Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 146, 1 (2017)	30-Sep-2017

Q(β^-)=−1742 *3*; S(n)=8611.72 *4*; S(p)=9005.00 *18*; Q(α)=−2560.7 *3* 2017Wa10
S(2n)=15517.35 *8*, S(2p)=16410.4 *3* (2017Wa10).
First identification of ^{138}Ba nuclide by F. W. Aston in 1925: Philos Mag 49, 1191 (1925). See 2010Sh20.
Nuclear Structure Theory: 2011To17, 2001An05, 2001Sh06, 2001Ty03, 2000Vr04, 2000Yo08, 1997Ho05.
Other measurements:
2015Wa30: ^{198}Pt(^{136}Xe,Xγ) E=7.98 MeV/nucleon. Measured σ.
2004Va03: ^{198}Pt(^{136}Xe,Xγ) E=850 MeV. Measured $T_{1/2}$.
Double giant-dipole resonance: 1990Au01, 1991Au04, 1992Ba02.
Giant quadrupole resonance: 1991BeZT.
Giant dipole resonance: 1996Be30.
Isotope shift, Δ<r^2> measurements: 2000Ga58, 1995Va36, 1995Zh57.
Neutron induced reactions on ^{137}Ba and ^{138}Ba: 2000ZhZV, 1999ZhZR, 1998Ko07.

^{138}Ba Levels

Cross Reference (XREF) Flags

A	^{138}Cs β^- decay (32.5 min)	G	^{137}Ba(n,γ) E=thermal	M	^{138}Ba($\alpha,\alpha'\gamma$)
B	^{138}Cs β^- decay (2.91 min)	H	^{137}Ba(d,p)	N	^{138}Ba(α,α')
C	^{138}La ε decay	I	^{138}Ba(γ,γ'),(pol γ,γ')	O	^{139}La(d,^{3}He)
D	^{136}Xe(^{3}He,n)	J	^{138}Ba(e,e$'$)	P	^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ)
E	^{136}Xe(α,2nγ)	K	^{138}Ba(n,n$'\gamma$)	Q	Coulomb excitation
F	^{136}Ba(t,p)	L	^{138}Ba(p,p$'$)		

E(level)[†]	J$^\pi$	$T_{1/2}$[@]	XREF	Comments
0.0[&]	0$^+$	stable	ABCDEFGHIJKLMNOPQ	Evaluated nuclear charge radius <r^2>$^{1/2}$=4.838 fm *5* (2013An02).
1435.805[&] *10*	2$^+$	0.199 ps *6*	ABCDE GHIJKL NOPQ	μ=+1.44 *22* (1987Ba65,2014StZZ) Q=−0.14 *7* (1989Bu07,2016St14) B(E2)↑=0.231 *9* J$^\pi$: 1435.795γ E2 to 0$^+$ g.s.; L(d,p)=0 from 3/2$^+$; L(p,p$'$)=L(α,α')=2. $T_{1/2}$: weighted average of 0.204 ps *6* from B(E2)↑ in Coulomb excitation, 0.186 ps *10* from B(E2)↑ in (e,e$'$), 0.193 ps *+15−13* from measured width in (γ,γ'). Other: 0.19 ps *+12−6* in (n,n$'\gamma$) by DSAM. μ: from g-factor=0.72 *11* (1987Ba65) in Coulomb excitation. Q: −0.14 *7* is for constructive interference from second 2$^+$ state, +0.08 *7* for destructive interference (1989Bu07) in Coulomb excitation. B(E2)↑: weighted average of 0.249 *13* from (e,e$'$) and 0.227 *6* from Coulomb excitation.
1898.588[&] *11*	4$^+$	2.160 ns *11*	AB E G KL NOP	μ=+3.2 *6* (2014StZZ,1985Be04) J$^\pi$: L(α,α')=L(p,p$'$)=4; L(d,^{3}He)=4 from 7/2$^+$; 462.796γ E2 to 2$^+$. $T_{1/2}$: from $\beta\gamma\gamma$(t) in ^{138}Cs β^- decay (32.5 m), weighted average of 2.164 ns *11* (1995Ma75), 2.13 ns *3* (2011Ro42) and 2.17 ns *8* (1963Cu04). Other: 2.3 ns *1* from γ(t) in (α,2nγ). μ: from g-factor=0.80 *14* (1985Be04) in ^{138}Cs β^- decay (32.5 m).
2090.536[&] *21*	6$^+$	0.85 μs *10*	AB E G KL NOP	μ=+5.88 *12* (1976Ik04) XREF: N(2120).

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Adopted Levels, Gammas (continued)

^{138}Ba Levels (continued)

E(level)[†]	J^{π}	$T_{1/2}$[@]	XREF	Comments
				J^{π}: L(p,p′)=6. $T_{1/2}$: weighted average of 0.8 μs *1* from βγ(t) in ^{138}Cs β^- decay (2.91 m), 0.8 μs *2* from γ(t) in (α,2nγ) and 1.25 μs *25* from γ(t) 2004Va03 via ^{198}Pt(^{136}Xe,Xγ) reaction. μ: from g-factor=0.98 *2* (1976Ik04, TDPAD) in (α,2nγ). Additional information 1.
2189.861 *22*	(1,2$^+$)	≥0.8 ps	G K	J^{π}: possible 2189.2γ to 0$^+$; strong primary feeding from 2$^+$ in (n,γ) E=thermal. J^{π}=0$^+$ from (n,n′γ) based on 754.12γ isotropic is inconsistent. $T_{1/2}$: from (n,n′γ) using DSAM.
2203.05 *3*	6$^+$	55 ps *17*	AB E G KL oP	J^{π}: 112.52γ M1+E2 to 6$^+$ and 980.6γ stretched E2 from 8$^+$. $T_{1/2}$: from βγγ(t) in ^{138}Cs β^- decay (32.5 m).
2217.874 *18*	2$^+$	0.130 ps *10*	A E G I KL No Q	J^{π}: 2217.86γ E2 to 0$^+$; L(p,p′)=2. $T_{1/2}$: weighted average of 0.135 ps *+21−16* from B(E2)↑ in Coulomb excitation, 0.114 ps *+14−12* from width in (γ,γ′), and 0.137 ps *10* in (n,n′γ) using DSAM.
2307.515 *17*	4$^+$	7 ps *3*	AB E G KL N P	XREF: N(2270). J^{π}: L(p,p′)=4; L(d,^{3}He)=4+2 from 7/2$^+$; 871.68γ E2 to 2$^+$, 408.97γ M1+E2 to 4$^+$. $T_{1/2}$: from βγγ(t) in ^{138}Cs β^- decay (32.5 m). Other: ≤0.07 ns in (α,2nγ) using DSAM.
2340	0$^+$		D	J^{π}: L(^{3}He,n)=0+(2).
2415.337 *19*	5$^+$	16 ps *8*	AB E G KL OP	XREF: O(2440). J^{π}: 516.70γ M1+E2 to 4$^+$, 324.84γ M1+E2 to 6$^+$. $T_{1/2}$: from βγγ(t) in ^{138}Cs β^- decay (32.5 m). Other: ≤0.07 ns from γ(t) in (α,2nγ).
2445.550 *15*	3$^+$	5 ps *4*	A E G KL O	XREF: O(2470). J^{π}: 1009.70γ M1+E2 to 2$^+$, 546.975γ M1+E2 to 4$^+$. $T_{1/2}$: from βγγ(t) in ^{138}Cs β^- decay (32.5 m). Other: ≥0.7 ps in (n,n′γ) using DSAM.
2582.18 *23*	4$^+$		L	J^{π}: L=4 in (p,p′).
2582.99 *3*	1$^+$	0.13 ps *+4−3*	A E G KL	J^{π}: 1147.17γ M1+E2 to 2$^+$, 2583.03γ D to 0$^+$. $T_{1/2}$: from (n,n′γ) using DSAM. Other: ≤7 ps from βγγ(t) in ^{138}Cs β^- decay (32.5 m).
2639.39 *4*	2$^+$	0.32 ps *+10−5*	A E G I KL N	XREF: N(2650). J^{π}: L(p,p′)=2; 2639.35γ E2 to 0$^+$. $T_{1/2}$: weighted average of 0.26 ps *+10−5* from width in (γ,γ′) and 0.42 ps *+12−8* using DSAM in (n,n′γ).
2779.31 *3*	4$^+$	≤6 ps	A E G KL	J^{π}: L(p,p′)=4. $T_{1/2}$: from βγγ(t) in ^{138}Cs β^- decay (32.5 m).
2795.2? *3*	(1,2$^+$)		G	E(level): This level is proposed in (n,γ) E=thermal (1995Bo05) based on the observation of the 2794-5817 coincidence, which, however, could also assume a level at 5817 instead of at 2794. A level at 5815 is proposed by 2006Vo11 in (γ,γ′) from the observed 5817γ and the 2794γ is not observed in (n,n′γ), which makes this 2794 level questionable. J^{π}: possible 2794.9γ to 0$^+$.
2851.444 *22*	4$^+$	≤11 ps	A E G K	J^{π}: 1415.71γ stretched E2 to 2$^+$, 952.86γ M1+E2 to 4$^+$. $T_{1/2}$: from βγγ(t) in ^{138}Cs β^- decay (32.5 m), $T_{1/2}$≥1.5 ps from (n,n′γ) using DSAM.
2880.66 *8*	3$^-$	0.055 ps *6*	A DE GH JKL N Q	B(E3)↑=0.133 *13* (1985Bu01) XREF: D(2850). J^{π}: L(α,α′)=L(p,p′)=3; L(d,p)=3 from 3/2$^+$. $T_{1/2}$: from (n,n′γ) using DSAM. Other: ≤11 ps from βγγ(t) in ^{138}Cs β^- decay (32.5 m).

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Adopted Levels, Gammas (continued)

^{138}Ba Levels (continued)

E(level)[†]	J^{π}	$T_{1/2}$[@]	XREF	Comments
				B(E3)↑: from 1985Bu01 in Coulomb excitation. Other: 0.195 *12* from 1972LeYB in (e,e′).
≈2900			H	
2916.61? *18*	$(1,2^+)$		G	E(level): This level is proposed in (n,γ) E=thermal (1995Bo05) based on the observation of the 2917-5695 coincidence, which, however, could also assume a level at 5695 instead of at 2794. A level at 5695 is proposed by 2006Vo11 in (γ,γ′) from the observed 5695γ and the 2717γ is not observed in (n,n′γ), which makes this 2917 level questionable. J^{π}: possible 2916.98γ to 0^+.
2931.40 *4*	2^+	0.19 ps *+5−4*	A E G KL	J^{π}: 2931.3γ E2 to 0^+. $T_{1/2}$: from (n,n′γ) using DSAM.
2991.07 *4*	3^+	≤11 ps	A G KL	J^{π}: 773.20γ and 1555.25γ M1+E2 to 2^+, 683.70γ D+Q to 4^+. $T_{1/2}$: from βγγ(t) in ^{138}Cs β^- decay (32.5 m).
3049.91 *3*	2^+	0.33 ps *+14−8*	A E G KL	J^{π}: 1614.08γ M1+E2 to 2^+, 3049.6γ to 0^+, 1151.26γ to 4^+. $T_{1/2}$: from (n,n′γ) using DSAM.
3154.71 *6*	4^+		E G KL	J^{π}: L(p,p′)=4; 1256.23γ D+Q to 4^+, 1064.14γ to 6^+, 739.31γ to 3^+.
3163.27 *7*	$(2)^+$	0.28 ps *+55−12*	A E G K	J^{π}: 1727.3γ M1(+E2) to 2^+, 1264.70γ (Q) to 4^+, strong primary γ from 2^+ in (n,γ) E=thermal. $T_{1/2}$: from (n,n′γ) using DSAM.
3183.60[&] *22*	8^+	20 ps *+20−14*	E K P	J^{π}: 1093.0γ stretched E2 to 6^+; band structure. $T_{1/2}$: from (α,2nγ) using DSAM.
3243.06 *8*	3		A G K	J^{π}: 935.85γ D+Q to 4^+, 1806.81γ D+Q to 2^+.
3257.24 *7*	3		A E G KL	J^{π}: 1358.80γ D+Q to 4^+, 1821.33γ to 2^+.
3309.4 *3*	(5,6,7)		E K	J^{π}: 1106.3γ D,Q to 6^+.
3338.72 *6*	2^+	31 fs *9*	A GHI KL N	J^{π}: L(p,p′)=2; 3338.68γ E2 to 0^+. $T_{1/2}$: weighted average of 31 fs *9* from width in (γ,γ′) and 31 fs *+9−8* from (n,n′γ) using DSAM.
3352.6 *3*	$(1,2^+)$		A	J^{π}: 3352.6γ to 0^+.
3359.7 *3*	7^+	25 ps *10*	E K P	J^{π}: 944.2γ E2 to 5^+. $T_{1/2}$: from (α,2nγ) using DSAM.
3366.71 *7*	2^+	31 fs *+10−8*	A G I KL	J^{π}: L(p,p′)=2; 3366.72γ E2 to 0^+. $T_{1/2}$: weighted average of 29 fs *+21−13* from width in (γ,γ′) and 31 fs *+10−8* from (n,n′γ) using DSAM.
3376.63 *8*	3		G K	J^{π}: 1940.74γ D+Q to 2^+, 1478.28γ D+Q to 4^+.
3437.5 *6*	$(1,2^+)$		A	J^{π}: 3437.5γ to 0^+.
3442.18 *12*	$2^{(+)}$		A G K	J^{π}: 3442.25γ Q to 0^+.
3485.98 *5*			K	J^{π}: 1587.6γ to 4^+, 1040.42γ to 3^+.
≈3500	(4^+)		N	J^{π}: L(α,α′)=(4).
3504.28 *10*	2^-	≥0.2 ps	GH K	J^{π}: L(d,p)=3; 3504.91γ Q to 0^+. $T_{1/2}$: from (n,n′γ) using DSAM.
3534	$^-$		H	J^{π}: L(d,p)=3 from $3/2^+$.
3562.25 *8*	$(4)^-$		H KL	J^{π}: L(d,p)=3 from $3/2^+$; 1116.71γ D+Q to 3^+, 1663.2γ to 4^+; $(4)^-$ from analysis of p-decay of IAR in ^{138}Ba+p and in ^{137}Ba(d,p) (1967Mo15).
3600.73 *10*	1	≥0.09 ps	G K	J^{π}: 3600.56γ D to 0^+, 2164.96γ to 2^+. $T_{1/2}$: from (n,n′γ) using DSAM.
3610.1 *3*			E K	J^{π}: 1407.0γ D,Q to 6^+.
3617.8 *4*	0^+		F K	J^{π}: L(t,p)=0.
3622.1 *3*	10^+	0.51 ns *7*	E K	J^{π}: 438.5γ E2 γ to 8^+. $T_{1/2}$: from γ(t) in (α,2nγ).

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Adopted Levels, Gammas (continued)

^{138}Ba Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$[@]	XREF	Comments
3632.8[e] 4	9⁻	31 ps 18	E K P	Jπ: 449.2γ E1 to 8⁺; band structure. $T_{1/2}$: from (α,2nγ) using DSAM.
3643.08 11	2⁺	19 fs +16−11	A G I Kl	Jπ: 3643.10γ E2 to 0⁺. $T_{1/2}$: from (n,n′γ) using DSAM. Other: ≤15 fs from (γ,γ′).
3646.71 13	(3)⁻		A GH Kl	Jπ: L(d,p)=3 from 3/2⁺; 766.03γ D+Q to 3⁻; (3)⁻ from analysis of p-decay of IAR in ^{138}Ba+p and in ^{137}Ba(d,p) (1967Mo15).
3652.6 8	(1,2⁺)		A	Jπ: 3652.5γ to 0⁺.
3678.2 5	8⁻	≤0.07 ns	E	Jπ: 318.5γ E1 7⁺. $T_{1/2}$: from γ(t) in (α,2nγ).
3684.7 3	1		K	Jπ: 3684.6γ D to 0⁺.
3693.92 12			A G K	
3734.4 3	2⁺	0.08 ps +13−4	K	Jπ: 3734.3γ E2 to 0⁺. $T_{1/2}$: from (n,n′γ) using DSAM.
3800.06 24	2⁺	0.09 ps +21−6	K	Jπ: 3800.1γ E2 to 0⁺. $T_{1/2}$: from (n,n′γ) using DSAM.
3837.50 10	(2⁺)		G	Jπ: 3837γ to 0⁺, 957.6γ to 3⁻.
3859.5 3	(5)⁻		H KL	Jπ: L(d,p)=3 from 3/2⁺; 1960.9γ (D) to 4⁺.
3910.5[&] 4	10⁺	≤14 ps	E P	Jπ: 726.9γ E2 to 8⁺, 288.4γ D+Q to 10⁺, band structure. $T_{1/2}$: from (α,2nγ).
3922.13 6	(3)⁻		A GH KL	Jπ: L(d,p)=1 from 3/2⁺; 2486.51γ to 2⁺, 2023.62γ (D) to 4⁺.
3931.18 24			K	
3934.87 11	2⁺		A G K	Jπ: 3935.2γ to 0⁺, 2499.4γ to 2⁺, 1054.36γ to 3⁻, primary transition from 2⁺ in (n,γ) E=thermal, log *ft*=7.8 from 3⁻ parent.
4001.47 11	2⁽⁺⁾		G K	Jπ: 4001.40γ Q to 0⁺.
4011.9? 3	(2⁺,3,4⁺)		A	Jπ: 2114.3γ to 4⁺, 745.5γ to 3, 368.7γ to 2⁺.
4013.7 3	(1,2⁺)		G	Jπ: 4012.7γ to 0⁺.
4026.00 11	1⁻	2.11 fs +17−15	GHI KL	Jπ: 4025.80γ E1 to 0⁺. Interpreted as 2⁺⊗3⁻ two-phonon state (1994KnZZ,1995He25,1996Zi02). $T_{1/2}$: from width in (γ,γ′). Other: ≤35 fs from (n,n′γ) using DSAM.
4043	2⁺		F	Jπ: L(t,p)=2.
4079.88 23	(1)⁻		A GH L	Jπ: L(d,p)=1 from 3/2⁺; 4080.1γ to 0⁺.
4083.4 4	(1,2⁺)		G	Jπ: 4083.3γ to 0⁺.
4114.8 5			E	
4115.42 8	(1,2⁺)		G	Jπ: 4114.5γ to 0⁺.
4130.55 20			D G	
4143.3 3	(1)⁻		GH	Jπ: L(d,p)=1 from 3/2⁺; 4143.2γ to 0⁺; fed by primary transition from 2⁺ in (n,γ) E=thermal.
4157.5 5			E	
4165.1 3	(4)⁻		H KL N	XREF: N(?). Jπ: L(d,p)=3, 1284.4γ to 3⁻; (4)⁻ from analysis of p-decay of IAR in ^{138}Ba+p and in ^{137}Ba(d,p) (1967Mo15).
4197.15 10	(1,2,3)		G	Jπ: fed by primary transition from 2⁺ in (n,γ) E=thermal.
4242.11 18	(1,2⁺)		A GH KL	Jπ: fed by primary transition from 2⁺ in (n,γ) E=thermal; 4242γ to 0⁺.
4280.24 8	(1,2)⁻		GH L	Jπ: L(d,p)=1 from 3/2; 1398.46γ to 3⁻, 1695.9γ to 1⁺, 4280.31γ to 0⁺. 2⁻ is not excluded since 1995Bo05 in (n,γ) E=thermal observed that the 4280.31γ in the 4332-4280 cascade is very weak and Mult(4280γ)=M2 is possible.
4323.56 7	1⁻	3.6 fs +19−12	GHI L	Jπ: 4323.50γ D to 0⁺; L(d,p)=1 from 3/2⁺.
4332.27 6	(1,2⁺)		G	Jπ: 4332.23γ to 0⁺.

