

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	T. D. Johnson, D. Symochko(a), M. Fadil(b), and J. K. Tuli		NDS 112,1949 (2011)	1-Jun-2010

$Q(\beta^-)=2181.9$; $S(n)=6181.8$; $S(p)=10655.11$; $Q(\alpha)=-295.7$ [2012Wa38](#)
 Note: Current evaluation has used the following Q record 2177 96183 810654 12-295 7 [2011AuZZ](#).
 $Q(\beta^-n)=-2982.8$, $Q(\epsilon p)=-16937.7$ [2011AuZZ](#).
 Values in [2003Au03](#): $Q(\beta^-)=2212.5$, $S(n)=6169.10$, $S(p)=10635.12$, $Q(\alpha)=-100.4$, $Q(\beta^-n)=-2956.7$, $Q(\epsilon p)=-16790.9$.
 Optical isotope shift: [1997Co26](#) (with respect to ¹⁴⁰Ba, ¹⁴⁴Ba).
 Nuclear structure, calculations, theory: [2007Ji05](#), [1997Sa16](#), [1995Hi10](#), [1995Ba45](#) (also [1992Eg01](#), [1991Eg01](#), [1990Eg01](#)), [1992Wo11](#), [1992Na07](#).

¹⁴²Ba Levels

Cross Reference (XREF) Flags

- A ¹⁴²Cs β⁻ decay
- B ²⁴⁸Cm SF decay

E(level) [†]	J ^π [‡]	T _{1/2}	XREF	Comments
0.0 [@]	0 ⁺	10.6 min 2	AB	%β ⁻ =100 T _{1/2} : weighted average: 10.65 min 12 (1969Ca03), 10.80 min 16 (1972Eh02), 10.3 min 1 (1974Gr29). HFS, isomer shift (1988We07 , 1985Ne09 , 1983Mu12 , 1981Ne06), mass (1986Au02).
359.596 [@] 14	2 ⁺	65 [#] ps 2	AB	μ=+0.852 10 (2005St24 , 1988Wo03 , 1986Gi14) T _{1/2} : from 1990Ma25 . Other values: 82 ps 8 (2005Bi02), 79 ps 6 (1980ChZM), 0.07 ns 4 (1974JaYY), 58 ps 6 (1983MaYT), 64 ps 7 (1988MaZH). See also: 1989Ma38 , 1989Mo06 . J ^π : γ to 0 ⁺ is E2 (β decay).
834.81 [@] 9	4 ⁺	12.5 ps 8	AB	T _{1/2} : weighted average: 11.9 ps 9 (1990Ma25) and 17.3 ps 25 (2005Bi02). J ^π : from DCO ratio, polarization and band placement.
1292.20 ^{&} 14	(3 ⁻)		AB	J ^π : based on systematics.
1326.48 5	1 ⁻	10 [#] ps 5	A	J ^π : 1 or 3 from γγ(θ) in β decay of ¹⁴² Cs; γ to 0 ⁺ excludes 3. Allowed β ⁻ from 0 ⁻ .
1424.06 6	2 ⁺	<9 [#] ps	A	J ^π : γγ(θ) in β decay of ¹⁴² Cs, γ to 2 ⁺ is E2 (δ>10).
1465.98 [@] 24	6 ⁺	7.2 ps 13	B	J ^π : from DCO ratio, polarization and band placement. T _{1/2} : from ²⁵² Cf SF decay (1983MaYT).
1535.53 7	0 ⁺	9 [#] ps 7	A	J ^π : γγ(θ) in β decay of ¹⁴² Cs, γ to 2 ⁺ .
1541.57 ^{&} 23	5 ⁻		B	J ^π : from DCO ratio and polarization.
1639.60 10	0 ⁺	<16 [#] ps	A	J ^π : γγ(θ) in β decay of ¹⁴² Cs, syst for even-even nuclei.
1693.0? 3	2 ⁺		A	J ^π : γγ(θ) in β decay of ¹⁴² Cs, γ to 2 ⁺ is M1+E2.
1747.40 ^b 23	5 ⁽⁺⁾		B	J ^π : from DCO ratio and polarization.
1781.50 10			A	
1848.41 ^a 21	6 ⁺		B	J ^π : from DCO ratio and polarization.
1952.7 ^{&} 4	7 ⁻		B	J ^π : from DCO ratio and polarization.
2070.1 ^b 3	7 ⁽⁺⁾		B	J ^π : from DCO ratio and band placement.
2127.9 3	0 ⁺		A	J ^π : γγ(θ) in β decay of ¹⁴² Cs, γ to 2 ⁺ .
2159.4 [@] 4	8 ⁺		B	J ^π : from DCO ratios and polarization.
2229.3 ^a 3	8 ⁽⁺⁾		B	J ^π : from DCO ratio.
2341.77 10	1		A	J ^π : J=3 or 1 from γγ(θ), γ to 0 ⁺ excludes 3.
2513.8 ^{&} 4	9 ⁻		B	J ^π : from DCO ratio and polarization.
2569.78 11			A	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{142}Ba Levels (continued)

