

¹³⁹Xe β⁻ decay (39.68 s) 1988Fa06,1980Le03,1972Ac02

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	P. K. Joshi, B. Singh, S. Singh, A. K. Jain		NDS 138,1 (2016)	15-Oct-2016

Parent: ¹³⁹Xe: E=0.0; J^π=3/2⁻; T_{1/2}=39.68 s 14; Q(β⁻)=5057 4; %β⁻ decay=100

¹³⁹Xe-J^π,T_{1/2}: From ¹³⁹Xe Adopted Levels.

¹³⁹Xe-Q(β⁻): From 2012Wa38.

1988Fa06: TRISTAN. Measured E_γ, I_γ, γγ-coincidences, and γγ(θ=0°,35°,55°,90° or 15°,30°,45°,60°,75°,90°).

1980Le03: measured E_γ, I_γ, and γγ-coincidences.

1972Ac02 measured E_γ, I_γ and ce (Si(Li)).

2011Ro42: measured level half-lives by βγ(t) and γγ(t) using fast timing system. ¹³⁹Xe source produced in photofission of ²³⁸U by 50-MeV electron beam from the ALTO facility at Orsay.

Others:

2014Fi11 (conference article): measured total absorption γ spectrum using Modular Total Absorption Spectrometer (MTAS) at HRIBF-ORNL facility. ¹³⁹Xe produced in ²³⁸U(p,F),E=40 MeV followed by mass separation by magnetic spectrometer. Deduced average electromagnetic energy release of 1126 keV, about 20% higher than obtained from the decay scheme presented here. The results are stated as preliminary.

Additional information 1.

1999No05: measured E_γ, I_γ, γ(t), and γγ-coincidences (OSIRIS); 120 s collection period with 15 s measurement intervals.

1981ReZZ: measured E_β, I_β.

1975Al11 measured total absorption γ spectrum and deduced β strength function.

1973Ad04: 1978Wo15, 1978Wu04: measured βγ-coin.

1973Jo02: measured total absorption γ spectra, β-strength functions.

1967Ho18: decay study of ¹³⁹Xe.

¹³⁹Cs Levels

1988Fa06 updated the level scheme proposed by 1980Le03. The major modifications of 1988Fa06 were: 1) identification of a close-lying doublet at ≈394 keV, 2) level at 1186 keV proposed by 1980Le03 was not confirmed, 3) placement of 16 γ's changed, 4) 26 γ's placed by 1980Le03 were not placed by 1988Fa06, and 5) J^π(¹³⁹Xe g.s.)=3/2⁻ was assumed by 1988Fa06 instead of the 7/2⁻ assumed by 1980Le03. 1988Fa06 suggest that the placement of the 186 level by 1980Le03 is incorrect; however, evaluators note that there is a possible confusion in identification of the 1814 and 1818 γ's.

1999No05, on the basis of 216.7γ and 595.5γ coincidences, suggested a modification of the level scheme. These measurements resulted in a change in placement of the 595.43γ from deexciting the 2104 level to deexciting a 595 level and the observation of two additional γ's (914.9 and 1126.5) which were assigned to levels at 1510 and 1722, respectively.

E(level) [†]	J ^π [‡]	T _{1/2} [#]	Comments
0.0	7/2 ⁺		%β ⁻ =100
218.627 24	5/2 ⁺ ,7/2 ⁺	2.23 ns 5	Configuration=π2d _{5/2} (2011Ro42).
289.74 4	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	96 ps 25	
393.59 3	5/2 ⁺ ,7/2 ⁺	24 ps 15	
393.63 3	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺) [@]	1.71 ns 2	
515.11 4	3/2 ⁺ ,5/2 ⁺	6 ps +10-6	
595.43 & 13	(9/2 ⁺)		
646.51 6	3/2,5/2,7/2 ⁺		
710.12 5			
732.38 4	3/2 ⁺ ,5/2,7/2 ⁺		
891.53 6	3/2,5/2,7/2 ⁺		
942.59 4	3/2,5/2,7/2 ⁺		
1006.52 4	1/2 ⁽⁺⁾ ,3/2,5/2	15 ps 10	
1020.27 6	3/2,5/2,7/2 ⁺		
1037.23 9			
1138.86 5			