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Adopted Levels, Gammas (continued)

^{138}Ba Levels (continued)

E(level)[†]	J^{π}	$T_{1/2}$[@]	XREF	Comments
4359.47 *10*	(1$^+$,2,3)		G	J^{π}: 1913.9γ to 3$^+$; fed by primary transition from 2$^+$ in (n,γ) E=thermal.
4445.48 *7*	1$^-$	10.4 fs *+20−14*	GHI L	J^{π}: L(d,p)=1; strong 4445.40γ to 0$^+$; fed by primary transition from 2$^+$ in (n,γ) E=thermal.
4508.09 *15*	(2$^+$,3)		A G	J^{π}: 2609.54γ to 4$^+$, 3073.4γ to 2$^+$; fed by primary transition from 2$^+$ in (n,γ) E=thermal.
4535.99 *8*	1$^-$	2.5 fs *+5−4*	GHI M	J^{π}: L(d,p)=1; 4535.93γ to 0$^+$; J=1 from intensity ratio in (γ,γ').
4564.45 *9*	(2,3)$^-$		GH	J^{π}: L(d,p)=1 from 3/2$^+$; 1981.55γ to 1$^+$, 2257.31γ to 4$^+$, 3129.5γ to 2$^+$. 1995Bo05 in (n,γ) thermal assign J^{π}=(3)$^-$ but state that it is not conclusive.
4580.19 *16*	(1,2,3)		G	J^{π}: fed by primary transition from 2$^+$.
4584.2 *5*			E	
4586.3 *4*	(1)$^-$		GH L	J^{π}: L(d,p)=1 from 3/2$^+$; 3150.6γ to 2$^+$, 4585.6γ to 0$^+$.
4615.46 *15*			K	
4629.73 *13*			A K	
4645.72 *10*	(1,2,3)$^-$		GH L	J^{π}: L(d,p)=1 from 3/2$^+$; fed by primary transition from 2$^+$.
4665.14 *18*	(1$^-$,2$^+$)		G	J^{π}: 4664.12γ to 0$^+$, 2082.95γ to 1$^+$, 1784.7γ to 3$^-$.
4689.0[&] *4*	12$^+$	≤14 ps	E P	J^{π}: 778.5γ E2 to 10$^+$, band structure. $T_{1/2}$: from (α,2nγ) using DSAM.
4704.2[e] *4*	(11$^-$)		P	J^{π}: 1071.3γ to 9$^-$, 1082.1γ to 10$^+$, band structure.
4707.41 *9*	1$^-$	7.5 fs *+22−14*	GHI L	J^{π}: L(d,p)=1 from 3/2$^+$; J=1 from scattering asymmetries in (γ,γ'); 4707.21γ to 0$^+$.
4743.44 *12*	(2,3)$^-$		GH L	J^{π}: L(d,p)=1 from 3/2$^+$; 3306.40γ, 2525.9γ and 2104.08γ to 2$^+$, 1501.0γ to 2525.9γ to J=3; fed by primary transition from 2$^+$; no g.s. transition to 0$^+$.
4795.78 *19*	(2,3)$^-$		GH L	J^{π}: L(d,p)=1+3 from 3/2$^+$; fed by primary transition from 2$^+$; no g.s. transition to 0$^+$.
4855.52 *12*	1$^{(-)}$[‡]	0.28 fs *+39−16*	G I M	
4860	$^+$		D	J^{π}: L=0+(2) in (^{3}He,n).
4863.9 *5*			E	
4871.74 *15*	(2,3)$^-$		GH	J^{π}: L(d,p)=1+3 from 3/2$^+$, primary transition, no γ to 0$^+$ g.s.
5027.67 *17*	(2$^-$,3)		G L	J^{π}: fed by primary transition from 2$^+$ in (n,γ) E=thermal, no γ to g.s.
5128.4 *5*			P	
5145.5 *6*	1[‡]	0.85 fs *+17−12*	I M	
5186.0[e] *5*	(13$^-$)		P	J^{π}: 481.8γ to (11$^-$), band structure.
5284.0 *7*	1[‡]	1.6 fs *+4−3*	I	
5358.3 *5*			P	
5390.8 *6*	1$^{(-)}$[‡]	0.69 fs *+16−11*	I M	
5394.2[d] *5*	(13$^-$)		P	J^{π}: proposed in ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ).
5475.8 *6*	1[‡]	1.43 fs *+27−19*	I M	
5511.6 *7*	1$^-$[‡]	0.23 fs *+5−3*	I M	
5582.2 *7*	1$^-$[‡]	1.38 fs *+31−21*	I	
5644.8 *5*	1$^-$[‡]	0.29 fs *+6−4*	I M	
5655.4 *7*	1$^-$[‡]	0.85 fs *+22−14*	I M	
5694.6 *7*	1$^-$[‡]	1.30 fs *+27−19*	I M	
5740	0$^+$		D	J^{π}: L=0 in (^{3}He,n).
5741.8[b] *6*	(11$^+$)		P	J^{π}: band structure.
5743.0 *6*	1$^-$[‡]	0.88 fs *+19−14*	I	
5752.5 *8*	1[#]	2.1 fs *+5−3*	I	
5766.4 *6*	1$^-$[‡]	0.79 fs *+15−11*	I	

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Adopted Levels, Gammas (continued)

^{138}Ba Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$[@]	XREF	Comments
5815.1 *7*	1^-[‡]	1.09 fs *+22−16*	I M	
5873.7 *6*	1^-[‡]	0.44 fs *+8−6*	I M	
5921.6[c] *6*	(14^-)		P	Jπ: band structure.
5925.5[b] *4*	(12^+)		P	Jπ: band structure.
5963.6 *6*	1^-[‡]	0.56 fs *+11−8*	I M	
6102.3 *7*	1^-[‡]	0.42 fs *+50−15*	I	
6114.6 *9*	1^-[‡]	0.72 fs *+31−17*	I	
6193.0 *5*	1^-[‡]	0.25 fs *+5−4*	I	
6198.4[d] *6*	(15^-)		P	Jπ: band structure.
6210.9[b] *5*	(13^+)		P	Jπ: band structure.
6244.8 *8*	1^-[‡]	0.82 fs *+16−11*	I	
6280	0^+		D	Jπ: L=0 in (^{3}He,n).
6348.0 *7*	1^-[‡]	0.42 fs *+24−25*	I	
6361.8 *6*	1^-[‡]	0.35 fs *+6−5*	I	
6410.3 *6*	1^-[‡]	0.19 fs *+4−3*	I	
6434.5 *6*	1^-[‡]	0.20 fs *+4−3*	I	
6466.0 *7*	1[#]	0.76 fs *+15−11*	I	
6486.5 *9*	1[#]	1.8 fs *+5−3*	I	
6552.8 *8*	1[#]	0.75 fs *+17−12*	I	
6575.5 *8*	1[#]	0.66 fs *+14−10*	I	
6612.9 *6*	1[#]	0.16 fs *+3−2*	I M	
6635.3 *8*	1[#]	0.95 fs *+22−15*	I	
6657.6[b] *5*	(14^+)		P	Jπ: band structure.
6663.9 *7*	1[#]	0.63 fs *+12−9*	I	
6678.8 *5*	1[#]	0.18 fs *+3−2*	I	
6693.6 *5*	1[#]	0.17 fs *+3−2*	I	
6703.7 *6*	1[#]	0.43 fs *+8−6*	I	
6759.4[c] *7*	(16^-)		P	Jπ: band structure.
6802.1 *8*	1[#]	0.74 fs *13*	I	
6813.6 *6*	1[#]	0.21 fs *+5−3*	I	
6821.8 *11*	1[#]	0.99 fs *+28−18*	I	
6830	0^+		D	Jπ: L=0 in (^{3}He,n).
6839.3 *8*	1[#]	0.65 fs *+14−10*	I	
6848.5 *7*	1[#]	0.33 fs *+7−5*	I	
6862.2 *6*	1[#]	0.25 fs *+5−4*	I M	
6870.6 *7*	1[#]	0.40 fs *+8−6*	I	
6895.0 *6*	1[#]	0.16 fs *+3−2*	I	
6922.3 *8*	1[#]	0.42 fs *+8−6*	I	
6957.0 *12*	1[#]	0.63 fs *+16−11*	I	
6981.1 *8*	1[#]	0.74 fs *+16−11*	I	
6988.8[a] *5*	(14^+)		P	Jπ: band structure.
7040.3 *9*	1[#]	0.80 fs *+19−13*	I	
7106.1 *15*	1[#]	0.76 fs *+17−12*	I	
7144.0 *9*	1[#]	0.97 fs *+26−17*	I	
7155.8[d] *8*	(17^-)		P	Jπ: band structure.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{138}Ba Levels (continued)

E(level)[†]	J^π	$T_{1/2}$[@]	XREF	Comments
7211.8 *8*	1[#]	0.27 fs *+6−4*	I	
7227.7[a] *5*	(15+)		P	J^π: band structure.
7276.0 *10*	1[#]	0.18 fs *+4−3*	I	
7334.3 *10*	1[#]	0.51 fs *+11−8*	I	
7376.8 *9*	1[#]	0.44 fs *+9−7*	I	
7403.6 *8*			P	
7533.8[a] *6*	(16+)		P	J^π: band structure.
7546.9 *22*	1[#]	0.75 fs *+22−14*	I	
7705.8 *12*	1[#]	0.38 fs *+8−6*	I	
7774.2 *7*	1[#]	0.20 fs *+4−3*	I	
7805.5 *8*	1[#]	0.33 fs *+7−5*	I	
7819.9 *8*	1[#]	0.30 fs *+8−5*	I	
7871.3 *10*	1[#]	0.33 fs *+9−6*	I	
7980.5[a] *8*	(17+)		P	J^π: band structure.
8012.7 *9*			P	
8075.9 *8*	1[#]	0.15 fs *+3−2*	I	
8281.9[a] *9*	(18+)		P	J^π: band structure.
8433.5 *14*	1−[#]	0.52 fs *+19−11*	I	
8938.3[a] *10*	(19+)		P	J^π: band structure.
9334.4[a] *12*	(20+)		P	J^π: band structure.

† From a least-squares fit to γ-ray energies.
‡ From γ scattering asymmetry in (γ,γ′).
# From γ intensity ratio in (γ,γ′).
@ From (n,n′γ) using DSAM for levels up to 4026 and from widths in (γ,γ′) for levels above that, unless otherwise noted.
& Band(A): g.s. band.
a Band(B): Band based on (14+).
b Band(C): Band based on (11+).
c Band(D): Band based on (14−).
d Band(d): Band based on (13−).
e Band(E): Band based on 9−.

$\gamma(^{138}Ba)$

E_i(level)	J^π_i	E_γ [#]	I_γ [#]	E_f	J^π_f	Mult. [@]	δ [‡]	α [†]	Comments
1435.805	2^+	1435.795 *10*	100	0.0	0^+	E2		9.17×10^{-4}	α(K)=0.000743 *11*; α(L)=9.37×10^{-5} *14*; α(M)=1.92×10^{-5} *3* α(N)=4.14×10^{-6} *6*; α(O)=6.34×10^{-7} *9*; α(P)=4.62×10^{-8} *7*; α(IPF)=5.72×10^{-5} *8* B(E2)(W.u.)=11.0 *4* E_γ: from ^{138}La ε decay. Mult.: from ce data in ^{138}La ε decay, $\gamma(\theta)$ and γ(pol) in (n,n′γ), and $\gamma(\theta)$ in (α,2nγ).
1898.588	4^+	462.785 *5*	100	1435.805	2^+	E2		0.01223	α(K)=0.01024 *15*; α(L)=0.001578 *22*; α(M)=0.000329 *5* α(N)=7.02×10^{-5} *10*; α(O)=1.037×10^{-5} *15*; α(P)=6.12×10^{-7} *9* B(E2)(W.u.)=0.2878 *15* E_γ: from ^{138}Cs β^- decay (32.5 m). Mult.: from ce data in ^{138}Cs β^- decay (32.5 m), $\gamma(\theta)$ and γ(pol) in (n,n′γ), and $\gamma(\theta)$ in (α,2nγ).
2090.536	6^+	191.95 *2*	100	1898.588	4^+	[E2]		0.198	α(K)=0.1525 *22*; α(L)=0.0359 *5*; α(M)=0.00769 *11* α(N)=0.001615 *23*; α(O)=0.000224 *4*; α(P)=8.02×10^{-6} *12* B(E2)(W.u.)=0.053 *+8−6* E_γ: from (n,n′γ). Others: 191.96 *6* from ^{138}Cs β^- decay (32.5 m), 191.94 *9* from (n,γ) E=thermal.
2189.861	(1,2^+)	754.05 *2*	100 *6*	1435.805	2^+				E_γ: from (n,n′γ). Other: 754.12 *8* from (n,γ) E=thermal.
		2189.2 *4*	4.4 *11*	0.0	0^+				E_γ,I_γ: observed only in singles spectrum by 1995Bo05 in (n,γ) E=thermal, not observed by 2003Go02 in (n,n′γ).
2203.05	6^+	112.52 *3*	100 *7*	2090.536	6^+	M1+E2	−0.25 *2*	0.739 *12*	α(K)=0.618 *9*; α(L)=0.096 *3*; α(M)=0.0200 *6* α(N)=0.00428 *12*; α(O)=0.000637 *16*; α(P)=3.98×10^{-5} *6* B(M1)(W.u.)=0.15 *+7−4*; B(E2)(W.u.)=4.5×10^2 *+31−16* E_γ: weighted average of 112.50 *10* from ^{138}Cs β^- decay (32.5 m), 112.5 *3* from ^{138}Cs β^- decay (2.91 m), 112.6 *3* from (α,2nγ), 112.84 *17* from (n,γ) E=thermal, 112.51 *3* from (n,n′γ), and 112.1 *5* from ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ). I_γ: from (n,n′γ). Mult.: from ce data in β^- decay (32.5 m) and $\gamma(\theta)$ in (α,2nγ) and (n,n′γ). δ: from $\gamma(\theta)$ in (α,2nγ). Other: −0.27 *+12−10* from (n,n′γ).
		304.0 *2*	2.0 *3*	1898.588	4^+				E_γ,I_γ: from (n,n′γ) only.
2217.874	2^+	782.09 *9*	2.6 *3*	1435.805	2^+	M1(+E2)	−0.02 *8*	0.00444	α(K)=0.00383 *6*; α(L)=0.000485 *7*; α(M)=9.95×10^{-5} *15* α(N)=2.15×10^{-5} *3*; α(O)=3.31×10^{-6} *5*; α(P)=2.46×10^{-7} *4* B(M1)(W.u.)=0.0090 *+21−18* E_γ: weighted average of 782.08 *9* from ^{138}Csβ^- decay

$^{138}_{56}Ba_{82}$-8

Adopted Levels, Gammas (continued)

$\gamma(^{138}Ba)$ (continued)

E_i(level)	J_i^π	E_γ#	I_γ#	E_f	J_f^π	Mult.@	δ‡	α†	Comments
									(32.5 m), 782.8 *4* from (n,γ) E=thermal, and 782.06 *10* from (n,n′γ). I_γ: unweighted average of 2.16 *20* from ^{138}Cs β^- decay (32.5 m), 2.57 *14* from (n,γ) E=thermal, and 3.07 *23* from (n,n′γ). δ: or +2.5 *+7−4* (2003Go02) in (n,n′γ). Mult.,δ: from $\gamma(\theta)$ and γ(pol) in (n,n′γ).
2217.874	2+	2217.86 *2*	100.0 *20*	0.0	0+	E2		7.80×10^{-4}	α(K)=0.000330 *5*; α(L)=4.05×10^{-5} *6*; α(M)=8.29×10^{-6} *12* α(N)=1.79×10^{-6} *3*; α(O)=2.75×10^{-7} *4*; α(P)=2.05×10^{-8} *3*; α(IPF)=0.000400 *6* B(E2)(W.u.)=1.86 *+17−14* E_γ: from (n,n′γ). Others: 2218.00 *10* from ^{138}Cs β^- decay (32.5 m), 2217.76 *7* from (n,γ) E=thermal, 2218.0 *10* from (γ,γ′), and 2217.86 *2* from (n,n′γ). I_γ: from ^{138}Csβ^- decay (32.5 m). Mult.: from (n,n′γ) based on $\gamma(\theta)$ and RUL.
2307.515	4+	408.97 *2*	90 *2*	1898.588	4+	M1+E2	−0.23 *+5−7*	0.0216 *4*	α(K)=0.0185 *3*; α(L)=0.00242 *4*; α(M)=0.000499 *7* α(N)=0.0001076 *16*; α(O)=1.648×10^{-5} *24*; α(P)=1.201×10^{-6} *21* B(M1)(W.u.)=0.020 *+19−7*; B(E2)(W.u.)=4 *+7−3* E_γ: weighted average of 408.98 *6* from ^{138}Cs β^- decay (32.5 m), 408.8 *2* from ^{138}Cs β^- decay (2.91 m), 408.9 *3* from (α,2nγ), 409.02 *6* from (n,γ) E=thermal, and 408.96 *2* from (n,n′γ). I_γ: weighted average of 91.2 *18* from ^{138}Cs β^- decay (32.5 m) and 86 *4* from (n,n′γ). Others: 76.9 *4* from (n,γ) E=thermal, 52 *3* from (α,2nγ). Mult.: from ce data in ^{138}Cs β^- decay (32.5 m), $\gamma(\theta)$ and γ(pol) in (n,n′γ), $\gamma(\theta)$ in (α,2nγ). δ: from (n,n′γ). Others: −0.23 *7* in (α,2nγ).
		871.68 *2*	100 *3*	1435.805	2+	E2		0.00245	α(K)=0.00210 *3*; α(L)=0.000281 *4*; α(M)=5.79×10^{-5} *9* α(N)=1.244×10^{-5} *18*; α(O)=1.88×10^{-6} *3*; α(P)=1.299×10^{-7} *19* B(E2)(W.u.)=2.0 *+17−7* E_γ: weighted average of 871.74 *9* from (n,γ) E=thermal, 871.68 *2* from (n,n′γ), 871.72 *7* from ^{138}Cs β^- decay (32.5 m). I_γ: from ^{138}Cs β^- decay (32.5 m). Mult.: from ce data in ^{138}Cs β^- decay (32.5 m), $\gamma(\theta)$ and γ(pol) in (n,n′γ).
2415.337	5+	107.7 *1*	7.8 *12*	2307.515	4+				E_γ: from (n,n′γ). Others: 107.5 *3* from ^{138}Cs β^- decay (2.91 m), 107.3 *3* (α,2nγ). I_γ: weighted average of 16 *8* from ^{138}Cs β^- decay, 7.1 *24* from ^{136}Xe(α,2nγ), and 7.8 *12* from ^{138}Ba(n,n′γ).
		212.28 *3*	38 *3*	2203.05	6+	M1+E2	−0.07 *2*	0.1217	α(K)=0.1043 *15*; α(L)=0.01384 *20*; α(M)=0.00285 *4*

From ENSDF

$^{138}_{56}Ba_{82}$-9

Adopted Levels, Gammas (continued)