E(level) [†]	J ^π [‡]	XREF	Comments
2680.1 ^b 4	(9 ⁺)	B	
2814.9 ^a 4	(10 ⁺)	B	
2882.57 16	(1,2 ⁺)	A	J ^π : γ to 0 ⁺ .
2925.9 [@] 4	(10 ⁺)	B	J ^π : from band assignment.
3144.38 23	(1)	A	J ^π : γ to 0 ⁺ ,2 ⁺ ; β from 0 ⁻ .
3153.9 ^{&} 5	(11 ⁻)	B	
3261.7 4	(1)	A	J ^π : γ to 0 ⁺ ,2 ⁺ ; β from 0 ⁻ .
3283.29 19	(1)	A	J ^π : γ to 0 ⁺ ,2 ⁺ ; β from 0 ⁻ .
3343.0 ^b 5		B	
3507.3 ^a 5		B	
3573.08 24	(1)	A	J ^π : γ to 0 ⁺ ; β from 0 ⁻ .
3794.9 [@] 5		B	
3932.9 ^{&} 6		B	
4369.3 4	(1)	A	J ^π : γ to 0 ⁺ , β from 0 ⁻ .
4517.4? [@] 6		B	
5280.4 4		A	

[†] Least-squares fit to data from ^{142}Ce β^- decay and ^{248}Cm SF decay. Some levels from ^{252}Cf resulting in γ placement not consistent with ^{248}Cm SF decay were not adopted.

[‡] From angular correlation and polarization measurements in ^{248}Cm SF decay, except where noted.

[#] From $\beta\gamma\gamma(t)$ (1990Ma25).

[@] Band(A): g.s. band. Levels 3795 and 4517 have been assigned to octupole band by 1995Zh34.

[&] Band(B): octupole band.

^a Band(C): possible rotational band-1.

^b Band(D): possible rotational band-2.

Adopted Levels, Gammas (continued)