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¹³⁹Xe β⁻ decay (39.68 s) [1988Fa06](#),[1980Le03](#),[1972Ac02](#) (continued)

¹³⁹Cs Levels (continued)

E(level) [†]	J ^{π‡}	E(level) [†]	J ^{π‡}	E(level) [†]	J ^{π‡}
1214.39 15		2099.61 15		2937.00 21	3/2,5/2
1395.08 9		2103.8? 4	3/2,5/2,7/2 ⁺	2967.62 10	1/2 ⁽⁺⁾ ,3/2,5/2
1411.6 3		2119.49? 15		2980.3? 3	1/2 ⁽⁺⁾ ,3/2,5/2
1461.24 7		2185.52 5	1/2 ⁽⁺⁾ ,3/2,5/2	3130.37? 18	3/2 ⁽⁺⁾ ,5/2
1508.43 7		2304.67 8	3/2,5/2	3146.7? 3	3/2,5/2
1510.33& 24		2328.82 6	3/2,5/2	3155.98? 23	3/2,5/2
1600.02 7		2372.86 7	1/2 ⁽⁺⁾ ,3/2,5/2	3208.68 15	1/2,3/2,5/2
1652.76 6		2423.83 23	3/2,5/2,7/2 ⁺	3372.69? 19	1/2,3/2,5/2
1693.85 11		2432.46 23		3375.35 16	3/2,5/2
1718.29 8		2510.45 7	3/2,5/2	3504.64? 17	3/2,5/2
1721.94& 24		2585.95 9	1/2 ⁽⁺⁾ ,3/2,5/2	3745.54 25	1/2,3/2,5/2
1738.60 5		2620.39 8	1/2 ⁽⁺⁾ ,3/2,5/2	3775.83? 12	1/2,3/2,5/2
1793.17 21		2727.73 17		3815.27? 22	1/2,3/2,5/2
1816.47 ^a 4	3/2,5/2,7/2 ⁺	2754.04? 17	3/2,5/2	3924.67? 21	1/2,3/2,5/2
1831.30 23		2797.39 11	1/2 ⁽⁺⁾ ,3/2,5/2	4227.9? 3	1/2 ⁻ ,3/2 ⁻ ,5/2 ⁻
2063.60 11	3/2,5/2,7/2 ⁺	2852.31? 17	1/2 ⁽⁺⁾ ,3/2,5/2		

[†] From least-squares fit to E_γ data. The uncertainties of 996.4_γ from 1214 level and 1115.0_γ were doublet to 0.4 keV and 0.2 keV, respectively. Several γ rays with questionable placements were not included in the fitting procedure, when a level was defined by another γ ray with a definite placement. Reduced $\chi^2=1.6$ is somewhat larger than critical $\chi^2=1.3$.

[‡] From the Adopted Levels.

[#] From [2011Ro42](#), measured by $\beta\gamma(t)$ and $\gamma\gamma(t)$, fast timing technique between the BaF₂ and LaBr₃ detectors with slow gating on the HPGe detector. The time spectra were analyzed by shape deconvolution method, and half-life obtained as a slope on the delayed part of the time spectrum and/or by the centroid-shift method, the latter, especially for shorter half-lives up to about 10 ps or so.

[@] [1988Fa06](#) suggest 1/2⁺ based on lack of γ to 7/2⁺; however, this is not consistent with the probable dipole nature of the 175_γ.

[&] Suggested by [1999No05](#).

^a On the basis of a strong 218_γ-1816_γ coin, [1988Fa06](#) suggest that the 1816 level proposed by [1980Le03](#) is not confirmed; however, from the singles data of [1988Fa06](#) a 1814_γ is assigned on the basis the coin, and this could correspond to the 1814_γ assigned by [1980Le03](#) to 2104.

β⁻ radiations

β_γ-coincidences from [1973Ad04](#) and [1978Wu04](#).