γ(^{138}Ba) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$#	I$_\gamma$#	E$_f$	J$^\pi_f$	Mult.@	δ‡	α†	Comments
									α(N)=0.000616 *9*; α(O)=9.42$\times10^{-5}$ *14*; α(P)=6.84$\times10^{-6}$ *10* B(M1)(W.u.)=0.026 *+34−11*; B(E2)(W.u.)=1.7 *+48−13* E$_\gamma$: from (n,n′γ). Others: 212.34 *8* from ^{138}Cs β^- decay (32.5 m), 212.0 *3* from ^{138}Cs β^- decay (2.91 m), 212.3 *3* from (α,2nγ), 212.20 *19* from (n,γ) E=thermal, I$_\gamma$: weighted average of 41 *3* from ^{138}Cs β^- decay (32.5 m), 45 *8* from ^{138}Cs β^- decay (2.91 m), and 34.9 *28* from (n,n′γ). Others: 16.7 *24* from (α,2nγ), 16.7 *9* (n,γ) E=thermal. Mult.,δ: D+Q from γ(θ) in (n,n′γ), polarity from no level-parity change determined from other experimental evidence.
2415.337	5$^+$	324.84 *11*	54 *7*	2090.536	6$^+$	M1+E2	−0.10 *2*	0.0394	α(K)=0.0338 *5*; α(L)=0.00442 *7*; α(M)=0.000911 *13* α(N)=0.000197 *3*; α(O)=3.01$\times10^{-5}$ *5*; α(P)=2.20$\times10^{-6}$ *3* B(M1)(W.u.)=0.010 *+14−5*; B(E2)(W.u.)=0.6 *+14−4* E$_\gamma$: unweighted average of 325.16 *8* from (n,γ) E=thermal, 324.83 *2* from (n,n′γ), 324.90 *8* from ^{138}Cs β^- decay (32.5 m), 324.5 *3* from ^{138}Cs β^- decay (2.91 m), 324.8 *3* from (α,2nγ). I$_\gamma$: unweighted average of 44 *3* from (n,γ) E=thermal, 64 *4* from (n,n′γ), 68 *4* from ^{138}Cs β^- decay (32.5 m), 40.5 *24* from (α,2nγ). Mult.: from ce data in ^{138}Cs β^- decay (32.5 m),γ(θ) and γ(pol) in (n,n′γ). δ: or −7.8 *+16−18* in (n,n′γ). Others: −0.08 *3* or −7.5 *15* in (α,2nγ).
		516.70 *2*	100 *5*	1898.588	4$^+$	M1+E2	−0.11 *4*	0.01209 *18*	α(K)=0.01041 *15*; α(L)=0.001339 *19*; α(M)=0.000275 *4* α(N)=5.94$\times10^{-5}$ *9*; α(O)=9.12$\times10^{-6}$ *13*; α(P)=6.74$\times10^{-7}$ *10* B(M1)(W.u.)=0.0047 *+57−19*; B(E2)(W.u.)=0.13 *+39−10* E$_\gamma$: from (n,n′γ). Others: 516.71 *12* from (n,γ) E=thermal, 516.74 *12* from ^{138}Cs β^- decay (32.5 m), 516.7 *4* from ^{238}U(^{12}C,Fγ), 516.2 *5* from ^{138}Cs β^- decay (2.91 m), 516.6 *3* from (α,2nγ). I$_\gamma$: from (α,2nγ). Mult.: from γ(θ) and γ(pol) in (n,n′γ) and (α,2nγ). δ: from (α,2nγ). Other: +0.059 *7* from (n,n′γ).
2445.550	3$^+$	138.10 *6*	7.5 *25*	2307.515	4$^+$	M1,E2		0.51 *11*	α(K)=0.39 *6*; α(L)=0.09 *5*; α(M)=0.020 *11* α(N)=0.0041 *22*; α(O)=0.0006 *3*; α(P)=2.20$\times10^{-5}$ *5* E$_\gamma$: weighted average of 138.08 *6* from ^{138}Cs β^- decay (32.5 m), and 138.13 *7* from (n,n′γ). E$_\gamma$: unweighted average of 5.0 *3* from ^{138}Cs β^- decay (32.5 m), and 10 *1* from (n,n′γ). Mult.: from ce data in ^{138}Cs β^- decay (32.5 m).
		227.73 *6*	5.08 *22*	2217.874	2$^+$	M1(+E2)	+0.01 *8*	0.1007 *15*	α(K)=0.0863 *13*; α(L)=0.01140 *17*; α(M)=0.00235 *4* α(N)=0.000507 *8*; α(O)=7.76$\times10^{-5}$ *12*; α(P)=5.66$\times10^{-6}$ *8* B(M1)(W.u.)=0.012 *+56−7*

$\gamma(^{138}Ba)$ (continued)

E_i(level)	J_i^π	E_γ[#]	I_γ[#]	E_f	J_f^π	Mult.[@]	δ[‡]	α[†]	Comments
									E_γ: weighted average of 227.76 *6* from ^{138}Cs β^- decay (32.5 m), 227.7 *3* from (α,2nγ), 227.7 *3* from (n,γ) E=thermal, and 227.71 *6* from (n,n′γ). I_γ: weighted average of 5.06 *13* from ^{138}Cs β^- decay (32.5 m), 4 *4* from (α,2nγ), 4.4 *4* from (n,γ) E=thermal, and 6.4 *5* from (n,n′γ). Mult.: from ce data in ^{138}Cs β^- decay (32.5 m) and $\gamma(\theta)$ in (n,n′γ). δ: or −5.6 *+18−46* from (n,n′γ).
2445.550	3$^+$	546.975 *16*	35.7 *13*	1898.588	4$^+$	M1+E2	−0.13 *2*	0.01049	α(K)=0.00903 *13*; α(L)=0.001160 *17*; α(M)=0.000238 *4* α(N)=5.15×10^{-5} *8*; α(O)=7.90×10^{-6} *11*; α(P)=5.84×10^{-7} *9* B(M1)(W.u.)=0.006 *+27−3*; B(E2)(W.u.)=0.21 *+129−14* E_γ: weighted average of 546.990 *15* from ^{138}Cs β^- decay (32.5 m), 546.9 *3* from (α,2nγ), 546.89 *8* from (n,γ) E=thermal, and 546.93 *3* from (n,n′γ). I_γ: weighted average of 36.1 *8* from ^{138}Cs β^- decay (32.5 m), 24 *4* from (α,2nγ), 35.1 *18* from (n,γ) E=thermal, and 39 *3* from (n,n′γ). Mult.: from ce data and $\gamma(\theta)$ in ^{138}Cs β^- decay (32.5 m), $\gamma(\theta)$ and γ(pol) in (n,n′γ). δ: from (n,n′γ).
		1009.70 *2*	100.0 *21*	1435.805	2$^+$	M1+E2	−2.90 *15*	0.00184	α(K)=0.001585 *23*; α(L)=0.000206 *3*; α(M)=4.24×10^{-5} *7* α(N)=9.13×10^{-6} *14*; α(O)=1.391×10^{-6} *20*; α(P)=9.87×10^{-8} *15* B(M1)(W.u.)=0.00030 *+179−15*; B(E2)(W.u.)=1.5 *+81−7* E_γ: from (n,n′γ). Others: 1009.78 *7* from ^{138}Cs β^- decay (32.5 m), 1009.80 *8* from (n,γ) E=thermal, 1009.7 *3* from (α,2nγ). I_γ: from ^{138}Cs β^- decay (32.5 m). Mult.: from ce data in ^{138}Cs β^- decay (32.5 m), $\gamma(\theta)$ in (α,2nγ), $\gamma(\theta)$ and γ(pol) in (n,n′γ). δ: or −0.14 *3* from (α,2nγ). Others: −2.9 *1* (1984Di03) and +0.018 *7* (2003Go02) in (n,n′γ).
2582.99	1$^+$	365.18 *11*	14.4 *12*	2217.874	2$^+$	M1(+E2)	−0.1 *6*	0.0291 *16*	α(K)=0.0250 *16*; α(L)=0.00326 *7*; α(M)=0.000670 *16* α(N)=0.000145 *3*; α(O)=2.22×10^{-5} *4*; α(P)=1.63×10^{-6} *15* B(M1)(W.u.)=0.37 *+18−20* E_γ: weighted average of 365.29 *13* from ^{138}Cs β^- decay (32.5 m), and 365.10 *11* from (n,n′γ). Other: 364.65 *7* from (n,γ) E=thermal. I_γ: weighted average of 15.3 *19* from ^{138}Cs β^- decay (32.5 m), and 14.0 *12* from (n,n′γ). Other: 26.5 *14* from (n,γ) E=thermal for doublet (also placed from 2779 level). Mult.: D(+Q) from $\gamma(\theta)$ in (n,n′γ), polarity from no level-parity change determined from other experimental evidence. δ: or δ= −2.6 *+18−∞* in (n,n′γ).

$^{138}_{56}Ba_{82}$-11

γ(^{138}Ba) (continued)

E_i(level)	J^π_i	E_γ#	I_γ#	E_f	J^π_f	Mult.@	δ‡	α†	Comments
2582.99	1+	1147.17 *3*	100 *5*	1435.805	2+	M1+E2	−0.19 *11*	0.00181 *4*	α(K)=0.00156 *3*; α(L)=0.000196 *4*; α(M)=4.01×10^{-5} *8* α(N)=8.66×10^{-6} *16*; α(O)=1.332×10^{-6} *25*; α(P)=9.97×10^{-8} *20*; α(IPF)=1.78×10^{-6} *3* B(M1)(W.u.)=0.080 *+31−24*; B(E2)(W.u.)=1.3 *+29−12* E_γ: weighted average of 1147.22 *9* from ^{138}Cs β^- decay (32.5 m), 1147.1 *3* from (α,2nγ), 1147.20 *13* from (n,γ) E=thermal, and 1147.16 *3* from (n,n′γ). I_γ: from (n,γ) E=thermal. Mult.,δ: from $\gamma(\theta)$ and γ(pol) in (n,n′γ).
		2583.03 *10*	20.3 *12*	0.0	0+	M1		9.16×10^{-4}	α(K)=0.000273 *4*; α(L)=3.35×10^{-5} *5*; α(M)=6.85×10^{-6} *10* α(N)=1.480×10^{-6} *21*; α(O)=2.28×10^{-7} *4*; α(P)=1.726×10^{-8} *25*; α(IPF)=0.000600 *9* B(M1)(W.u.)=0.0015 *+7−5* E_γ: weighted average of 2583.15 *13* from ^{138}Cs β^- decay (32.5 m), 2583.02 *16* from (n,γ) E=thermal, and 2582.96 *10* from (n,n′γ). I_γ: weighted average of 19.2 *12* from ^{138}Cs β^- decay (32.5 m), 25 *5* from (n,γ) E=thermal, and 22.2 *19* from (n,n′γ). Mult.: D from $\gamma(\theta)$ in (n,n′γ), polarity from no level-parity change determined from other experimental evidence.
2639.39	2+	193.89 *8*	4.5 *3*	2445.550	3+	[M1,E2]		0.173 *18*	α(K)=0.140 *8*; α(L)=0.026 *9*; α(M)=0.0055 *19* α(N)=0.0012 *4*; α(O)=0.00017 *5*; α(P)=8.3×10^{-6} *5* E_γ: from ^{138}Cs β^- decay (32.5 m). Other: 193.9 *2* from (n,n′γ). I_γ: weighted average of 4.3 *3* from ^{138}Cs β^- decay (32.5 m) and 4.9 *4* from ^{138}Ba(n,n′γ).
		421.62 *14*	6.5 *11*	2217.874	2+	M1(+E2)	−0.08 *12*	0.0202 *4*	α(K)=0.0173 *3*; α(L)=0.00225 *4*; α(M)=0.000462 *7* α(N)=9.97×10^{-5} *14*; α(O)=1.530×10^{-5} *22*; α(P)=1.126×10^{-6} *20* B(M1)(W.u.)=0.051 *+22−21* E_γ: unweighted average of 421.59 *7* from ^{138}Cs β^- decay (32.5 m), 421.87 *13* from (n,γ) E=thermal, and 421.41 *11* from (n,n′γ). I_γ: unweighted average of 5.6 *3* from ^{138}Cs β^- decay (32.5 m), 5.1 *6* from (n,γ) E=thermal, and 8.7 *7* from (n,n′γ). Mult.: D(+Q) from $\gamma(\theta)$ in (n,n′γ), polarity from no level-parity change determined from other experimental evidence. δ: or +2.9 *+18−9* in (n,n′γ).
		1203.82 *15*	5.2 *5*	1435.805	2+				E_γ: weighted average of 1203.69 *13* from ^{138}Cs β^- decay (32.5 m), 1204.4 *3* from (α,2nγ), 1203.1 *20* from (n,γ) E=thermal, 1204.0 *4* from (n,n′γ).

$^{138}_{56}Ba_{82}$-12

Adopted Levels, Gammas (continued)

$\gamma(^{138}Ba)$ (continued)

E_i(level)	J^π_i	E_γ[#]	I_γ[#]	E_f	J^π_f	Mult.[@]	δ[‡]	α[†]	Comments
									I_γ: weighted average of 5.2 *5* from ^{138}Cs β^- decay (32.5 m), 5.1 *17* from (n,n′γ).
2639.39	2^+	2639.35 *4*	100 *3*	0.0	0^+	E2		8.78×10^{-4}	α(K)=0.000242 *4*; α(L)=2.96×10^{-5} *5*; α(M)=6.04×10^{-6} *9* α(N)=1.304×10^{-6} *19*; α(O)=2.01×10^{-7} *3*; α(P)=1.506×10^{-8} *21*; α(IPF)=0.000599 *9* B(E2)(W.u.)=0.28 *+6−7* E_γ: weighted average of 2639.59 *13* from ^{138}Cs β^- decay (32.5 m), 2639.26 *4* from (n,γ) E=thermal, 2639.7 *10* from (γ,γ'), and 2639.38 *3* from (n,n′γ). I_γ: from ^{138}Cs β^- decay (32.5 m). Mult.: Q from $\gamma(\theta)$ in (n,n′γ), M2 ruled out by RUL.
2779.31	4^+	333.79 *10*	9.3 *8*	2445.550	3^+				E_γ: weighted average of 333.86 *16* from ^{138}Cs β^- decay (32.5 m), 334.01 *12* from (n,γ) E=thermal, and 333.68 *8* from (n,n′γ). I_γ: weighted average of 7.8 *13* from ^{138}Cs β^- decay (32.5 m), 13 *7* from (n,γ) E=thermal, and 9.8 *8* from (n,n′γ).
		363.91 *4*	22.2 *10*	2415.337	5^+	M1+E2	−0.11 *3*	0.0293	α(K)=0.0252 *4*; α(L)=0.00329 *5*; α(M)=0.000676 *10* α(N)=0.0001459 *21*; α(O)=2.24×10^{-5} *4*; α(P)=1.639×10^{-6} *24* B(M1)(W.u.)>0.012; B(E2)(W.u.)>0.35 E_γ: weighted average of 363.93 *8* from ^{138}Cs β^- decay (32.5 m), 363.9 *3* from (α,2nγ), and 363.90 *4* from (n,n′γ). Other: 364.65 *7* from (n,γ) E=thermal. I_γ: weighted average of 21.3 *20* from ^{138}Cs β^- decay (32.5 m), and 26 *4* from (n,n′γ). Other: 48 *3* from (n,γ) E=thermal for doublet (also placed from 2583 level), 10 *3* from (α,2nγ). Mult.: D+Q from $\gamma(\theta)$ in (n,n′γ), polarity from no level-parity change determined from other experimental evidence. δ: or −4.7 *+6−9* in (n,n′γ).
		880.75 *10*	10.4 *15*	1898.588	4^+				E_γ: weighted average of 880.8 *3* from ^{138}Cs β^- decay (32.5 m), 880.62 *23* from (n,γ) E=thermal, and 880.77 *10* from (n,n′γ). I_γ: weighted average of 10 *3* from ^{138}Cs β^- decay (32.5 m), 9.3 *17* from (n,γ) E=thermal, and 11.3 *15* from (n,n′γ).
		1343.54 *3*	100 *5*	1435.805	2^+	(E2)		1.01×10^{-3}	α(K)=0.000846 *12*; α(L)=0.0001074 *15*; α(M)=2.20×10^{-5} *3* α(N)=4.75×10^{-6} *7*; α(O)=7.26×10^{-7} *11*; α(P)=5.26×10^{-8} *8*; α(IPF)=3.11×10^{-5} *5* B(E2)(W.u.)>0.36 E_γ: weighted average of 1343.59 *9* from ^{138}Cs β^- decay (32.5 m), 1343.4 *3* from (α,2nγ), 1343.43 *10* from (n,γ) E=thermal, and 1343.54 *3* from (n,n′γ). This peak could be an unresolved doublet with the second line associated with the de-excitation of the 3242 level, but that placement is uncertain. I_γ: from ^{138}Cs β^- decay (32.5 m). Mult.: from $\gamma(\theta)$ and γ(pol) in (n,n′γ).

$^{138}_{56}Ba_{82}$-13

Adopted Levels, Gammas (continued)

$\gamma(^{138}Ba)$ (continued)

E_i(level)	J_i^π	E_γ[#]	I_γ[#]	E_f	J_f^π	Mult.[@]	δ[‡]	α[†]	Comments
2795.2?	(1,2$^+$)	1359.4[b] *3*	<94	1435.805	2$^+$				E_γ: placed only in (n,γ) E=thermal. See also 1359γ from 3258 level.
		2794.9[b] *8*	100 *25*	0.0	0$^+$				E_γ: observed only in (n,γ) E=thermal.
2851.444	4$^+$	436.07 *2*	2.6 *3*	2415.337	5$^+$				E_γ,I_γ: from (n,n′γ) only.
		952.86 *11*	14.7 *12*	1898.588	4$^+$	M1+E2	−1.5 *5*	0.00225 *16*	α(K)=0.00194 *14*; α(L)=0.000251 *15*; α(M)=5.2×10^{-5} *3* α(N)=1.11×10^{-5} *7*; α(O)=1.70×10^{-6} *11*; α(P)=1.22×10^{-7} *10* B(M1)(W.u.)>5.8×10^{-5}; B(E2)(W.u.)>0.097 E_γ: weighted average of 953.0 *3* from ^{138}Cs β^- decay (32.5 m), 952.7 *3* from (α,2nγ), 952.87 *17* from (n,γ) E=thermal, and 952.85 *11* from (n,n′γ). I_γ: weighted average of 14 *4* from ^{138}Cs β^- decay (32.5 m), 17 *4* from (α,2nγ), 15.1 *12* from (n,γ) E=thermal, and 14.2 *12* from (n,n′γ). Mult.: from $\gamma(\theta)$ and γ(pol) in (n,n′γ). δ: or −5 *+2−9* in (n,n′γ).
		1415.71 *3*	100 *5*	1435.805	2$^+$	E2		9.35×10^{-4}	α(K)=0.000763 *11*; α(L)=9.65×10^{-5} *14*; α(M)=1.98×10^{-5} *3* α(N)=4.26×10^{-6} *6*; α(O)=6.52×10^{-7} *10*; α(P)=4.75×10^{-8} *7*; α(IPF)=5.10×10^{-5} *8* B(E2)(W.u.)>0.18 E_γ: weighted average of 1415.68 *13* from ^{138}Cs β^- decay (32.5 m), 1415.7 *3* from (α,2nγ), 1415.66 *11* from (n,γ) E=thermal, and 1415.71 *3* from (n,n′γ). I_γ: from (n,γ) E=thermal. Mult.: from $\gamma(\theta)$ and γ(pol) in (n,n′γ).
2880.66	3$^-$	982.14[&] *2*	1.53 *21*	1898.588	4$^+$				E_γ,I_γ: from (n,γ) E=thermal only.
		1445.87[&] *2*	100 *13*	1435.805	2$^+$	E1(+M2)	+0.04 *2*	5.76×10^{-4} *9*	α(K)=0.000344 *6*; α(L)=4.17×10^{-5} *8*; α(M)=8.52×10^{-6} *16* α(N)=1.84×10^{-6} *4*; α(O)=2.82×10^{-7} *5*; α(P)=2.10×10^{-8} *4*; α(IPF)=0.000179 *3* B(E1)(W.u.)=0.00150 *+20−16* E_γ: weighted average of 1445.04 *25* from ^{138}Cs β^- decay (32.5 m), 1444.8 *3* from (α,2nγ), 1444.97 *6* from (n,γ) E=thermal, and 1444.86 *2* from (n,n′γ). I_γ: from (n,γ) E=thermal. Mult.: from $\gamma(\theta)$ and γ(pol) in (n,n′γ). δ: others: −0.14 *6* or −3.0 *4* from 1984Di03 in (n,n′γ).
2916.61?	(1,2$^+$)	1479.2[b] *4*	100 *11*	1435.805	2$^+$				E_γ,I_γ: from (n,γ) E=thermal only.
		2916.98[b] *20*	89 *50*	0.0	0$^+$				E_γ,I_γ: from (n,γ) E=thermal only.