$\gamma(^{142}\text{Ba})$									
$E_i(\text{level})$	J_i^π	E_γ^{\ddagger}	I_γ^{\ddagger}	E_f	J_f^π	Mult.	δ	α^\ddagger	Comments
359.596	2 ⁺	359.598 14	100	0.0	0 ⁺	E2		0.0257	B(E2)(W.u.)=32.1 10 $\alpha(\text{K})=0.0212$ 3; $\alpha(\text{L})=0.00356$ 5; $\alpha(\text{M})=0.000748$ 11; $\alpha(\text{N}+..)=0.000183$ 3 $\alpha(\text{N})=0.0001589$ 23; $\alpha(\text{O})=2.31 \times 10^{-5}$ 4; $\alpha(\text{P})=1.232 \times 10^{-6}$ 18
834.81	4 ⁺	475.17 9	100	359.596	2 ⁺	E2		0.01135	B(E2)(W.u.)=45 4 $\alpha(\text{K})=0.00952$ 14; $\alpha(\text{L})=0.001455$ 21; $\alpha(\text{M})=0.000303$ 5; $\alpha(\text{N}+..)=7.49 \times 10^{-5}$ 11 $\alpha(\text{N})=6.48 \times 10^{-5}$ 9; $\alpha(\text{O})=9.57 \times 10^{-6}$ 14; $\alpha(\text{P})=5.70 \times 10^{-7}$ 8 Mult.: compatible with $\gamma\gamma(\theta)$.
1292.20	(3 ⁻)	457.26 15	20 2	834.81	4 ⁺				
		932.82 20	100 15	359.596	2 ⁺	D+Q			
1326.48	1 ⁻	966.89 7	69 6	359.596	2 ⁺	D+(Q)	-0.013 8		
		1326.46 7	100.0 15	0.0	0 ⁺				
1424.06	2 ⁺	1064.54 7	87 18	359.596	2 ⁺	E2+(M1)	>10	0.001586 23	B(E2)(W.u.)>0.48 $\alpha(\text{K})=0.001363$ 20; $\alpha(\text{L})=0.0001773$ 25; $\alpha(\text{M})=3.64 \times 10^{-5}$ 6; $\alpha(\text{N}+..)=9.12 \times 10^{-6}$ $\alpha(\text{N})=7.84 \times 10^{-6}$ 11; $\alpha(\text{O})=1.194 \times 10^{-6}$ 17; $\alpha(\text{P})=8.46 \times 10^{-8}$ 12 Mult.: from $\gamma\gamma(\theta)$.
		1423.9 1	100 5	0.0	0 ⁺	Q			
1465.98	6 ⁺	631.1 3	100	834.81	4 ⁺	E2		0.00532 8	B(E2)(W.u.)=18 4 $\alpha(\text{K})=0.00451$ 7; $\alpha(\text{L})=0.000641$ 9; $\alpha(\text{M})=0.0001329$ 19; $\alpha(\text{N}+..)=3.30 \times 10^{-5}$ 5 $\alpha(\text{N})=2.85 \times 10^{-5}$ 4; $\alpha(\text{O})=4.26 \times 10^{-6}$ 6; $\alpha(\text{P})=2.76 \times 10^{-7}$ 4
1535.53	0 ⁺	209.1 5	3.3 3	1326.48	1 ⁻				
		1175.93 6	100 2	359.596	2 ⁺	Q			
1541.57	5 ⁻	249.2		1292.20	(3 ⁻)				
		706.8 3	100	834.81	4 ⁺	E1		0.001519 22	$\alpha(\text{K})=0.001314$ 19; $\alpha(\text{L})=0.0001632$ 23; $\alpha(\text{M})=3.34 \times 10^{-5}$ 5; $\alpha(\text{N}+..)=8.36 \times 10^{-6}$ $\alpha(\text{N})=7.18 \times 10^{-6}$ 10; $\alpha(\text{O})=1.097 \times 10^{-6}$ 16; $\alpha(\text{P})=7.96 \times 10^{-8}$ 12
1639.60	0 ⁺	1280.0 1	100	359.596	2 ⁺	Q			
1693.0?	2 ⁺	1333.4 3	100	359.596	2 ⁺	D+Q	-0.94 29		
1747.40	5 ⁽⁺⁾	205.8 3	37 9	1541.57	5 ⁻				
		912.6 3	100 14	834.81	4 ⁺	(M1)			
1781.50		1421.9 1	100	359.596	2 ⁺	D+(Q)			
1848.41	6 ⁺	101.0 3	38 13	1747.40	5 ⁽⁺⁾	[D+Q]			
		306.9 3	100 10	1541.57	5 ⁻	[E1]			
		382.4 3	25 13	1465.98	6 ⁺				I_γ : 88 in ²⁵² Cf SF decay.