<E_β>=1.72 MeV 6 ([1982Al01](#). Si(Li)) is in excellent agreement with <E_β>=1737 keV 12 from the decay scheme. From total absorption γ spectrum, [2014Fi11](#) deduce a preliminary value of 1126 keV for the average electromagnetic energy release per decay, which is about 20% higher than expected from the present decay scheme, which suggests that the presently known discrete γ data for the decay ¹³⁹Xe are incomplete.

[1973Ad04](#), [1978Wo15](#), and [1978Wu04](#) measured β_γ-coincidences (scin,Ge(Li)).

E(decay)	E(level)	I _β ^{-†@}	Log ft [‡]	Comments
(829& 4)	4227.9?	0.10 7	5.9 4	av E _β =276.2 16
(1132& 4)	3924.67?	0.16 10	6.1 3	av E _β =398.9 17
(1242& 4)	3815.27?	0.10 8	6.5 4	av E _β =444.8 17
(1281& 4)	3775.83?	0.21 17	6.2 4	av E _β =461.4 17
(1312 4)	3745.54	0.40 8	6.0 1	av E _β =474.3 17
(1552& 4)	3504.64?	0.41 20	6.3 2	av E _β =578.3 18
(1682 4)	3375.35	0.42 12	6.4 1	av E _β =635.0 18

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¹³⁹Xe β⁻ decay (39.68 s) **1988Fa06,1980Le03,1972Ac02** (continued)

β⁻ radiations (continued)

E(decay)	E(level)	Iβ ^{-†@}	Log ff [‡]	Comments
(1684 & 4)	3372.69?	0.14 8	6.9 3	av Eβ=636.2 18
(1848 4)	3208.68	0.40 6	6.6 1	av Eβ=708.9 18
(1901 & 4)	3155.98?	0.13 9	7.1 3	av Eβ=732.4 18
(1910 & 4)	3146.7?	0.09 7	7.3 4	av Eβ=736.6 18
(1927 & 4)	3130.37?	0.24 17	6.9 3	av Eβ=743.9 18
(2077 & 4)	2980.3?	0.15 10	7.2 3	av Eβ=811.3 18
(2089 4)	2967.62	0.81 14	6.5 1	av Eβ=817.1 18
(2120 4)	2937.00	0.24 4	7.0 1	av Eβ=830.9 19
(2205 & 4)	2852.31?	0.17 13	7.2 4	av Eβ=869.3 19
(2260 4)	2797.39	1.10 15	6.5 1	av Eβ=894.2 19
(2303 & 4)	2754.04?	0.41 17	6.9 2	av Eβ=913.9 19
(2329 4)	2727.73	0.20 5	7.3 [#] 1	av Eβ=925.9 19
(2437 4)	2620.39	0.79 13	6.8 1	av Eβ=974.9 19
(2471 4)	2585.95	0.98 17	6.7 1	av Eβ=990.7 19
(2547 4)	2510.45	1.84 21	6.5 1	av Eβ=1025.3 19
(2625 4)	2432.46	0.31 9	7.3 [#] 1	av Eβ=1061.1 19
(2633 & 4)	2423.83	≤0.20	≥7.5 [#]	av Eβ=1065.2 19
(2684 4)	2372.86	0.71 10	7.0 1	av Eβ=1088.6 19
(2728 4)	2328.82	2.7 4	6.4 1	av Eβ=1108.8 19
(2752 4)	2304.67	3.0 15	6.4 2	av Eβ=1120.0 19
(2872 4)	2185.52	2.1 15	6.6 4	av Eβ=1175.0 19
(2938 & 4)	2119.49?	0.6 4	7.2 [#] 4	av Eβ=1205.5 19
(2957 4)	2099.61	0.26 6	7.6 [#] 1	av Eβ=1214.8 19
(2993 4)	2063.60	0.5 4	7.3 [#] 4	av Eβ=1231.5 19
(3226 4)	1831.30	0.32 14	7.7 [#] 2	av Eβ=1339.3 19
(3241 & 4)	1816.4?	≤0.14	≥8.0 [#]	av Eβ=1346.2 19
(3318 4)	1738.60	1.29 17	7.1 [#] 1	av Eβ=1382.4 19
(3339 4)	1718.29	0.57 7	7.5 [#] 1	av Eβ=1391.9 19
(3363 4)	1693.85	0.35 11	7.7 [#] 2	av Eβ=1403.3 19
(3404 4)	1652.76	1.7 3	7.0 [#] 1	av Eβ=1422.4 19
(3457 4)	1600.02	0.38 9	7.7 [#] 1	av Eβ=1447.0 19
(3549 & 4)	1508.43	0.22 12	7.9 [#] 3	av Eβ=1489.8 19
(3596 4)	1461.24	0.86 14	7.4 [#] 1	av Eβ=1511.8 19
(3645 & 4)	1411.6	≤0.18	≥8.2 [#]	av Eβ=1535.0 19
(3662 4)	1395.08	0.34 7	7.9 [#] 1	av Eβ=1542.7 19
(3843 4)	1214.39	0.23 7	8.1 [#] 3	av Eβ=1627.3 19
(4020 4)	1037.23	0.23 4	8.2 [#] 1	av Eβ=1710.1 19
				E(decay): Measured value=3880 60 (1972LeYH).
(4037 4)	1020.27	1.15 22	7.5 [#] 1	av Eβ=1718.2 19
(4051 4)	1006.52	8.8 11	6.6 1	av Eβ=1724.6 19
(4114 4)	942.59	1.18 18	7.5 [#] 1	av Eβ=1754.6 19
(4166 4)	891.53	1.1 7	7.6 [#] 3	av Eβ=1778.5 19
(4325 4)	732.38	2.2 3	7.4 [#] 1	av Eβ=1853.2 19
(4347 & 4)	710.12	0.11 6	8.7 [#] 3	av Eβ=1863.6 19
(4411 4)	646.51	0.33 10	8.2 [#] 2	av Eβ=1893.5 19
				E(decay): measured value=4380 60 (1972LeYH).
(4462 & 4)	595.43	≤0.28	≥8.3	av Eβ=1917.5 19
(4542 4)	515.11	21.9 24	6.45 5	av Eβ=1955.2 19