From ENSDF

Adopted Levels, Gammas (continued)

$\gamma(^{138}Ba)$ (continued)

E_i(level)	J_i^π	E_γ[#]	I_γ[#]	E_f	J_f^π	Mult.[@]	δ[‡]	α[†]	Comments
2931.40	2^+	1495.59 *3*	100 *7*	1435.805	2^+	M1+E2	−0.75 *4*	1.01×10^{-3} *2*	α(K)=0.000804 *13*; α(L)=0.0001003 *15*; α(M)=2.05×10^{-5} *3* α(N)=4.44×10^{-6} *7*; α(O)=6.82×10^{-7} *11*; α(P)=5.08×10^{-8} *8*; α(IPF)=7.64×10^{-5} *11* B(M1)(W.u.)=0.020 +*7*−*6*; B(E2)(W.u.)=3.1 +*12*−*9* E_γ: weighted average of 1495.63 *23* from ^{138}Cs β^- decay (32.5 m), 1495.5 *3* from (α,2nγ), 1495.69 *11* from (n,γ) E=thermal, and 1495.58 *3* from (n,n′γ). I_γ: from (n,n′γ). Mult.,δ: from γ(θ) and γ(pol) in (n,n′γ).
		2931.3 *3*	10.1 *16*	0.0	0^+	E2		9.63×10^{-4}	α(K)=0.000202 *3*; α(L)=2.46×10^{-5} *4*; α(M)=5.02×10^{-6} *7* α(N)=1.083×10^{-6} *16*; α(O)=1.668×10^{-7} *24*; α(P)=1.255×10^{-8} *18*; α(IPF)=0.000730 *11* B(E2)(W.u.)=0.030 +*17*−*11* E_γ: weighted average of 2931.4 *4* from ^{138}Cs β^- decay (32.5 m), 2930.9 *8* from (n,γ) E=thermal, and 2931.3 *3* from (n,n′γ). I_γ: unweighted average of 10.8 *21* from ^{138}Cs β^- decay (32.5 m), 12.4 *18* from (n,γ) E=thermal, and 7.2 *11* from (n,n′γ). Mult.: Q from γ(θ) in (n,n′γ), M2 ruled out by RUL.
2991.07	3^+	575.7 *4*	5.6 *23*	2415.337	5^+				E_γ,I_γ: from ^{138}Cs β^- decay (32.5 m). Other: Eγ=575.7 *20*, Iγ=38 from (n,γ) E=thermal.
		683.70 *13*	32 *9*	2307.515	4^+	M1+E2	−2.5 *5*	0.00460 *13*	α(K)=0.00392 *12*; α(L)=0.000538 *13*; α(M)=0.0001113 *25* α(N)=2.39×10^{-5} *6*; α(O)=3.60×10^{-6} *9*; α(P)=2.43×10^{-7} *8* B(M1)(W.u.)>0.00010; B(E2)(W.u.)>1.1 E_γ: weighted average of 683.59 *15* from ^{138}Cs β^- decay (32.5 m), 683.69 *15* from (n,γ) E=thermal, and 683.78 *13* from (n,n′γ). I_γ: unweighted average of 30 *4* from ^{138}Cs β^- decay (32.5 m), 18.3 *17* from (n,γ) E=thermal, and 48 *3* from (n,n′γ). Mult.: D+Q from γ(θ) in (n,n′γ), polarity from no level-parity change determined from other experimental evidence in (n,n′γ). δ: or −0.27 *6* in (n,n′γ).
		773.20 *7*	56 *3*	2217.874	2^+	M1+E2	−2.5 *3*	0.00342 *7*	α(K)=0.00292 *6*; α(L)=0.000394 *7*; α(M)=8.12×10^{-5} *14* α(N)=1.74×10^{-5} *3*; α(O)=2.64×10^{-6} *5*; α(P)=1.82×10^{-7} *4* B(M1)(W.u.)>0.00014; B(E2)(W.u.)>1.1 E_γ: weighted average of 773.31 *10* from ^{138}Cs β^- decay (32.5 m), 773.42 *15* from (n,γ) E=thermal, and 773.15 *5* from (n,n′γ). I_γ: weighted average of 64 *5* from ^{138}Cs β^- decay (32.5 m), 53 *3* from (n,γ) E=thermal, and 58 *5* from (n,n′γ).

Adopted Levels, Gammas (continued)

γ(^{138}Ba) (continued)

E_i(level)	J^π_i	E_γ[#]	I_γ[#]	E_f	J^π_f	Mult.[@]	δ[‡]	α[†]	Comments
									Mult.: from $\gamma(\theta)$ and γ(pol) in (n,n′γ). δ: or −0.18 *4* (2003Go02) in (n,n′γ). Other: −2.0 *+4−6* (1984Di03) in (n,n′γ).
2991.07	3+	1555.25 *4*	100 *5*	1435.805	2+	M1+E2	+9.8 *+21−14*	8.37×10^{-4}	α(K)=0.000638 *9*; α(L)=8.01×10^{-5} *12*; α(M)=1.640×10^{-5} *23* α(N)=3.54×10^{-6} *5*; α(O)=5.42×10^{-7} *8*; α(P)=3.97×10^{-8} *6*; α(IPF)=9.83×10^{-5} *14* B(M1)(W.u.)>1.9×10^{-6}; B(E2)(W.u.)>0.068 E_γ: weighted average of 1555.31 *10* from ^{138}Cs β^- decay (32.5 m), 1555.54 *18* from (n,γ) E=thermal, and 1555.24 *3* from (n,n′γ). I_γ: from (n,γ) E=thermal. Mult.: from $\gamma(\theta)$ and γ(pol) in (n,n′γ). δ: from (n,n′γ) (2003Go02). Other: or 0.21 *+4−3* (1984Di03) in (n,n′γ).
3049.91	2+	862.3 *20*	22	2189.861	(1,2+)				E_γ,I_γ: from (n,γ) E=thermal only.
		1151.26 *18*	13.2 *11*	1898.588	4+				E_γ,I_γ: from (n,n′γ). Also observed in (n,γ) E=thermal.
		1614.08 *3*	100 *5*	1435.805	2+	M1+E2	+0.16 *2*	9.69×10^{-4}	α(K)=0.000733 *11*; α(L)=9.10×10^{-5} *13*; α(M)=1.86×10^{-5} *3* α(N)=4.02×10^{-6} *6*; α(O)=6.20×10^{-7} *9*; α(P)=4.66×10^{-8} *7*; α(IPF)=0.0001217 *17* B(M1)(W.u.)=0.010 *4*; B(E2)(W.u.)=0.06 *+5−3* E_γ: weighted average of 1614.09 *20* from ^{138}Cs β^- decay (32.5 m), 1614.0 *3* from (α,2nγ), 1614.26 *12* from (n,γ) E=thermal, and 1614.07 *3* from (n,n′γ). This γ is also placed from 3911 level in (n,γ) E=thermal, but that placement is not confirmed in other γ studies. I_γ: from (n,γ) E=thermal. Mult.: from $\gamma(\theta)$ and γ(pol) in (n,n′γ). δ: from 2003Go02 in (n,n′γ). Other: −008 *5* or 3.1 *+6−5* from from 1984Di03 in (n,n′γ).
		3049.6 *3*	26.2 *11*	0.0	0+				E_γ: unweighted average of 3049.9 *3* from ^{138}Cs β^- decay (32.5 m) and 3049.27 *5* from (n,γ) E=thermal. I_γ: weighted average of 23 *3* from ^{138}Cs β^- decay (32.5 m) and 26.5 *10* from (n,γ) E=thermal.
3154.71	4+	375.6 *2*	21 *3*	2779.31	4+				E_γ,I_γ: from (n,n′γ) only.
		708.74 *18*	31 *2*	2445.550	3+				E_γ,I_γ: from (n,γ) E=thermal only, Iγ normalized to Iγ(1256γ)=100.
		739.31 *20*	44 *10*	2415.337	5+				E_γ: weighted average of 739.0 *3* from (n,γ) E=thermal and 739.44 *19* from (n,n′γ). I_γ: unweighted average of 34 *8* from (n,γ) E=thermal and 54 *5* from (n,n′γ).
		1064.14 *10*	67 *9*	2090.536	6+				E_γ: weighted average of 1064.0 *3* from (α,2nγ), 1064.5 *3* from (n,γ) E=thermal, and 1064.11 *10* from (n,n′γ). I_γ: unweighted average of 63 *5* from (n,γ) E=thermal and 87 *12*

From ENSDF

$^{138}_{56}Ba_{82}$-16

Adopted Levels, Gammas (continued)

$\gamma(^{138}Ba)$ (continued)

E_i(level)	J^π_i	E_γ#	I_γ#	E_f	J^π_f	Mult.@	δ‡	α†	Comments
									from (n,n′γ). 1995Bo05 in (n,γ) E=thermal also place this transition from the 4707 and 4115 levels but those placements are not confirmed in other γ studies.
3154.71	4^+	1256.23 *10*	100 *9*	1898.588	4^+	M1+E2	−1.0 +*2*−*3*	0.00132 *5*	α(K)=0.00112 *5*; α(L)=0.000142 *5*; α(M)=2.91×10^{-5} *11* α(N)=6.28×10^{-6} *23*; α(O)=9.6×10^{-7} *4*; α(P)=7.1×10^{-8} *3*; α(IPF)=1.385×10^{-5} *21* E_γ: weighted average of 1256.3 *3* from (n,γ) E=thermal and 1256.22 *10* from (n,n′γ). I_γ: from (n,n′γ), 100 *8* from (n,γ) E=thermal. Mult.,δ: D+Q from $\gamma(\theta)$ in (n,n′γ), polarity from no level-parity change determined from other experimental evidence.
		1719.2[b] *3*	161 *13*	1435.805	2^+				E_γ,I_γ: observed in (n,γ) E=thermal only.
3163.27	$(2)^+$	717.61 *13*	16.5 *13*	2445.550	3^+				E_γ: weighted average of 717.7 *3* from ^{138}Cs β^- decay (32.5 m), 717.56 *13* from (n,γ) E=thermal, and 717.67 *17* from (n,n′γ). I_γ: weighted average of 16.9 *13* from (n,γ) E=thermal, and 15.8 *17* from (n,n′γ).
		855.7 *3*	9.7 *8*	2307.515	4^+				E_γ: weighted average of 855.6 *5* from ^{138}Cs β^- decay (32.5 m), 855.6 *4* from (n,γ) E=thermal, and 855.7 *3* from (n,n′γ). I_γ: weighted average of 9.2 *8* from (n,γ) E=thermal, and 11.1 *14* from (n,n′γ).
		945.5 *3*	12.6 *7*	2217.874	2^+				E_γ: weighted average of 946.0 *5* from ^{138}Cs β^- decay (32.5 m) and 945.3 *3* from (n,γ) E=thermal. Not observed in (n,n′γ). I_γ: from (n,γ) E=thermal.
		1264.70 *10*	60 *6*	1898.588	4^+	(Q)			E_γ: weighted average of 1264.94 *16* from ^{138}Cs β^- decay (32.5 m), 1264.7 *3* from (α,2nγ), 1264.29 *25* from (n,γ) E=thermal, and 1264.67 *10* from (n,n′γ). I_γ: weighted average of 64 *4* from (n,γ) E=thermal, and 51 *6* from (n,n′γ). This transition is observed as the strongest one in ^{138}Cs β^- decay (32.5 m), with I(1264.7γ)/I(1727.3γ)=123 *15*/100 *12*. Mult.: from $\gamma(\theta)$ in (n,n′γ).
		1727.3 *2*	100 *7*	1435.805	2^+	M1(+E2)	+0.05 *5*	9.06×10^{-4}	α(K)=0.000636 *9*; α(L)=7.87×10^{-5} *11*; α(M)=1.612×10^{-5} *23* α(N)=3.48×10^{-6} *5*; α(O)=5.36×10^{-7} *8*; α(P)=4.04×10^{-8} *6*; α(IPF)=0.0001711 *24* B(M1)(W.u.)=0.008 +*7*−*6* E_γ: unweighted average of 1727.68 *18* from ^{138}Cs β^- decay (32.5 m), 1727.2 *2* from (n,γ) E=thermal, and 1727.02 *6* from (n,n′γ).

$^{138}_{56}Ba_{82}$-17

$\gamma(^{138}Ba)$ (continued)

E_i(level)	J^π_i	E_γ[#]	I_γ[#]	E_f	J^π_f	Mult.[@]	δ[‡]	α[†]	Comments
									I_γ: from (n,γ) E=thermal. Others: 100 *9* from (n,n′γ). Mult.: from $\gamma(\theta)$ and γ(pol) in (n,n′γ). δ: or 2.0 *+5−3* in (n,n′γ).
3183.60	8$^+$	980.6 *3*	32.4 *20*	2203.05	6$^+$	E2		0.00189	α(K)=0.001621 *23*; α(L)=0.000213 *3*; α(M)=4.39×10^{-5} *7* α(N)=9.43×10^{-6} *14*; α(O)=1.433×10^{-6} *20*; α(P)=1.005×10^{-7} *14* B(E2)(W.u.)=0.18 *+47−10* E_γ: weighted average of 980.7 *3* from (α,2nγ), 980.7 *3* from (n,n′γ), and 980.3 *3* from ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ). I_γ: weighted average of 31.7 *20* from (α,2nγ), 42 *7* from (n,n′γ), and 32 *7* from ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ). Mult.: Q from $\gamma(\theta)$ in (α,2nγ) and M2 ruled out by RUL.
		1093.0 *3*	100 *4*	2090.536	6$^+$	E2		1.50×10^{-3}	α(K)=0.001287 *18*; α(L)=0.0001669 *24*; α(M)=3.43×10^{-5} *5* α(N)=7.38×10^{-6} *11*; α(O)=1.125×10^{-6} *16*; α(P)=7.99×10^{-8} *12* B(E2)(W.u.)=0.32 *+79−17* E_γ: weighted average of 1093.3 *3* from (α,2nγ), 1093.1 *3* from (n,n′γ), and 1092.7 *3* from ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ). I_γ: from (α,2nγ). Mult.: Q from $\gamma(\theta)$ and γ(pol) in (α,2nγ), M2 ruled out by RUL.
3243.06	3	362		2880.66	3$^-$				E_γ: observed in (n,γ) E=thermal only.
		796.7 *3*	20 *3*	2445.550	3$^+$				E_γ,I_γ: from (n,n′γ) only.
		935.85 *9*	100 *8*	2307.515	4$^+$	D+Q	+0.25 *7*		E_γ: weighted average of 935.03 *12* from ^{138}Cs β^- decay (32.5 m), 934.81 *12* from (n,γ) E=thermal, and 934.78 *9* from (n,n′γ). I_γ: from (n,n′γ). Others: 100 *6* from (n,γ) E=thermal, 100 *9* from ^{138}Cs β^- decay (32.5 m). Mult.: from $\gamma(\theta)$ in (n,n′γ). δ: or +8 *+6−3* in (n,n′γ).
		1343[b]		1898.588	4$^+$				E_γ: observed in the coincidence spectrum (1995Bo05) in (n,γ) E=thermal, could be unresolved with the 1343.54γ from 2779 level; placed by 1995Bo05 in (n,γ) E=thermal and 2003Go02 in (n,n′γ) but it is uncertain.
		1806.81 *18*	65 *14*	1435.805	2$^+$	D+Q	+0.17 *5*		E_γ: weighted average of 1806.65 *18* from ^{138}Cs β^- decay (32.5 m), 1807.1 *2* from (n,γ) E=thermal, and 1806.77 *18* from (n,n′γ). I_γ: unweighted average of 51 *6* from ^{138}Cs β^- decay (32.5 m), 79 *6* from (n,n′γ). Other: 106 *10* from (n,n′γ) E=thermal. Mult.: from $\gamma(\theta)$ in (n,n′γ). δ: or −28 *+6−∞* in (n,n′γ).
3257.24	3	1358.80 *11*	58 *5*	1898.588	4$^+$	D+Q	+0.11 *6*		E_γ: weighted average of 1359.1 *5* from ^{138}Cs β^- decay (32.5 m), 1358.6 *3* from (α,2nγ), 1359.4 *3* from (n,γ) E=thermal, and 1358.75 *9* from (n,n′γ). 1995Bo05 in (n,γ) E=thermal also place this transition from a level at 4872 level, but it is not confirmed in other γ studies. I_γ: weighted average of 62 *25* from (α,2nγ), 50 *4* from (n,γ)

