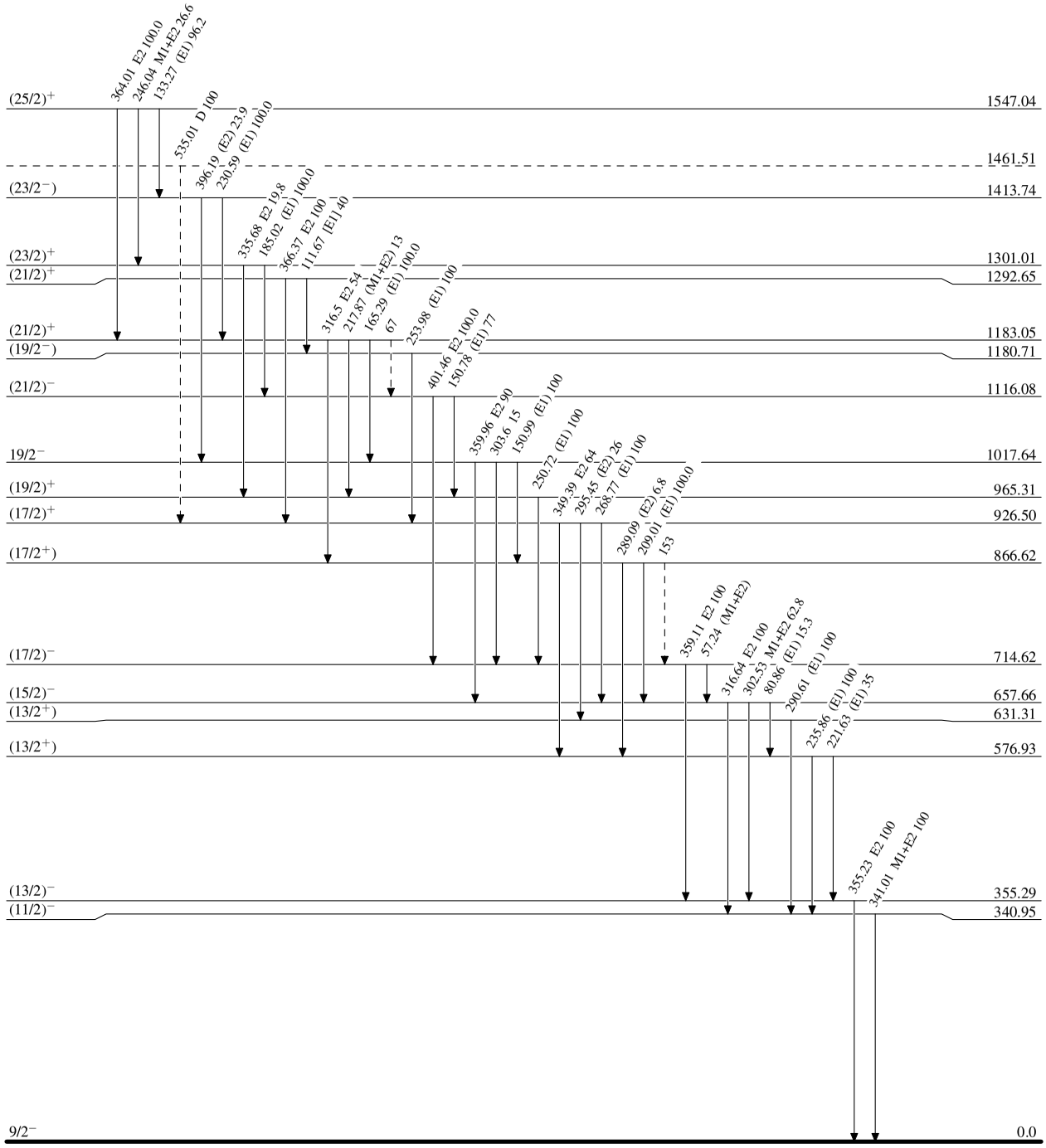
Adopted Levels, Gammas

Legend

Level Scheme (continued)