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^{139}Xe β^- decay (39.68 s) 1988Fa06,1980Le03,1972Ac02 (continued) β^- radiations (continued)

<u>E(decay)</u>	<u>E(level)</u>	<u>$I\beta^{-\dagger@}$</u>	<u>$\text{Log } f t^{\ddagger}$</u>	<u>Comments</u>
				E(decay): measured value=4450 60 (1972LeYH).
(4663 4)	393.63	1.2 5	7.7 [#] 2	av $E\beta=2012.3$ 19
(4663 4)	393.59	13.9 18	6.7 1	av $E\beta=2012.3$ 19
(4767 4)	289.74	1.9 9	7.6 [#] 2	av $E\beta=2061.1$ 19
(4838 4)	218.627	4.9 16	7.2 [#] 2	av $E\beta=2094.5$ 19
(5057 4)	0.0	15 10	8.6 ^{1u} 3	av $E\beta=2175.9$ 19
				$I\beta^-$: other: 15 6 (quoted by 1988Fa06 from thesis by 1987RoZW).

[†] Uncertainties include estimates of uncertainties caused by multiply-placed or uncertain gammas.

[‡] Uniqueness from decay scheme.

[#] $\log f^{1u}t > 8.5$.

[@] Absolute intensity per 100 decays.

[&] Existence of this branch is questionable.