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γ(^{138}Ba) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$[#]	I$_\gamma$[#]	E$_f$	J$^\pi_f$	Mult.[@]	δ[‡]	α[†]	Comments
									E=thermal, and 65 *4* from (n,n′γ). Mult.: from γ(θ) in (n,n′γ). δ: or −50 *+40−600* in (n,n′γ).
3257.24	3	1821.33 *8*	100 *8*	1435.805	2^+	D+Q	+0.46 *4*		E$_\gamma$: weighted average of 1821.7 *3* from ^{138}Cs β^- decay (32.5 m), 1821.2 *3* from (α,2nγ), 1821.4 *2* from (n,γ) E=thermal, and 1821.30 *8* from (n,n′γ). 1995Bo05 in (n,γ) E=thermal also place this transition from a level at 2794 level, but it is not confirmed in other γ studies. I$_\gamma$: from (n,n′γ). Mult.: from γ(θ) in (n,n′γ). δ: or +4.2 *+7−6* in (n,n′γ).
3309.4	(5,6,7)	1106.3 *3*	100	2203.05	6^+	D,Q			Mult.: from γ(θ) in (α,2nγ).
3338.72	2^+	893.3[a] *3*	<4.4[a]	2445.550	3^+				E$_\gamma$,I$_\gamma$: from (n,γ) E=thermal only.
		1120.7	4.3 *7*	2217.874	2^+				E$_\gamma$,I$_\gamma$: from (n,γ) E=thermal only.
		1902.8 *2*	13.0 *18*	1435.805	2^+				E$_\gamma$: weighted average of 1903.2 *4* from ^{138}Cs β^- decay (32.5 m), 1902.6 *2* from (n,γ) E=thermal, and 1903.0 *4* from (n,n′γ). I$_\gamma$: weighted average of 30 *9* from ^{138}Cs β^- decay (32.5 m), 14.3 *14* from (n,γ) E=thermal, and 11.0 *15* from (n,n′γ).
		3338.68 *6*	100 *6*	0.0	0^+	E2		1.09×10^{-3}	α(K)=0.0001618 *23*; α(L)=1.96×10^{-5} *3*; α(M)=4.00×10^{-6} *6* α(N)=8.64×10^{-7} *12*; α(O)=1.331×10^{-7} *19*; α(P)=1.004×10^{-8} *14*; α(IPF)=0.000902 *13* B(E2)(W.u.)=0.87 *+45−22* E$_\gamma$: weighted average of 3339.01 *25* from ^{138}Cs β^- decay (32.5 m), 3338.62 *5* from (n,γ) E=thermal, 3338.4 *15* from (γ,γ′),(pol γ,γ′), and 3338.81 *8* from (n,n′γ). I$_\gamma$: from ^{138}Cs β^- decay (32.5 m). Mult.: Q from γ(θ) in (n,n′γ), M2 ruled out by RUL.
3352.6	$(1,2^+)$	3352.6 *3*	100	0.0	0^+				E$_\gamma$: from ^{138}Cs β^- decay (32.5 m) only.
3359.7	7^+	944.4 *3*	100	2415.337	5^+	E2		0.00205	α(K)=0.001759 *25*; α(L)=0.000232 *4*; α(M)=4.79×10^{-5} *7* α(N)=1.029×10^{-5} *15*; α(O)=1.562×10^{-6} *22*; α(P)=1.090×10^{-7} *16* B(E2)(W.u.)=0.71 *+48−21* E$_\gamma$: weighted average of 944.2 *3* from (α,2nγ), 944.7 *3* from (n,n′γ) and 944.0 *5* from ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ). Mult.: Q from γ(θ) in (α,2nγ) and (n,n′γ), M2 ruled out by RUL.
3366.71	2^+	921.43[a] *22*	<29[a]	2445.550	3^+				E$_\gamma$,I$_\gamma$: from (n,γ) E=thermal only.
		1931.2	7.1 *12*	1435.805	2^+				E$_\gamma$,I$_\gamma$: from (n,γ) E=thermal only.
		3366.72 *7*	100 *21*	0.0	0^+	E2		1.10×10^{-3}	α(K)=0.0001595 *23*; α(L)=1.93×10^{-5} *3*; α(M)=3.94×10^{-6} *6* α(N)=8.52×10^{-7} *12*; α(O)=1.312×10^{-7} *19*; α(P)=9.90×10^{-9} *14*; α(IPF)=0.000913 *13*

Adopted Levels, Gammas (continued)

$\gamma(^{138}Ba)$ (continued)

E_i(level)	J^π_i	E_γ#	I_γ#	E_f	J^π_f	Mult.@	δ‡	α†	Comments
									B(E2)(W.u.)=0.8 *+5−3* E_γ: weighted average of 3366.98 *25* from ^{138}Cs β^- decay (32.5 m), 3366.67 *10* from (n,γ) E=thermal, 3365.4 *15* from (γ,γ'),(polγ,γ'), and 3366.73 *7* from (n,n$'\gamma$). I_γ: from (n,γ) E=thermal. Mult.: Q from $\gamma(\theta)$ in (n,n$'\gamma$) and M2 ruled out by RUL.
3376.63	3	1069.1 *4*	32 *3*	2307.515	4^+				E_γ,I_γ: from (n,γ) E=thermal only.
		1158.7 *5*	32 *3*	2217.874	2^+				E_γ,I_γ: from (n,γ) E=thermal only.
		1478.28 *17*	37 *3*	1898.588	4^+	D+Q	−0.13 *12*		E_γ,I_γ: from (n,n$'\gamma$) only. Mult.: from $\gamma(\theta)$ in (n,n$'\gamma$). δ: or −4 *+1−6* in (n,n$'\gamma$).
		1940.74 *9*	100 *11*	1435.805	2^+	D+Q	+0.9 *+4−3*		E_γ: weighted average of 1940.67 *19* from (n,γ) E=thermal and 1940.76 *9* from (n,n$'\gamma$). It is also placed from the 4131 level in (n,γ) E=thermal, but not confirmed in (n,n$'\gamma$). I_γ: from (n,n$'\gamma$). Mult.,δ: from $\gamma(\theta)$ in (n,n$'\gamma$).
3437.5	(1,2^+)	3437.5 *6*	100	0.0	0^+				
3442.18	$2^{(+)}$	1251.7 *3*	46 *8*	2189.861	(1,2^+)				E_γ,I_γ: from (n,n$'\gamma$) only.
		3442.25 *13*	100 *9*	0.0	0^+	Q			E_γ: weighted average of 3442.6 *6* from ^{138}Cs β^- decay (32.5 m), 3442.30 *13* from (n,γ) E=thermal, and 3442.12 *18* from (n,n$'\gamma$). I_γ: from (n,n$'\gamma$). Mult.: from $\gamma(\theta)$ in (n,n$'\gamma$).
3485.98		1040.42 *4*	100 *8*	2445.550	3^+				E_γ,I_γ: from (n,n$'\gamma$) only.
		1587.6 *4*	7.5 *14*	1898.588	4^+				E_γ,I_γ: from (n,n$'\gamma$) only.
3504.28	2^-	1605.4 *2*	54 *5*	1898.588	4^+				E_γ,I_γ: from (n,n$'\gamma$) only.
		2068.15 *15*	<52	1435.805	2^+				E_γ: weighted average of 2068.16 *15* from (n,γ) E=thermal and 2068.1 *4* from (n,n$'\gamma$). Also placed from 4707 level. I_γ: from 39 *13*, unweighted average of 26 *4* from (n,γ) E=thermal and 52 *6* from (n,n$'\gamma$).
		3504.91 *18*	100 *8*	0.0	0^+	Q			E_γ: weighted average of 3504.5 25 from (n,γ) E=thermal and 3504.1 *2* from (n,n$'\gamma$). I_γ: from (n,n$'\gamma$). Mult.: Q from $\gamma(\theta)$ in (n,n$'\gamma$).
3562.25	$(4)^-$	1116.71 *8*	100 *9*	2445.550	3^+	E1+M2	+0.07 *4*	0.00194	α(K)=0.001672 *24*; α(L)=0.000210 *3*; α(M)=4.30×10^{-5} *6* α(N)=9.28×10^{-6} *13*; α(O)=1.428×10^{-6} *21*; α(P)=1.069×10^{-7} *16*; α(IPF)=6.83×10^{-7} *10* E_γ,I_γ: from (n,n$'\gamma$) only. Mult.,δ: D+Q from $\gamma(\theta)$ in (n,n$'\gamma$), polarity from level-parity change determined by L(d,p)=3.
		1663.2 *5*	16 *3*	1898.588	4^+				E_γ,I_γ: from (n,n$'\gamma$) only.
3600.73	1	2164.96 *12*	100 *10*	1435.805	2^+				E_γ: weighted average of 2164.99 *12* from (n,γ) E=thermal and 2164.8 *3* from (n,n$'\gamma$). I_γ: from (n,n$'\gamma$). Other: I(2164.96γ)/I(3600.56γ)=56 *10*/100 *12* from (n,γ) E=thermal.

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$\gamma(^{138}$Ba) (continued)

E_i(level)	J^π_i	E_γ[#]	I_γ[#]	E_f	J^π_f	Mult.[@]	δ[‡]	α[†]	Comments
3600.73	1	3600.56 *17*	86 *9*	0.0	0^+	D			E_γ: weighted average of 3600.52 *17* from (n,γ) E=thermal and 3600.7 *3* from (n,n′γ). I_γ: from (n,n′γ). Mult.: from $\gamma(\theta)$ in (n,n′γ).
3610.1		1407.0 *3*	100	2203.05	6^+	D,Q		0.00104 *14*	α=0.00104 *14*; α(K)=0.00089 *12*; α(L)=0.00011 *2* E_γ: weighted average of 1406.9 *3* from (α,2nγ) and 1407.1 *4* from (n,n′γ). Mult.: from $\gamma(\theta)$ in (α,2nγ).
3617.8	0^+	2182.0 *4*	100	1435.805	2^+				E_γ: from (n,n′γ) only.
3622.1	10^+	438.5 *3*	100	3183.60	8^+	E2		0.01426	α(K)=0.01191 *17*; α(L)=0.00187 *3*; α(M)=0.000390 *6* α(N)=8.31×10^{-5} *12*; α(O)=1.223×10^{-5} *18*; α(P)=7.08×10^{-7} *10* B(E2)(W.u.)=1.59 *+26−20* E_γ: weighted average of 438.6 *3* from (α,2nγ) and 438.3 *3* from (n,n′γ). Mult.: from $\gamma(\theta)$ and γ(pol) in (α,2nγ).
3632.8	9^-	449.2 *3*	100	3183.60	8^+	E1		0.00418	α(K)=0.00361 *5*; α(L)=0.000456 *7*; α(M)=9.33×10^{-5} *14* α(N)=2.01×10^{-5} *3*; α(O)=3.05×10^{-6} *5*; α(P)=2.15×10^{-7} *3* B(E1)(W.u.)=9.E−5 *+13−4* E_γ: weighted average of 449.2 *3* from (α,2nγ), 449.2 *3* from (n,n′γ), and 449.1 *3* from (^{12}C,Fγ),(^{18}O,Fγ). Mult.: from $\gamma(\theta)$ and γ(pol) in (α,2nγ).
3643.08	2^+	1004.3 *5*	44 *5*	2639.39	2^+				E_γ,I_γ: from (n,γ) E=thermal only.
		1744.6 *2*	100 *6*	1898.588	4^+				E_γ: weighted average of 1744.6 *2* from (n,γ) E=thermal and 1743.95 *18* from (n,n′γ). I_γ: from (n,γ) E=thermal.
		2207	<126	1435.805	2^+				E_γ: from (n,γ) E=thermal only. I_γ: from Iγ in (n,γ) E=thermal only for unresolved 2207+2212 doublet.
		3643.10 *22*	≤119	0.0	0^+	E2		1.18×10^{-3}	α(K)=0.0001398 *20*; α(L)=1.690×10^{-5} *24*; α(M)=3.45×10^{-6} *5* α(N)=7.44×10^{-7} *11*; α(O)=1.147×10^{-7} *16*; α(P)=8.67×10^{-9} *13*; α(IPF)=0.001022 *15* B(E2)(W.u.)=0.24 *+99−24* E_γ: unweighted average of 3643.3 *4* from ^{138}Cs β^- decay (32.5 m), 3643.61 *3* from (n,γ) E=thermal, 3642.7 *15* from (γ,γ'),(pol γ,γ'), and 3642.8 *2* from (n,n′γ). I_γ: from (n,γ) E=thermal, possible contribution due to strong 3641γ in ^{139}Ba. Mult.: Q from $\gamma(\theta)$ in (n,n′γ), M2 ruled out by RUL.
3646.71	$(3)^-$	766.03 *12*	100 *9*	2880.66	3^-	M1(+E2)	−0.07 *10*	0.00466 *8*	α(K)=0.00402 *7*; α(L)=0.000509 *8*; α(M)=0.0001045 *16* α(N)=2.26×10^{-5} *4*; α(O)=3.47×10^{-6} *6*; α(P)=2.58×10^{-7} *5* E_γ: weighted average of 766.10 *12* from ^{138}Cs β^- decay

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Adopted Levels, Gammas (continued)

$\gamma(^{138}Ba)$ (continued)

E_i(level)	J^π_i	E_γ[#]	I_γ[#]	E_f	J^π_f	Mult.[@]	α[†]	Comments
								(32.5 m), 766.09 *21* from (n,γ) E=thermal, and 765.90 *14* from (n,n′γ). I_γ: from (n,n′γ). Mult.: from γ(θ) in (n,n′γ), polarity from level-parity change determined by L(d,p)=3. δ: or +1.5 *5* in (n,n′γ).
3646.71	$(3)^-$	1748.7 *5*	47 *21*	1898.588	4^+			E_γ,I_γ: from ^{138}Cs β^- decay (32.5 m), not observed in (n,n′γ). Iγ is normalized to Iγ(766.03γ)=100.
		2210.8 *3*	53 *5*	1435.805	2^+			E_γ: weighted average of 2210.7 *4* from ^{138}Cs β^- decay (32.5 m), and 2210.9 *3* from (n,n′γ). I_γ: from (n,n′γ).
3652.6	$(1,2^+)$	3652.5 *8*	100	0.0	0^+			E_γ: from ^{138}Cs β^- decay (32.5 m).
3678.2	8^-	318.5 *3*	100	3359.7	7^+	E1	0.00978	α(K)=0.00842 *12*; α(L)=0.001077 *16*; α(M)=0.000221 *4* α(N)=4.73×10^{-5} *7*; α(O)=7.15×10^{-6} *11*; α(P)=4.93×10^{-7} *7* B(E1)(W.u.)>0.00011 E_γ: from (α,2nγ) only. Mult.: from γ(θ) and γ(pol) in (α,2nγ).
3684.7	1	3684.6 *3*	100	0.0	0^+	D		E_γ,Mult.: from (n,n′γ).
3693.92		702.92 *17*	100 *16*	2991.07	3^+			E_γ: from ^{138}Cs β^- decay (32.5 m) only.
		813.1 *3*	72 *21*	2880.66	3^-			E_γ: weighted average of 813.0 *3* from ^{138}Cs β^- decay (32.5 m), 813.2 *4* from (n,γ) E=thermal, and 813.0 *4* from (n,n′γ). I_γ: from ^{138}Cs β^- decay (32.5 m).
		842.34 *25*	97 *14*	2851.444	4^+			E_γ: weighted average of 842.21 *16* from ^{138}Cs β^- decay (32.5 m) and 842.8 *3* from (n,γ) E=thermal. I_γ: from ^{138}Cs β^- decay (32.5 m).
		1386.5 *3*	90 *14*	2307.515	4^+			E_γ: weighted average of 1386.39 *21* from ^{138}Cs β^- decay (32.5 m) and 1387.0 *4* from (n,n′γ). I_γ: from ^{138}Cs β^- decay (32.5 m).
3734.4	2^+	3734.3 *3*	100	0.0	0^+	E2	1.21×10^{-3}	α(K)=0.0001341 *19*; α(L)=1.621×10^{-5} *23*; α(M)=3.31×10^{-6} *5* α(N)=7.14×10^{-7} *10*; α(O)=1.101×10^{-7} *16*; α(P)=8.32×10^{-9} *12*; α(IPF)=0.001060 *15* B(E2)(W.u.)=0.23 *+23−15* E_γ: from (n,n′γ). Mult.: Q from γ(θ) in (n,n′γ), M2 ruled out by RUL.
3800.06	2^+	1582.0 *4*	26 *5*	2217.874	2^+			E_γ,I_γ: from (n,n′γ).
		3800.1 *3*	100 *9*	0.0	0^+	E2	1.24×10^{-3}	α(K)=0.0001303 *19*; α(L)=1.574×10^{-5} *22*; α(M)=3.21×10^{-6} *5* α(N)=6.93×10^{-7} *10*; α(O)=1.069×10^{-7} *15*; α(P)=8.08×10^{-9} *12*; α(IPF)=0.001086 *16* B(E2)(W.u.)=0.15 *+33−11* E_γ,I_γ: from (n,n′γ). Mult.: Q from γ(θ) in (n,n′γ), M2 ruled out by RUL.
3837.50	(2^+)	957.6[a] *4*	<31[a]	2880.66	3^-			E_γ,I_γ: from (n,γ) E=thermal only.
		1620.10 *23*	100 *7*	2217.874	2^+			E_γ,I_γ: from (n,γ) E=thermal only.
		2401.46 *11*	93 *11*	1435.805	2^+			E_γ,I_γ: from (n,γ) E=thermal only.

From ENSDF

γ(^{138}Ba) (continued)

E_i(level)	J^π_i	E_γ[#]	I_γ[#]	E_f	J^π_f	Mult.[@]	δ[‡]	α[†]	Comments
3837.50	(2$^+$)	3837		0.0	0$^+$				E_γ: from (n,γ) E=thermal only.
3859.5	(5)$^-$	1960.9 *3*	100	1898.588	4$^+$	(D)			E_γ,Mult.: from (n,n′γ).
3910.5	10$^+$	288.4 *3*	14 *7*	3622.1	10$^+$	M1+E2	−0.38 *10*	0.0540 *2*	α(K)=0.0460 *3*; α(L)=0.00630 *10*; α(M)=0.00129 *2*; α(N+..)=0.00035 *1* B(M1)(W.u.)>0.0065; B(E2)(W.u.)>4.2 E_γ: weighted average of 288.5 *3* from (α,2nγ) and 288.2 *3* from (^{12}C,Fγ),(^{18}O,Fγ). I_γ: unweighted average of 12 *4* from (α,2nγ) and 34 *12* from (^{12}C,Fγ),(^{18}O,Fγ). Mult.,δ: from γ(θ) in (α,2nγ), polarity from level-parity change determined fro other experimental evidence.
		726.9 *3*	100 *4*	3183.60	8$^+$	E2		0.00375	α(K)=0.00320 *5*; α(L)=0.000441 *7*; α(M)=9.11×10^{-5} *13* α(N)=1.96×10^{-5} *3*; α(O)=2.94×10^{-6} *5*; α(P)=1.96×10^{-7} *3* B(E2)(W.u.)>4.1 E_γ: weighted average of 727.1 *3* from (α,2nγ) and 726.7 *3* from (^{12}C,Fγ),(^{18}O,Fγ). I_γ: from (α,2nγ). Mult.: from γ(θ) and γ(pol) in (α,2nγ).
3922.13	(3)$^-$	1041.50 *11*	37 *2*	2880.66	3$^-$				E_γ: weighted average of 1041.4 *3* from ^{138}Cs β$^-$ decay (32.5 m) and 1041.51 *11* from (n,γ) E=thermal. I_γ: weighted average of 54 *14* from ^{138}Cs β$^-$ decay (32.5 m) and 37 *2* from (n,γ) E=thermal.
		1614.26 *12*	133 *7*	2307.515	4$^+$				E_γ,I_γ: from (n,γ) E=thermal only.
		2023.62 *8*	100 *9*	1898.588	4$^+$	(E1)		8.38×10^{-4}	α(K)=0.000453 *7*; α(L)=5.59×10^{-5} *8*; α(M)=1.144×10^{-5} *16* α(N)=2.47×10^{-6} *4*; α(O)=3.81×10^{-7} *6*; α(P)=2.87×10^{-8} *4*; α(IPF)=0.000315 *5* E_γ: weighted average of 2023.93 *20* from ^{138}Cs β$^-$ decay (32.5 m), 2023.59 *7* from (n,γ) E=thermal, and 2023.5 *3* from (n,n′γ). I_γ: from (n,n′γ) E=thermal. Mult.: (D) from γ(θ) in (n,n′γ), polarity from level-parity change determined by L(d,p)=1.
		2486.51 *17*	17 *2*	1435.805	2$^+$				E_γ: weighted average of 2487.1 *6* from ^{138}Cs β$^-$ decay (32.5 m), 2486.48 *17* from (n,γ) E=thermal, and 2486.1 *8* from (n,n′γ). I_γ: weighted average of 19 *7* from ^{138}Cs β$^-$ decay (32.5 m), 17 *2* from (n,γ) E=thermal, and 16 *5* from (n,n′γ).
3931.18		1515.8 *4*	30 *7*	2415.337	5$^+$				E_γ,I_γ: from (n,n′γ) only.
		2032.6 *3*	100 *10*	1898.588	4$^+$				E_γ,I_γ: from (n,n′γ) only.
3934.87	2$^+$	596.2 *4*	16 *6*	3338.72	2$^+$				E_γ,I_γ: from ^{138}Cs β$^-$ decay (32.5 m) only.
		1054.36 *16*	100 *12*	2880.66	3$^-$				E_γ: weighted average of 1054.32 *15* from ^{138}Cs β$^-$ decay (32.5 m), 1054.9 *3* from (n,γ) E=thermal, and 1054.2 *2* from (n,n′γ). I_γ: from (n,n′γ). Others: 105 *28* from ^{138}Cs β$^-$ decay (32.5 m).