Adopted Levels, Gammas (continued)

γ(¹⁴²Ba) (continued)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[‡]</u>	<u>I_γ[‡]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.</u>	<u>δ</u>	<u>Comments</u>
1848.41	6 ⁺	1013.6 3	73 10	834.81	4 ⁺	E2		I _γ : 48 in ²⁵² Cf SF decay.
1952.7	7 ⁻	411.8 2	13 2	1541.57	5 ⁻	[E2]		
		487.0 3	100 11	1465.98	6 ⁺	E1		
2070.1	7 ⁽⁺⁾	222.0 2	37 8	1848.41	6 ⁺	[D+Q]		
		323.2 2	25 5	1747.40	5 ⁽⁺⁾	[E2]		
		603.8 3	100 17	1465.98	6 ⁺	(M1)		
2127.9	0 ⁺	1768.3 3	100	359.596	2 ⁺	Q		
2159.4	8 ⁺	206.6 2	2.3 8	1952.7	7 ⁻	[E1]		
		693.4 3	100	1465.98	6 ⁺	E2		
2229.3	8 ⁽⁺⁾	159.0 3	46 9	2070.1	7 ⁽⁺⁾	[D+Q]		
		276.8 3	35 5	1952.7	7 ⁻	[E1]		
		380.9 3	100 12	1848.41	6 ⁺	(E2)		
		763.4 3	69 8	1465.98	6 ⁺	(E2)		
2341.77	1	1015.3 1	15.9 11	1326.48	1 ⁻			
		1982.1 2	100 7	359.596	2 ⁺	D+(Q)	+0.09 5	
		2341.7 5	15.9 25	0.0	0 ⁺			
2513.8	9 ⁻	284 1	14 6	2229.3	8 ⁽⁺⁾	[D+Q]		
		354.3 3	100 8	2159.4	8 ⁺	E1		
		560.9 2	88 8	1952.7	7 ⁻	(E2)		
2569.78		1243.3 1	100	1326.48	1 ⁻			
2680.1	(9 ⁺)	451.0 3	100 11	2229.3	8 ⁽⁺⁾	[D+Q]		
		609.8 3	84 18	2070.1	7 ⁽⁺⁾	[E2]		
2814.9	(10 ⁺)	301.1 3	22 6	2513.8	9 ⁻	[D]		
		585.7 3	100 9	2229.3	8 ⁽⁺⁾	[E2]		
		655.4 3	24 6	2159.4	8 ⁺	[Q]		
2882.57	(1,2 ⁺)	1101.1 2	74 22	1781.50				
		2522.9 4	66 10	359.596	2 ⁺			
		2882.5 3	100 9	0.0	0 ⁺			
2925.9	(10 ⁺)	412.1 3	43 9	2513.8	9 ⁻	[D]		
		766.5 3	100 13	2159.4	8 ⁺	[E2]		
3144.38	(1)	1818.0 3	100 11	1326.48	1 ⁻			
		2784.6 5	39 9	359.596	2 ⁺			
		3144.2 5	46 10	0.0	0 ⁺			
3153.9	(11 ⁻)	228.0 3	42 8	2925.9	(10 ⁺)	[D]		
		640.1 3	100 20	2513.8	9 ⁻	[E2]		
3261.7	(1)	1935.2 4	100 11	1326.48	1 ⁻			
		3261.6 5	49 8	0.0	0 ⁺			
3283.29	(1)	1956.8 4	45 8	1326.48	1 ⁻			
		2923.5 3	83 8	359.596	2 ⁺			
		3283.4 3	100 10	0.0	0 ⁺			
3343.0		662.9 3	100	2680.1	(9 ⁺)			

Adopted Levels, Gammas (continued)

$\gamma(^{142}\text{Ba})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\ddagger	I_γ^\ddagger	E_f	J_f^π	$E_i(\text{level})$	J_i^π	E_γ^\ddagger	I_γ^\ddagger	E_f	J_f^π
3507.3		692.4 3	100	2814.9	(10 ⁺)	4369.3	(1)	4009.3 7	25 7	359.596	2 ⁺
3573.08	(1)	2246.1 4	60 7	1326.48	1 ⁻			4369.3 4	100 9	0.0	0 ⁺
		3573.3 3	100 7	0.0	0 ⁺	4517.4?		722.5 3	100	3794.9	
3794.9		641.0 3	100 50	3153.9	(11 ⁻)	5280.4		2397.8 4	100 9	2882.57	(1,2 ⁺)
		869 1	25 15	2925.9	(10 ⁺)			2938.6 5	17 4	2341.77	1
3932.9		779.0 3	100	3153.9	(11 ⁻)						

[†] Additional information 1.