¹³⁹Xe β⁻ decay (39.68 s) **1988Fa06,1980Le03,1972Ac02 (continued)**

γ(¹³⁹Cs)

I_γ normalization, I(γ+ce) normalization: from I_γ(218.6γ) relative to I_γ(1283.3γ; ¹³⁹Cs) (measured in an equilibrium ¹³⁹Xe-¹³⁹Cs source), I_γ(1283.3γ) relative to I_γ(165.8γ; ¹³⁹Ba) (corrected for time dependence of ¹³⁹Cs-¹³⁹Ba activity ratio) and I_γ(165.8γ; ¹³⁹Ba)=23.76% 25 (1980Ge04). I_γ(218.6γ)/I_γ(1283.3γ; ¹³⁹Cs) and I_γ(1283.3γ; ¹³⁹Cs)/I_γ(165.8γ; ¹³⁹Ba) were derived by the evaluators from I_γ normalization(¹³⁹Xe)=0.052 6 and I_γ normalization(¹³⁹Cs)=0.0077 30 (1980Le03) and I_γ(165.8γ; ¹³⁹Ba).

α(K)exp, K/L+: from 1972Ac02.

γ-γ-coincidences shown on drawing are primarily from 1988Fa06 with some from 1980Le03 and 1999No05.

RI(L) TVUnweighted average of discrepant I_γ measurements from 1988Fa06 and 1980Le03 for the following transitions:

E _γ	1980Le03	1988Fa06	E _γ	1980Le03	1988Fa06	E _γ	1980Le03	1988Fa06
565.4	1.1 3	2.0 1	946.5	1.7 4	0.5 1	1584.7	2.8 4	1.5 1
569.6	1.6 3	3.8 2	1137.5	7.1 5	5.6 3	1681.1	1.9 4	4.9 2
595.4	3.5 4	6.5 1	1190.6	0.9 4	2.1 1	1700.2	1.9 4	3.6 2
601.8	9.3 7	32.1 5	1199.4	2.4 4	4.0 1	1711.4	4.1 4	6.0 7
626.9	14.0 12	20.3 4	1219.3	2.8 4	4.0 2	2110.1	5.2 4	7.0 2
896.3	3.8 5	1.3 1	1437.7	1.3 5	2.7 2			
942.6	2.1 4	0.6 1	1459.0	2.8 5	5.9 2			

1980Le03	1988Fa06 (ΔE<0.1)	1980Le03	1988Fa06	1980Le03 (ΔE<0.1)	1988Fa06	(ΔE<0.1)
x652.58 13	652.7	x1021.4 6	1022.5	x1699.8 3	1700.7	
x926.0 6	927.6	1416.94 20	1416.1	1816.7 4	1818.5	
961.1 4	960.2	1448.7 3	1449.4	x1831.5 4	1829.0	
X996.19 11	996.6	x1540.8 5	1539.4	x2063.90 12	2063.5	
x1006.25 14	1005.7	x1609.3 4	1608.1			

E _γ [†]	I _γ ^{‡r}	E _i (level)	J _i ^π	E _f	J _f ^π	Mult.#	δ [#]	α ^p	I _(γ+ce) ^r	Comments
55.7@u 3	1.9& 5	2119.49?		2063.60	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	D(+Q)			10 7	α(exp)≥1.105 23 α(K)=7 6; α(L)=1.0 9; α(M)=0.4 4 Mult.,δ: M1(+E2), δ≤0.5 3 or E1(+M2), δ≤0.28 6 from I(γ+ce) and I _γ . I _(γ+ce) : ≤15.4 14 from intensity balancing at the 2064 level and ≥4.0 11 from α(E1)=1.096 and I _γ . α(exp): upper limit from I(γ+ce) and I _γ ; lower limit from α(E1)=1.105.
71.0 4	3.6 1	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	218.627	5/2 ⁺ ,7/2 ⁺	[M1,E2]		4.4 20		α(K)=2.7 7; α(L)=1.4 11; α(M)=0.30 24 α(N)=0.060 48; α(O)=0.0070 54; α(P)=8.4×10 ⁻⁵ 3
103.75 6	5.6& 4	393.59	5/2 ⁺ ,7/2 ⁺	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	M1(+E2)	<0.87	0.99 18		α(K)exp=0.73 13

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^{139}Xe β^- decay (39.68 s) **1988Fa06,1980Le03,1972Ac02 (continued)**

$\gamma(^{139}\text{Cs})$ (continued)