$^{138}_{56}Ba_{82}$-23

γ(^{138}Ba) (continued)

E$_i$(level)	J^{π}_i	E$_\gamma$[#]	I$_\gamma$[#]	E$_f$	J^{π}_f	Mult.[@]	α[†]	Comments
3934.87	2^+	1627.8 *4*	78 *10*	2307.515	4^+			E$_\gamma$,I$_\gamma$: from (n,n′γ) only.
		1717.1 *3*	67 *15*	2217.874	2^+			E$_\gamma$,I$_\gamma$: from ^{138}Cs β^- decay (32.5 m) only.
		2499.4 *3*	77 *9*	1435.805	2^+			E$_\gamma$: weighted average of 2499.4 *3* from ^{138}Cs β^- decay (32.5 m), 2499.8 *5* from (n,γ) E=thermal, and 2499.3 *3* from (n,n′γ). I$_\gamma$: from (n,n′γ).
		3935.2 *5*	11 *2*	0.0	0^+			E$_\gamma$,I$_\gamma$: from ^{138}Cs β^- decay (32.5 m) only.
4001.47	$2^{(+)}$	2566	23 *17*	1435.805	2^+			E$_\gamma$,I$_\gamma$: from (n,n′γ) only.
		4001.40 *11*	100 *12*	0.0	0^+	Q		E$_\gamma$: weighted average of 4001.41 *11* from (n,γ) E=thermal and 4001.2 *4* from (n,n′γ). I$_\gamma$: from (n,n′γ).
4011.9?	(2^+,3,4^+)	368.7 *4*	64 *25*	3643.08	2^+			E$_\gamma$,I$_\gamma$: from ^{138}Cs β^- decay (32.5 m) only.
		754.5 *4*	1.0×10^2 *4*	3257.24	3			E$_\gamma$,I$_\gamma$: from ^{138}Cs β^- decay (32.5 m) only.
		2114.3 *7*	60 *27*	1898.588	4^+			E$_\gamma$,I$_\gamma$: from ^{138}Cs β^- decay (32.5 m) only.
4013.7	(1,2^+)	2578.1[a] *3*	<182[a]	1435.805	2^+			E$_\gamma$,I$_\gamma$: from (n,γ) E=thermal only.
		4012.7 *6*	100 *15*	0.0	0^+			E$_\gamma$,I$_\gamma$: from (n,γ) E=thermal only.
4026.00	1^-	2590.71 *24*	≈23	1435.805	2^+			E$_\gamma$,I$_\gamma$: from (n,γ) E=thermal. Other: Iγ<5 from 1995He25 in (γ,γ').
		4025.80 *12*	<100	0.0	0^+	E1	1.75×10^{-3}	α(K)=7.23×10^{-5} *11*; α(L)=8.60×10^{-6} *12*; α(M)=1.752×10^{-6} *25* α(N)=3.78×10^{-7} *6*; α(O)=5.83×10^{-8} *9*; α(P)=4.41×10^{-9} *7*; α(IPF)=0.001665 *24* B(E1)(W.u.)<0.002 E$_\gamma$,I$_\gamma$: from (n,γ) E=thermal, also placed as primary transition. Mult.: from γ(lin pol) in (pol γ,γ') and $\gamma(\theta)$ in (n,n′γ).
4079.88	$(1)^-$	1199.15 *24*	100 *18*	2880.66	3^-			E$_\gamma$,I$_\gamma$: unplaced γ in ^{138}Cs β^- decay (32.5 m). Seen and placed in (n,γ) E=thermal.
		4080.1 *5*	10.5 *14*	0.0	0^+			E$_\gamma$,I$_\gamma$: from ^{138}Cs β^- decay (32.5 m).
4083.4	(1,2^+)	4083.3 *4*	100	0.0	0^+			
4114.8		482.0 *3*	100	3632.8	9^-	D,Q		E$_\gamma$,Mult.: from (α,2nγ).
4115.42	(1,2^+)	749.38 *24*	27 *6*	3366.71	2^+			
		1064.5 *3*	<33	3049.91	2^+			E$_\gamma$: placed only in (n,γ) E=thermal. See 1064.14γ from 3155 level.
		2679.65 *8*	30 *4*	1435.805	2^+			
		4114.5 *3*	100 *8*	0.0	0^+			
4130.55		1940.67 *19*	100	2189.861	(1,2^+)			E$_\gamma$: see also 1940.7γ from 3377 level.
4143.3	$(1)^-$	4143.2 *3*	100	0.0	0^+			
4157.5		247.0 *3*	100	3910.5	10^+	D,Q		E$_\gamma$,Mult.: from (α,2nγ).
4165.1	$(4)^-$	1284.4 *3*	100	2880.66	3^-			E$_\gamma$: from (n,n′γ).
4197.15	(1,2,3)	2761.32 *10*	100	1435.805	2^+			
4242.11	(1,2^+)	2806.28 *18*	100 *10*	1435.805	2^+			E$_\gamma$: unweighted average of 2806.57 *17* from ^{138}Cs β^- decay (32.5 m), 2805.97 *10* from (n,γ) E=thermal, and 2806.3 *11* from (n,n′γ). I$_\gamma$: from (n,γ) E=thermal.
		4242	20	0.0	0^+			E$_\gamma$: seen only in (n,γ) E=thermal.
4280.24	$(1,2)^-$	1398.46[&] *22*	73 *8*	2880.66	3^-			
		1695.9[&] *2*	100 *6*	2582.99	1^+			
		2061.5 *4*	<97	2217.874	2^+			E$_\gamma$,I$_\gamma$: also placed from 4508 level.

Adopted Levels, Gammas (continued)

γ(^{138}Ba) (continued)

E_i(level)	J^π_i	E_γ[#]	I_γ[#]	E_f	J^π_f	Mult.[@]	Comments
4280.24	(1,2)$^-$	2845 *3*	54	1435.805	2$^+$		
		4280.31 *8*	<27	0.0	0$^+$		E_γ: also placed as a primary transition in (n,γ) E=thermal.
4323.56	1$^-$	957.6[a] *4*	<13[a]	3366.71	2$^+$		
		1158.7 *5*	10.3 *9*	3163.27	(2)$^+$		
		4323.50 *7*	100 *6*	0.0	0$^+$	D	E_γ: weighted average of 4323.37 *7* from (n,γ) E=thermal, 4323.0 *7* from (γ,γ′) and 4323.2 *4* from (n,n′γ). Mult.: from γ(θ) in (n,n′γ).
4332.27	(1,2$^+$)	2895.62[&] *9*		1435.805	2$^+$		
		4332.23 *6*		0.0	0$^+$		E_γ: also placed as a primary transition in (n,γ) E=thermal.
4359.47	(1$^+$,2,3)	1116.4 *3*	96 *8*	3243.06	3		
		1913.9 *1*	92 *8*	2445.550	3$^+$		
		2923.7 *3*	100 *19*	1435.805	2$^+$		
4445.48	1$^-$	4445.40 *7*	100	0.0	0$^+$		
4508.09	(2$^+$,3)	2061.9 *4*	100 *10*	2445.550	3$^+$		E_γ: unweighted average of 2062.34 *17* from ^{138}Cs β^- decay (32.5 m) and 2061.5 *4* from (n,γ) E=thermal. Also placed from 4280 level in (n,γ) E=thermal. I_γ: from ^{138}Cs β^- decay (32.5 m).
		2609.54 *16*	30 *5*	1898.588	4$^+$		E_γ: weighted average of 2609.3 *3* from ^{138}Cs β^- decay (32.5 m) and 2609.61 *16* from (n,γ) E=thermal. I_γ: from ^{138}Cs β^- decay (32.5 m).
		3073.4 *9*	17 *4*	1435.805	2$^+$		E_γ: unweighted average of 3072.5 *4* from ^{138}Cs β^- decay (32.5 m) and 3074.25 *11* from (n,γ) E=thermal. I_γ: from ^{138}Cs β^- decay (32.5 m).
4535.99	1$^-$	893.3[a] *3*	<16[a]	3643.08	2$^+$		
		2345.86[a] *18*	<51[a]	2189.861	(1,2$^+$)		
		3096.6[b] *6*	110 *16*	1435.805	2$^+$		E_γ: placed only in (n,γ) E=thermal. Poor fit, inconsistent with level-energy difference=3100. The evaluator has considered this placement questionable.
		4535.93 *9*	100 *5*	0.0	0$^+$		E_γ: weighted average of 4535.94 *6* from (n,γ) E=thermal and 4535.1 *6* from (γ,γ′),(pol γ,γ′).
4564.45	(2,3)$^-$	921.43[a] *22*	<64[a]	3643.08	2$^+$		
		1981.55 *15*	73 *9*	2582.99	1$^+$		
		2257.31 *18*	60 *7*	2307.515	4$^+$		
		2345.86[a] *18*	<91[a]	2217.874	2$^+$		
		3129.5 *5*	100 *14*	1435.805	2$^+$		
4580.19	(1,2,3)	1337.65 *24*	71 *8*	3243.06	3		
		3143.98 *20*	100 *33*	1435.805	2$^+$		
4584.2		962.1 *3*	100	3622.1	10$^+$		E_γ: from (α,2nγ).
4586.3	(1)$^-$	3150.6 *4*	100 *12*	1435.805	2$^+$		
		4585.6 *7*	<86	0.0	0$^+$		E_γ: also placed as a primary transition in (n,γ) E=thermal.
4615.46		3179.62 *15*	100	1435.805	2$^+$		E_γ: from (n,n′γ).
4629.73		1778.25 *23*	100 *17*	2851.444	4$^+$		E_γ,I_γ: from ^{138}Cs β^- decay (32.5 m).
		2731.12 *15*	87 *6*	1898.588	4$^+$		E_γ,I_γ: from ^{138}Cs β^- decay (32.5 m).
4645.72	(1,2,3)$^-$	1766.2 *3*	36 *4*	2880.66	3$^-$		

$^{138}_{56}Ba_{82}$-25

γ(^{138}Ba) (continued)

E_i(level)	J^π_i	E_γ[#]	I_γ[#]	E_f	J^π_f	Mult.[@]	α[†]	Comments
4645.72	(1,2,3)$^-$	1850.1[b] *2*	100 *7*	2795.2?	(1,2$^+$)			
		3209.75 *10*	75 *14*	1435.805	2$^+$			
4665.14	(1$^-$,2$^+$)	1784.7 *3*	85 *10*	2880.66	3$^-$			
		2082.95 *14*	100 *15*	2582.99	1$^+$			
		3230.01[&] *9*	35 *20*	1435.805	2$^+$			
		4664.12[&] *11*	31 *4*	0.0	0$^+$			
4689.0	12$^+$	778.5 *3*	100	3910.5	10$^+$	E2	0.00318	α(K)=0.00272 *4*; α(L)=0.000370 *6*; α(M)=7.65×10^{-5} *11* α(N)=1.642×10^{-5} *23*; α(O)=2.48×10^{-6} *4*; α(P)=1.676×10^{-7} *24* B(E2)(W.u.)>3.3 E_γ: weighted average of 778.6 *3* from (α,2nγ) and 778.4 *3* from (^{12}C,Fγ),(^{18}O,Fγ). Mult.: Q from $\gamma(\theta)$ in (α,2nγ), M2 ruled out by RUL.
4704.2	(11$^-$)	1071.3 *3*	100 *30*	3632.8	9$^-$			E_γ,I_γ: from ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ).
		1082.1 *3*	100 *30*	3622.1	10$^+$			E_γ,I_γ: from ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ).
4707.41	1$^-$	1064.5 *3*	<93	3643.08	2$^+$			E_γ: placed only in (n,γ) E=thermal. See 1064.14γ from 3155 level.
		2068.16 *15*	<134	2639.39	2$^+$			E_γ,I_γ: also placed from 3504 level in (n,γ) E=thermal.
		4707.21 *11*	100 *7*	0.0	0$^+$			E_γ: other: 4705.6 *9* from (γ,γ').
4743.44	(2,3)$^-$	1501.0 *3*	55 *5*	3243.06	3			
		2104.08 *16*	100 *14*	2639.39	2$^+$			
		2525.9 *3*	48 *6*	2217.874	2$^+$			
		3306.4 *3*	100 *14*	1435.805	2$^+$			
4795.78	(2,3)$^-$	957.6[a] *4*	48[a] *4*	3837.50	(2$^+$)			
		2578.1[a] *3*	100[a] *11*	2217.874	2$^+$			
		3360.1 *3*	41 *6*	1435.805	2$^+$			
4855.52	1$^{(-)}$	921.43[a] *22*	<87[a]	3934.87	2$^+$			
		2272.6 *6*	36 *5*	2582.99	1$^+$			
		4855.11 *14*	100 *19*	0.0	0$^+$			
4863.9		1241.8 *3*	100	3622.1	10$^+$			E_γ: from (α,2nγ).
4871.74	(2,3)$^-$	1821.4 *2*	<107	3049.91	2$^+$			E_γ,I_γ: placed only by 1995Bo05 in (n,γ) E=thermal, not confirmed in other γ studies. See also 1821γ from 3258 level.
		3436.40 *22*	<100	1435.805	2$^+$			E_γ,I_γ: placed only by 1995Bo05 in (n,γ) E=thermal, not confirmed in other γ studies. See also 3436γ from 3436 level.
5027.67	(2$^-$,3)	3591.81 *17*	100	1435.805	2$^+$			
5128.4		1506.3 *5*	100	3622.1	10$^+$			E_γ: from ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ).
5145.5	1	5145.4 *6*		0.0	0$^+$			
5186.0	(13$^-$)	481.8 *3*	100	4704.2	(11$^-$)			E_γ: from ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ).
5284.0	1	5283.9 *7*		0.0	0$^+$			
5358.3		1736.4 *5*	100	3622.1	10$^+$			E_γ: from ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ).
5390.8	1$^{(-)}$	5390.7 *6*		0.0	0$^+$			
5394.2	(13$^-$)	705.2 *3*	100	4689.0	12$^+$			E_γ: from ^{238}U(^{12}C,Fγ),^{208}Pb(^{18}O,Fγ).
5475.8	1	5475.7 *6*		0.0	0$^+$			
5511.6	1$^-$	4076		1435.805	2$^+$			

From ENSDF

γ(^{138}Ba) (continued)

E_i(level)	J_i^π	E_γ[#]	I_γ[#]	E_f	J_f^π	Mult.[@]	α[†]	Comments
5511.6	1$^-$	5511.3 *10*		0.0	0$^+$	E1	0.00221	α(K)=4.77×10^{-5} *7*; α(L)=5.65×10^{-6} *8*; α(M)=1.151×10^{-6} *17* α(N)=2.48×10^{-7} *4*; α(O)=3.83×10^{-8} *6*; α(P)=2.91×10^{-9} *4*; α(IPF)=0.00216 *3*
5582.2	1$^-$	5582.1 *7*		0.0	0$^+$	E1	0.00223	α(K)=4.69×10^{-5} *7*; α(L)=5.56×10^{-6} *8*; α(M)=1.132×10^{-6} *16* α(N)=2.44×10^{-7} *4*; α(O)=3.77×10^{-8} *6*; α(P)=2.86×10^{-9} *4*; α(IPF)=0.00218 *3* B(E1)(W.u.)=0.00105 *+19−20*
5644.8	1$^-$	4209		1435.805	2$^+$			
		5644.6 *5*		0.0	0$^+$	E1	0.00225	α(K)=4.62×10^{-5} *7*; α(L)=5.48×10^{-6} *8*; α(M)=1.116×10^{-6} *16* α(N)=2.41×10^{-7} *4*; α(O)=3.71×10^{-8} *6*; α(P)=2.82×10^{-9} *4*; α(IPF)=0.00220 *3*
5655.4	1$^-$	5655.3 *7*		0.0	0$^+$	E1	0.00225	α(K)=4.61×10^{-5} *7*; α(L)=5.47×10^{-6} *8*; α(M)=1.113×10^{-6} *16* α(N)=2.40×10^{-7} *4*; α(O)=3.70×10^{-8} *6*; α(P)=2.81×10^{-9} *4*; α(IPF)=0.00220 *3* B(E1)(W.u.)=0.0016 *4*
5694.6	1$^-$	5694.5 *7*		0.0	0$^+$	E1	0.00226	α(K)=4.57×10^{-5} *7*; α(L)=5.42×10^{-6} *8*; α(M)=1.103×10^{-6} *16* α(N)=2.38×10^{-7} *4*; α(O)=3.67×10^{-8} *6*; α(P)=2.79×10^{-9} *4*; α(IPF)=0.00221 *3* B(E1)(W.u.)=0.00105 *+18−19*
5741.8	(11$^+$)	2119.8 *8*	100	3622.1	10$^+$			
5743.0	1$^-$	4307	10	1435.805	2$^+$			I_γ: from Iγ(4307)/Iγ(5742.9)=0.10 *1* in (γ,γ′).
		5742.9 *7*	100	0.0	0$^+$	E1	0.00228	α(K)=4.52×10^{-5} *7*; α(L)=5.36×10^{-6} *8*; α(M)=1.091×10^{-6} *16* α(N)=2.36×10^{-7} *4*; α(O)=3.63×10^{-8} *5*; α(P)=2.76×10^{-9} *4*; α(IPF)=0.00223 *4* B(E1)(W.u.)=0.00138 *+27−25*
5752.5	1	5752.4 *8*		0.0	0$^+$			
5766.4	1$^-$	5766.3 *6*		0.0	0$^+$	E1	0.00228	α(K)=4.50×10^{-5} *7*; α(L)=5.33×10^{-6} *8*; α(M)=1.085×10^{-6} *16* α(N)=2.34×10^{-7} *4*; α(O)=3.61×10^{-8} *5*; α(P)=2.74×10^{-9} *4*; α(IPF)=0.00223 *4* B(E1)(W.u.)=0.0017 *3*
5815.1	1$^-$	5815.0 *7*		0.0	0$^+$	E1	0.00230	α(K)=4.45×10^{-5} *7*; α(L)=5.28×10^{-6} *8*; α(M)=1.074×10^{-6} *15* α(N)=2.32×10^{-7} *4*; α(O)=3.57×10^{-8} *5*; α(P)=2.71×10^{-9} *4*; α(IPF)=0.00225 *4* B(E1)(W.u.)=0.00118 *+21−20*
5873.7	1$^-$	5873.6 *6*		0.0	0$^+$	E1	0.00231	α(K)=4.39×10^{-5} *7*; α(L)=5.21×10^{-6} *8*; α(M)=1.060×10^{-6} *15* α(N)=2.29×10^{-7} *4*; α(O)=3.53×10^{-8} *5*; α(P)=2.68×10^{-9} *4*; α(IPF)=0.00226 *4* B(E1)(W.u.)=0.0028 *5*
5921.6	(14$^-$)	527.4 *4*	100	5394.2	(13$^-$)			
5925.5	(12$^+$)	183.7 *5*	54 *21*	5741.8	(11$^+$)			
		567.3 *3*	100 *30*	5358.3				
		797.1 *4*	49 *25*	5128.4				
		1221.2 *5*	44 *21*	4704.2	(11$^-$)			
		1236.4 *4*	98 *30*	4689.0	12$^+$			
		2303.6 *8*	23 *12*	3622.1	10$^+$			
5963.6	1$^-$	5963.5 *6*		0.0	0$^+$	E1	0.00234	α(K)=4.31×10^{-5} *6*; α(L)=5.11×10^{-6} *8*; α(M)=1.039×10^{-6} *15* α(N)=2.24×10^{-7} *4*; α(O)=3.46×10^{-8} *5*; α(P)=2.63×10^{-9} *4*; α(IPF)=0.00229 *4* B(E1)(W.u.)=0.0021 *4*
6102.3	1$^-$	6102.2 *7*		0.0	0$^+$	E1		B(E1)(W.u.)=0.0027 *15*
6114.6	1$^-$	6114.5 *9*		0.0	0$^+$	E1		B(E1)(W.u.)=0.0015 *5*
6193.0	1$^-$	6192.9 *5*		0.0	0$^+$	E1		B(E1)(W.u.)=0.0043 *+9−8*
6198.4	(15$^-$)	804.2 *3*	100	5394.2	(13$^-$)			