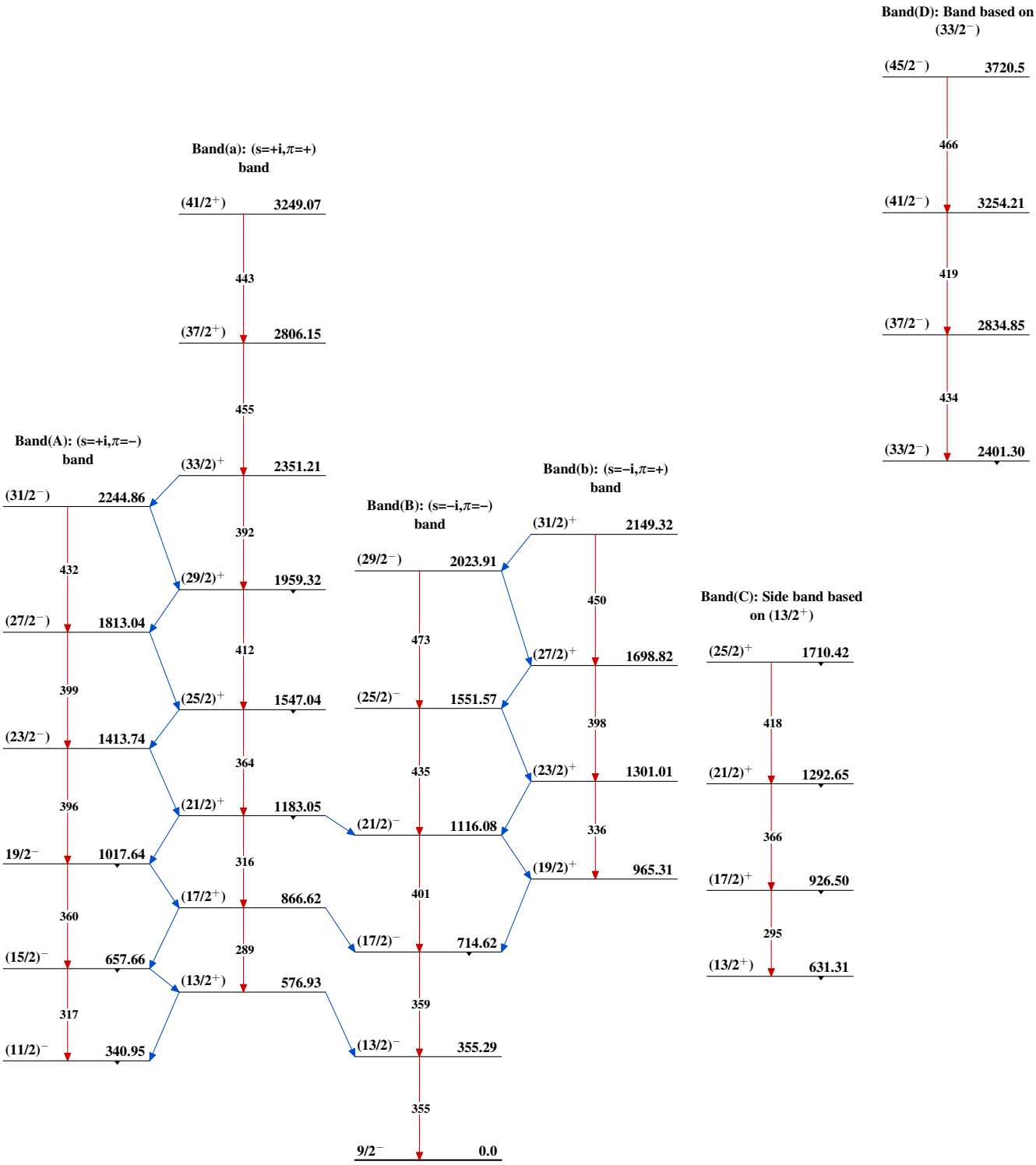
Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{219}_{89}Ac_{130}$

Adopted Levels, Gammas



$^{219}_{89}Ac_{130}$