E_γ †	I_γ ‡r	E_i (level)	J_i^π	E_f	J_f^π	Mult. #	α^p	$I_{(\gamma+ce)}$ r	Comments
									$\alpha(\text{K})=0.78$ 9; $\alpha(\text{L})=0.168$ 76; $\alpha(\text{M})=0.035$ 17 $\alpha(\text{N})=0.0073$ 33; $\alpha(\text{O})=9.3\times 10^{-4}$ 38; $\alpha(\text{P})=2.79\times 10^{-5}$ 8 K/L+ too low and attributed to a contribution by the γ line to ce(L+) (1972Ac02).
119.4@u 4	1.2& 4	2304.67	3/2,5/2	2185.52	1/2(+),3/2,5/2			27 26	$I_{(\gamma+ce)}$: ≤ 51.2 18 from intensity balancing at the 2186 level and ≥ 1.4 5 from $\alpha(\text{E1})=0.134$ and I_γ .
121.37ta 8	8.4t 3	515.11	3/2+,5/2+	393.63	(3/2+,5/2+,7/2+)				E_γ : level-energy difference=121.47 6.
121.37t 8	1.1t 1	515.11	3/2+,5/2+	393.59	5/2+,7/2+				E_γ : level-energy difference=121.52 5.
174.97tbc 4	202t 13	393.59	5/2+,7/2+	218.627	5/2+,7/2+	(M1+E2)d	0.23 4	229e 15	$\alpha(\text{K})\text{exp}=0.122$ 15; K/(L+M+N)+O+P=10 4 ce(K)/($\gamma+ce$)=0.148 15; ce(L)/($\gamma+ce$)=0.029 11; ce(M)/($\gamma+ce$)=0.0060 25 ce(N)/($\gamma+ce$)=0.00124 49; ce(O)/($\gamma+ce$)=1.59 $\times 10^{-4}$ 55; ce(P)/($\gamma+ce$)=5.14 $\times 10^{-6}$ 18 $\alpha(\text{K})=0.182$ 21; $\alpha(\text{L})=0.035$ 14; $\alpha(\text{M})=0.0073$ 30 $\alpha(\text{N})=0.00152$ 60; $\alpha(\text{O})=1.95\times 10^{-4}$ 67; $\alpha(\text{P})=6.30\times 10^{-6}$ 10 $\alpha(\text{K})\text{exp,K/L+}$: for doublet.
174.97tbc 4	154t 14	393.63	(3/2+,5/2+,7/2+)	218.627	5/2+,7/2+	(M1+E2)d	0.23 4	175e 16	ce(K)/($\gamma+ce$)=0.148 15; ce(L)/($\gamma+ce$)=0.029 11; ce(M)/($\gamma+ce$)=0.0060 25 ce(N)/($\gamma+ce$)=0.00124 49; ce(O)/($\gamma+ce$)=1.59 $\times 10^{-4}$ 55; ce(P)/($\gamma+ce$)=5.14 $\times 10^{-6}$ 18 $\alpha(\text{K})=0.182$ 21; $\alpha(\text{L})=0.035$ 14; $\alpha(\text{M})=0.0073$ 30 $\alpha(\text{N})=0.00152$ 60; $\alpha(\text{O})=1.95\times 10^{-4}$ 67; $\alpha(\text{P})=6.30\times 10^{-6}$ 10
181.3f 1	2.5 1	891.53	3/2,5/2,7/2+	710.12					
218.59b 3	1000	218.627	5/2+,7/2+	0.0	7/2+	E2,M1	0.113 11		$\alpha(\text{K})\text{exp}=0.082$ 12; K/(L+M+N)+O+P=4.1 4 $\alpha(\text{K})=0.093$ 5; $\alpha(\text{L})=0.0159$ 44;

¹³⁹Xe β⁻ decay (39.68 s) **1988Fa06,1980Le03,1972Ac02 (continued)**

γ(¹³⁹Cs) (continued)