$\gamma(^{138}Ba)$ (continued)

E_i(level)	J^π_i	E_γ#	I_γ#	E_f	J^π_f	Mult.@	Comments
6210.9	(13^+)	285.4 *3*	100 *33*	5925.5	(12^+)		
		1521.9 *5*	35 *13*	4689.0	12^+		
6244.8	1^-	6244.6 *8*		0.0	0^+	E1	B(E1)(W.u.)=0.00127 *+20−21*
6348.0	1^-	4912	16	1435.805	2^+		I_γ: from Iγ(4912)/Iγ(6348)=0.16 *+54−15* in (γ,γ′).
		6347.9 *8*	100	0.0	0^+	E1	B(E1)(W.u.)=0.0020 *+30−8*
6361.8	1^-	6361.6 *6*		0.0	0^+	E1	B(E1)(W.u.)=0.0028 *5*
6410.3	1^-	6410.1 *6*		0.0	0^+	E1	B(E1)(W.u.)=0.0051 *+10−9*
6434.5	1^-	6434.3 *6*		0.0	0^+	E1	B(E1)(W.u.)=0.0048 *+9−8*
6466.0	1	6465.8 *7*		0.0	0^+		
6486.5	1	6486.3 *9*		0.0	0^+		
6552.8	1	6552.6 *8*		0.0	0^+		
6575.5	1	6575.3 *8*		0.0	0^+		
6612.9	1	6612.7 *6*		0.0	0^+		
6635.3	1	6635.1 *8*		0.0	0^+		
6657.6	(14^+)	446.7 *3*	100	6210.9	(13^+)		
6663.9	1	6663.7 *7*		0.0	0^+		
6678.8	1	6678.6 *5*		0.0	0^+		
6693.6	1	6693.4 *5*		0.0	0^+		
6703.7	1	6703.5 *6*		0.0	0^+		
6759.4	(16^-)	837.8 *4*	100	5921.6	(14^-)		
6802.1	1	6801.9 *8*		0.0	0^+		
6813.6	1	6813.4 *6*		0.0	0^+		
6821.8	1	6821.6 *11*		0.0	0^+		
6839.3	1	6839.1 *8*		0.0	0^+		
6848.5	1	6848.3 *7*		0.0	0^+		
6862.2	1	6862.0 *6*		0.0	0^+		
6870.6	1	6870.4 *7*		0.0	0^+		
6895.0	1	6894.8 *6*		0.0	0^+		
6922.3	1	6922.1 *8*		0.0	0^+		
6957.0	1	6956.8 *12*		0.0	0^+		
6981.1	1	6980.9 *8*		0.0	0^+		
6988.8	(14^+)	778.0 *4*	100 *35*	6210.9	(13^+)		
		1067.1 *5*	65 *28*	5921.6	(14^-)		
		1802.6 *6*	54 *26*	5186.0	(13^-)		
7040.3	1	7040.1 *9*		0.0	0^+		
7106.1	1	7105.9 *15*		0.0	0^+		
7144.0	1	7143.8 *9*		0.0	0^+		
7155.8	(17^-)	957.4 *5*	100	6198.4	(15^-)		
7211.8	1	7211.6 *8*		0.0	0^+		
7227.7	(15^+)	239.0 *4*	31 *14*	6988.8	(14^+)		
		570.1 *3*	100 *30*	6657.6	(14^+)		
7276.0	1	7275.8 *10*		0.0	0^+		
7334.3	1	7334.1 *10*		0.0	0^+		

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Adopted Levels, Gammas (continued)

γ(^{138}Ba) (continued)

E_i(level)	J^π_i	E_γ #	I_γ #	E_f	J^π_f
7376.8	1	7376.6 *9*		0.0	0$^+$
7403.6		1205.2 *5*	100	6198.4	(15$^-$)
7533.8	(16$^+$)	306.1 *3*	100	7227.7	(15$^+$)
7546.9	1	7546.7 *22*		0.0	0$^+$
7705.8	1	7705.6 *12*		0.0	0$^+$
7774.2	1	7774.0 *7*		0.0	0$^+$
7805.5	1	7805.3 *8*		0.0	0$^+$
7819.9	1	7819.7 *8*		0.0	0$^+$
7871.3	1	7871.1 *10*		0.0	0$^+$
7980.5	(17$^+$)	446.7 *5*	100	7533.8	(16$^+$)
8012.7		856.9 *5*	100	7155.8	(17$^-$)
8075.9	1	8075.6 *8*		0.0	0$^+$
8281.9	(18$^+$)	301.4 *4*	100	7980.5	(17$^+$)
8433.5	1$^-$	8433.2 *14*		0.0	0$^+$
8938.3	(19$^+$)	656.4 *5*	100	8281.9	(18$^+$)
9334.4	(20$^+$)	396.1 *5*	100 *48*	8938.3	(19$^+$)

† Additional information 2.

‡ If No value given it was assumed δ=1.00 for E2/M1, δ=1.00 for E3/M2 and δ=0.10 for the other multipolarities.

From (n,γ) E=thermal up to 5028 level and from (γ,γ') above that, unless otherwise noted.

@ From γ scattering asymmetry in (γ,γ') for transitions from levels above 4026, unless otherwise noted.

& Poor fit. For fitting purpose only, uncertainties were increased to 0.3 keV to reduce the χ^2/dof to 2.9 from 12.9.

[a] Multiply placed with undivided intensity.

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

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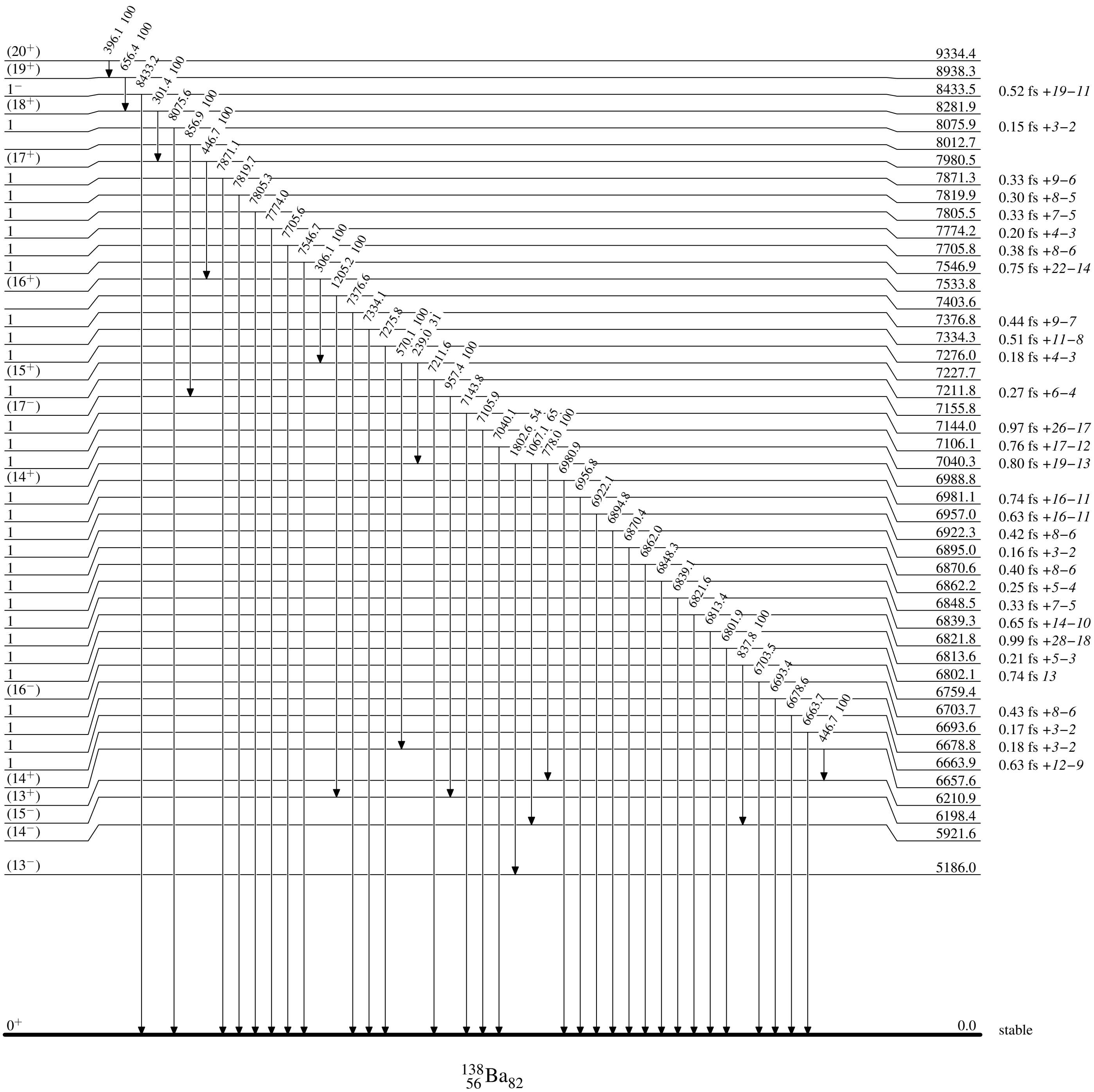
Adopted Levels, Gammas

Level Scheme

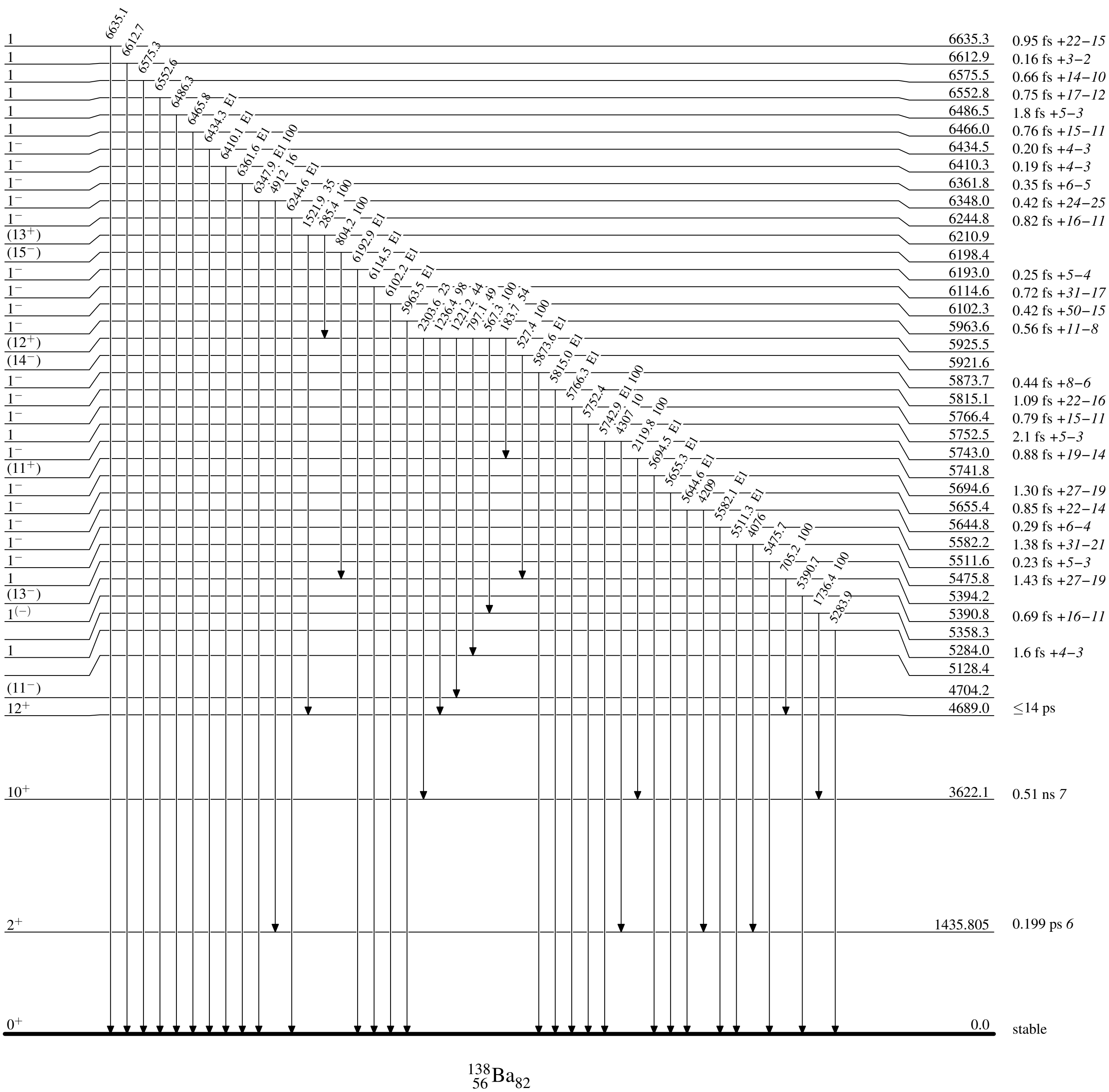
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

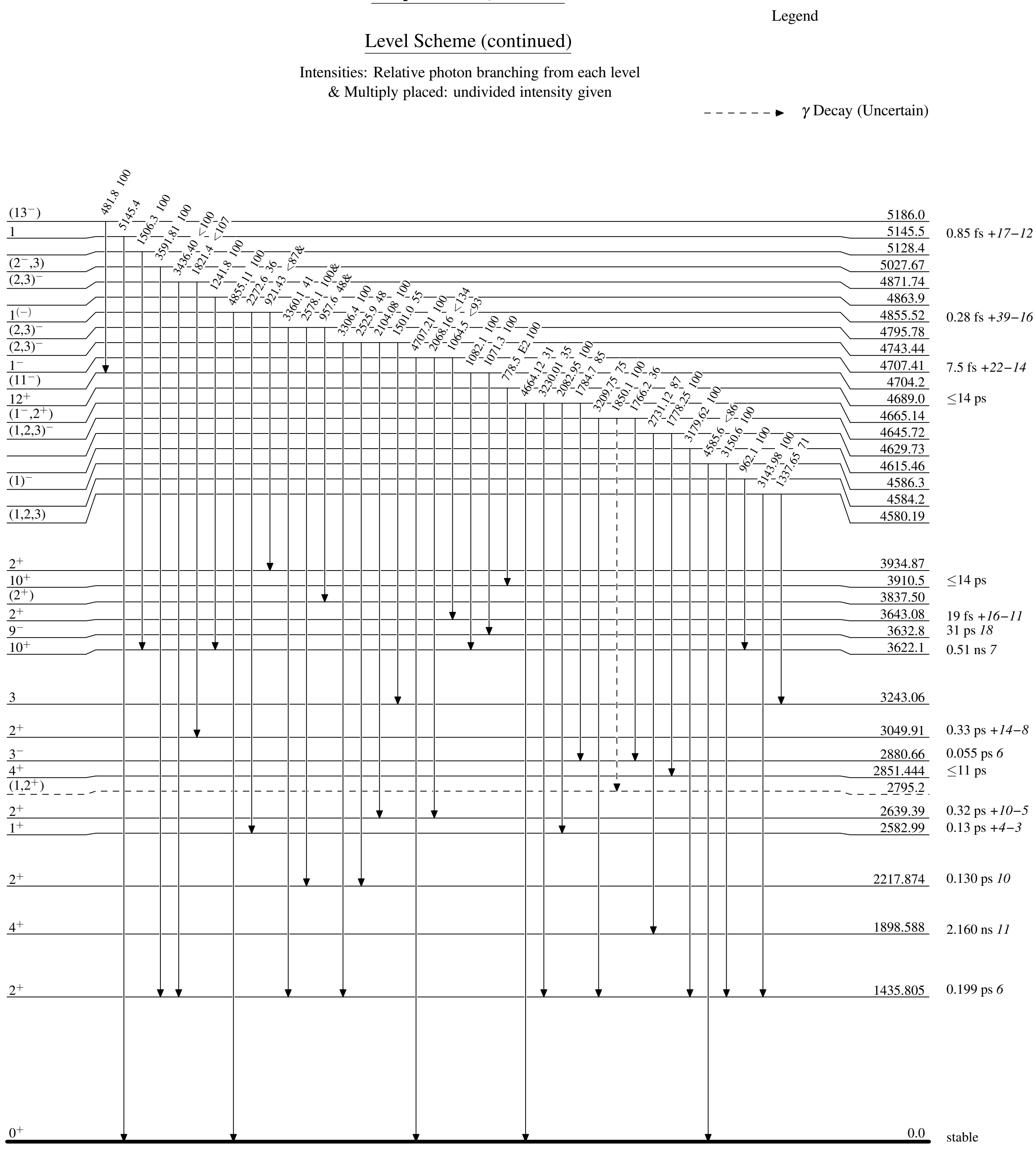
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