[‡] Taken from ^{142}Cs β^- decay, if present. Otherwise, from ^{248}Cm SF decay.

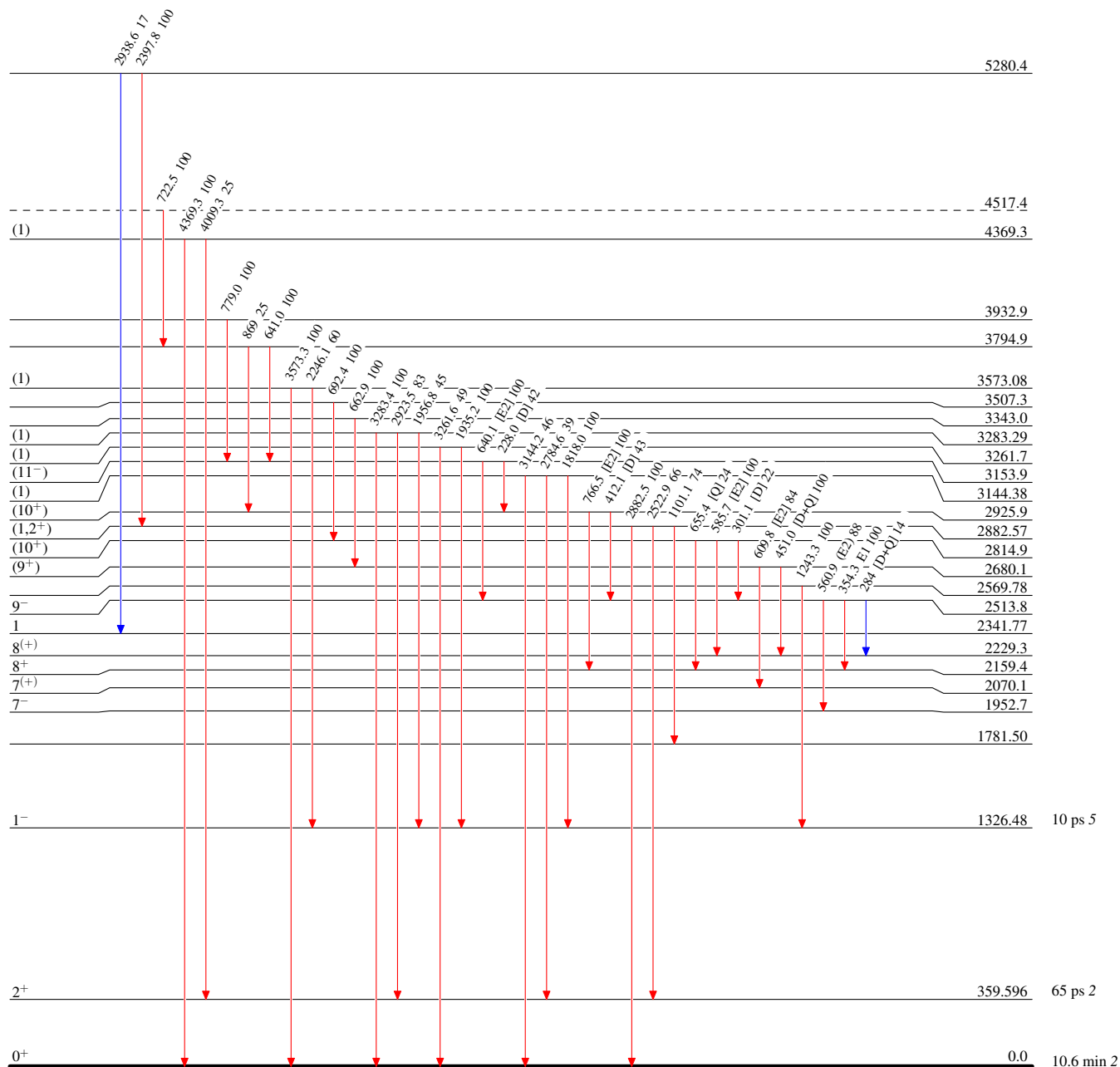
Adopted Levels, Gammas

Level Scheme

Intensities: Type not specified

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



$^{142}_{56}\text{Ba}_{86}$

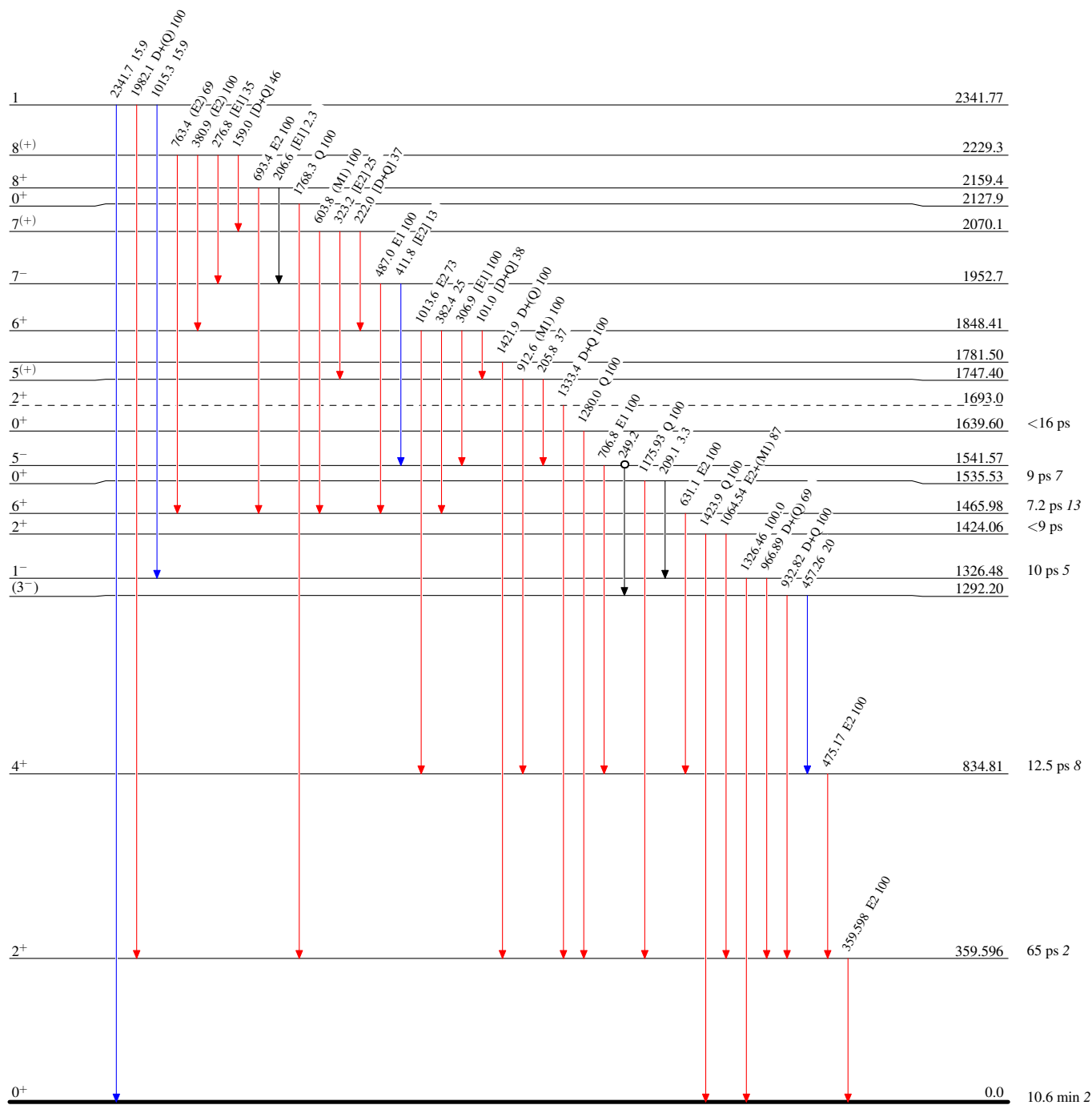
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- Coincidence
- Coincidence (Uncertain)



$^{142}_{56}\text{Ba}_{86}$

Adopted Levels, Gammas