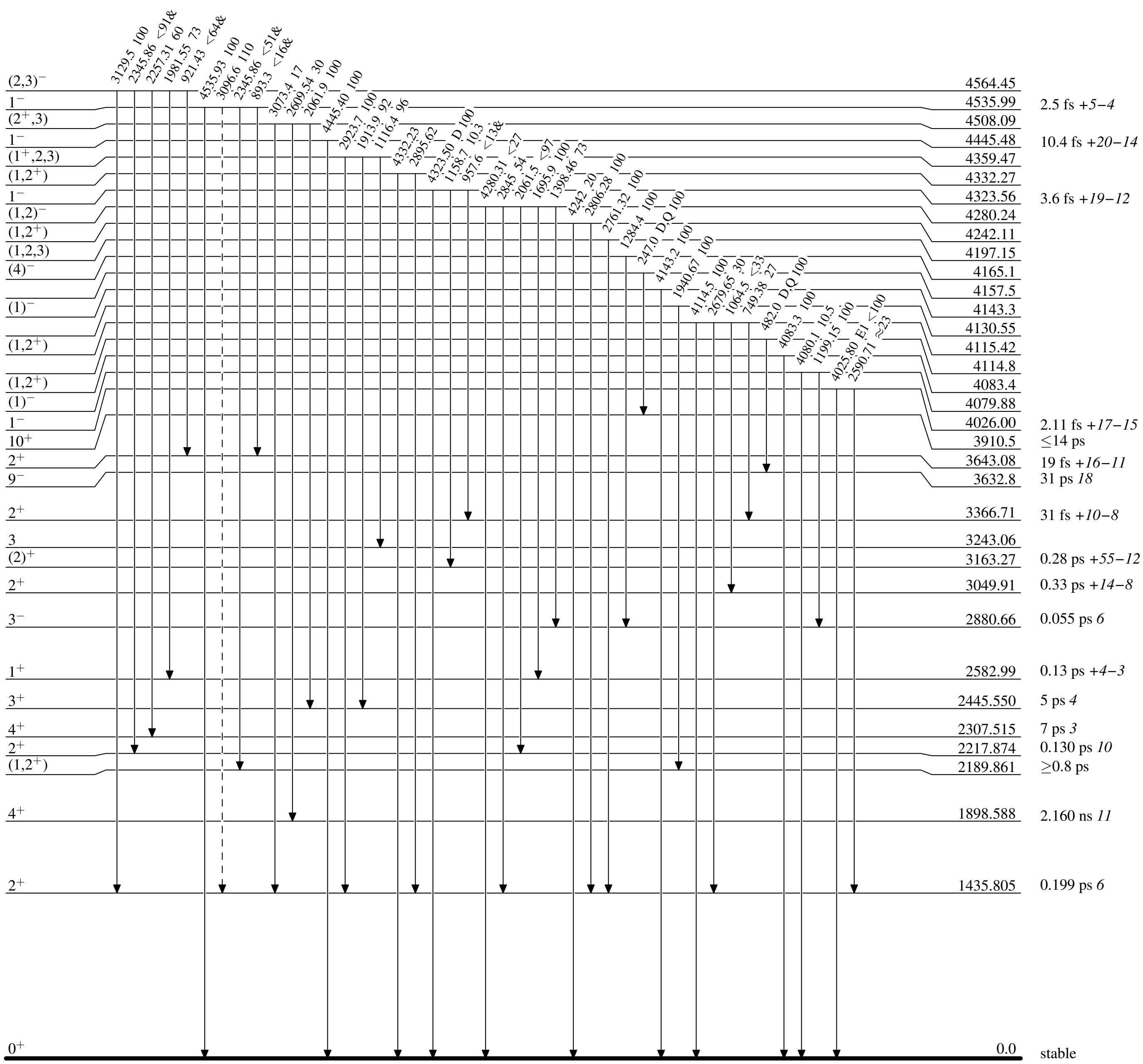
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

Legend

γ Decay (Uncertain)

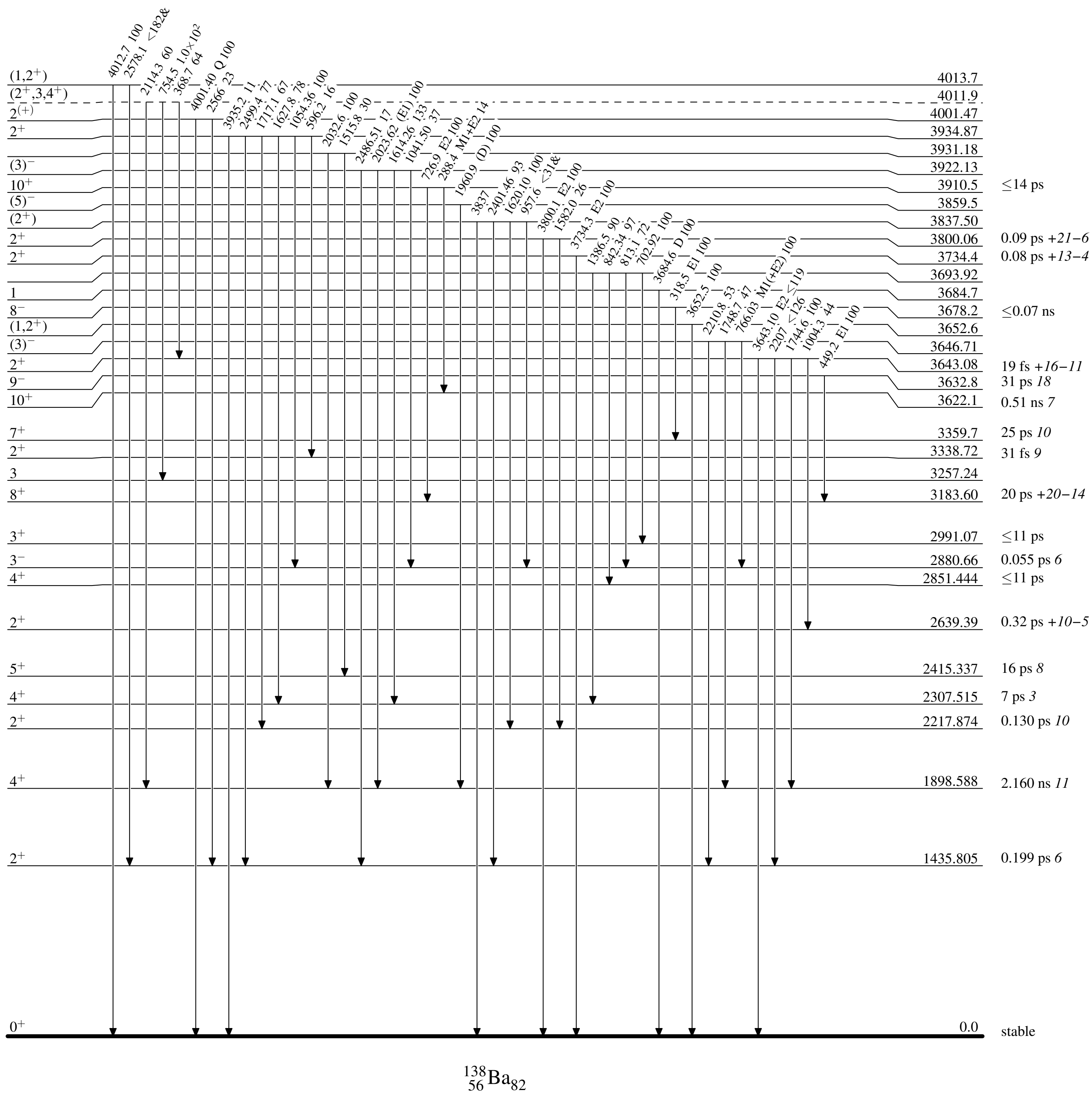


$^{138}_{56}Ba_{82}$

Adopted Levels, Gammas

Level Scheme (continued)

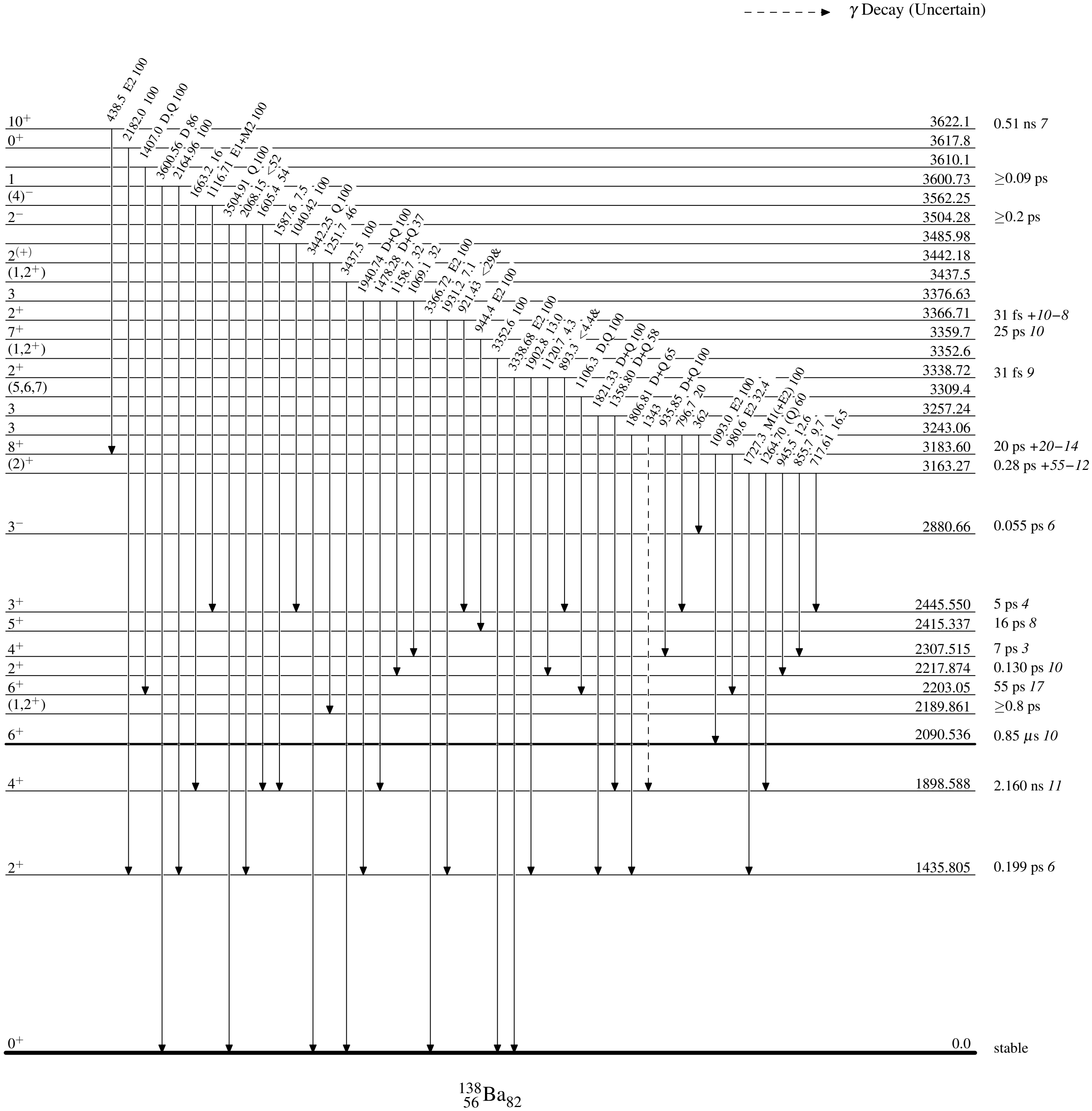
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



Adopted Levels, Gammas

Level Scheme (continued)

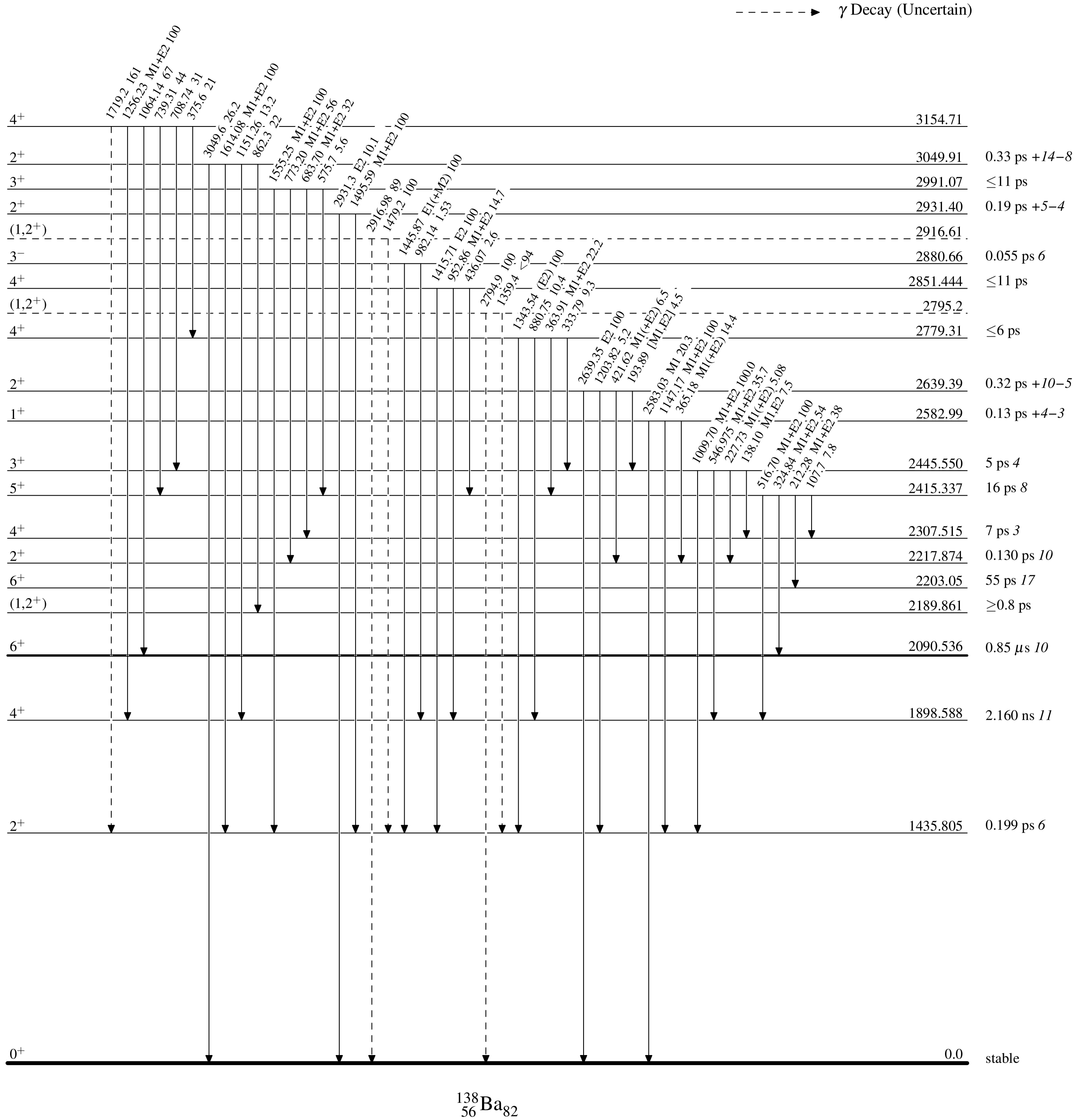
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



Adopted Levels, Gammas

Level Scheme (continued)

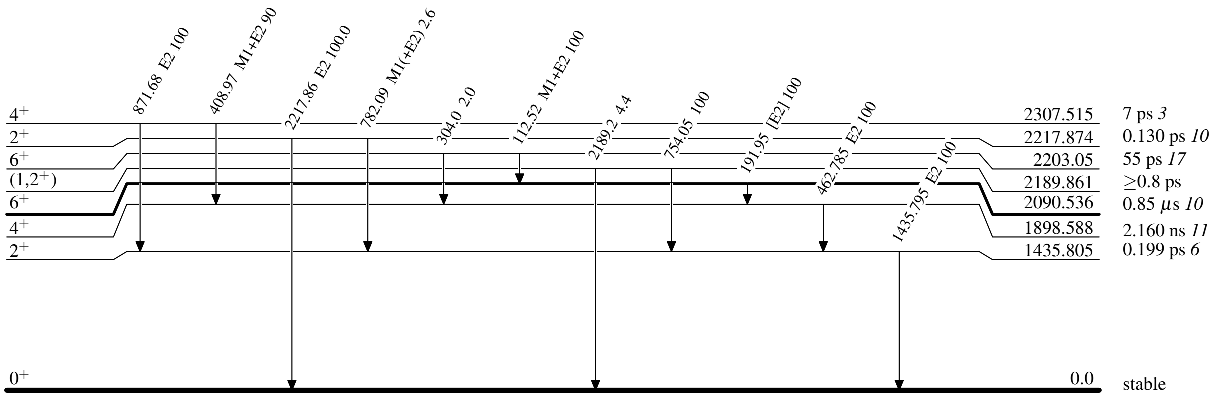
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



Adopted Levels, Gammas

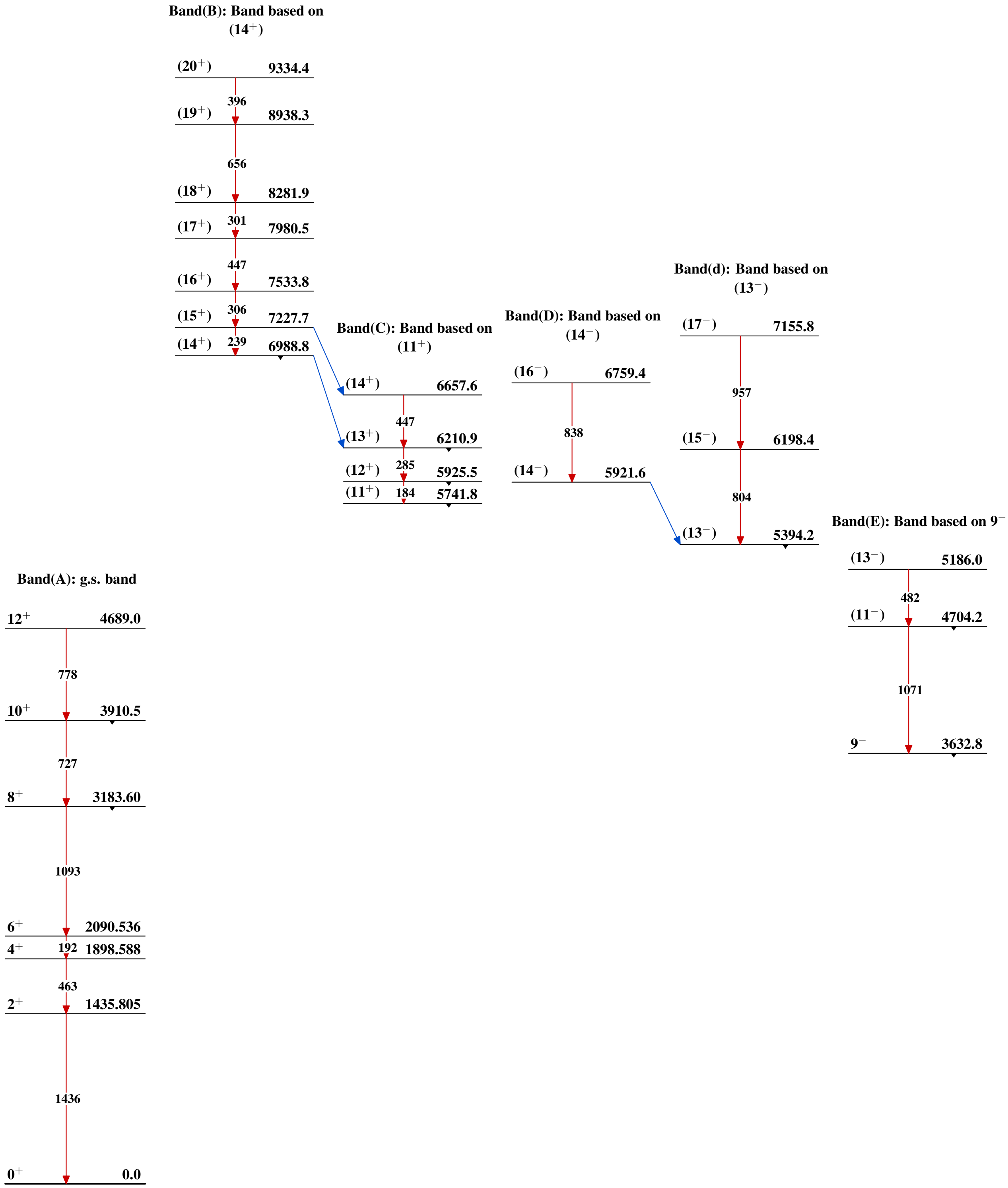
Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



$^{138}_{56}Ba_{82}$

Adopted Levels, Gammas



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