E_γ †	I_γ ‡ ^r	E_i (level)	J_i^π	E_f	J_f^π	Mult. #	α^P	Comments
								$\alpha(M)=0.00332$ 96 $\alpha(N)=6.9\times 10^{-4}$ 19; $\alpha(O)=9.0\times 10^{-5}$ 21; $\alpha(P)=3.31\times 10^{-6}$ 16 Mult.: $\alpha(K)$ exp gives M1(+E2) with $\delta < 1.25$, K/L+ ratio suggests pure E2.
225.38 7	53.9 5	515.11	3/2 ⁺ ,5/2 ⁺	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	[M1,E2]	0.103 9	$\alpha(K)=0.085$ 4; $\alpha(L)=0.0143$ 37; $\alpha(M)=0.00299$ 81 $\alpha(N)=6.2\times 10^{-4}$ 17; $\alpha(O)=8.2\times 10^{-5}$ 18; $\alpha(P)=3.03\times 10^{-6}$ 17
289.78 ^b 7	164 7	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	0.0	7/2 ⁺	E2,M1	0.0486	$\alpha(K)$ exp=0.031 6 $\alpha(K)=0.0408$ 13; $\alpha(L)=0.0063$ 9; $\alpha(M)=0.00130$ 19 $\alpha(N)=0.00027$ 4; $\alpha(O)=3.6\times 10^{-5}$ 4; $\alpha(P)=1.49\times 10^{-6}$ 15 Mult.: $\delta(E2/M1) > 0.65$.
296.53 ^b 7	388 8	515.11	3/2 ⁺ ,5/2 ⁺	218.627	5/2 ⁺ ,7/2 ⁺	E2,M1	0.0455 8	$\alpha(K)$ exp=0.036 5 $\alpha(K)=0.0382$ 14; $\alpha(L)=0.0058$ 8; $\alpha(M)=0.00121$ 17 $\alpha(N)=0.00025$ 4; $\alpha(O)=3.4\times 10^{-5}$ 3; $\alpha(P)=1.39\times 10^{-6}$ 15
305.0 ^f 1	0.7 1	1037.23		732.38	3/2 ⁺ ,5/2,7/2 ⁺			E_γ : from Table I in 1988Fe06 , authors' level-scheme Fig. 1 lists 305.5.
326.8 ^o 4	1.6 1	1037.23		710.12				
338.86 7	11.1 2	732.38	3/2 ⁺ ,5/2,7/2 ⁺	393.59	5/2 ⁺ ,7/2 ⁺	(M1,E2)	0.0310 15	$\alpha(K)$ exp=0.016 12 $\alpha(K)=0.0262$ 18; $\alpha(L)=0.0039$ 3; $\alpha(M)=0.00079$ 6
356.72 8	9.4 1	646.51	3/2,5/2,7/2 ⁺	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺		0.09 4	$\alpha(K)$ exp=0.079 25 Mult.: 1972Ac02 suggest M2,E3, but $\alpha(K)=0.519$ for M2 and 0.515 for E3 barely overlap the experimental value. High value of $\alpha(K)$ exp may be due to E0 admixture in the 356.7 transition. α : deduced from $\alpha(K)$ exp.
388.6 ^f 1	1.1 1	1395.08		1006.52	1/2 ⁽⁺⁾ ,3/2,5/2			
393.50 6	120 ^{&} 6	393.59	5/2 ⁺ ,7/2 ⁺	0.0	7/2 ⁺	E2,M1	0.0204 17	$\alpha(K)$ exp=0.015 3; K/(L+M+N)+O+P=3 1 $\alpha(K)=0.0173$ 18; $\alpha(L)=0.00246$ 4; $\alpha(M)=0.000507$ 11 $\alpha(N)=0.0001065$ 18; $\alpha(O)=1.45\times 10^{-5}$ 4; $\alpha(P)=6.4\times 10^{-7}$ 10 K/L+ value is a factor of ≈ 2.5 too low for M1, E2 or E1. $\alpha(K)=0.010$ 6; $\alpha(L)=0.0012$ 8; $\alpha(M)=0.00025$
427.7 4	1.3 1	942.59	3/2,5/2,7/2 ⁺	515.11	3/2 ⁺ ,5/2 ⁺	[D,E2]	0.011 7	
441.3 7	1.7 1	1461.24		1020.27	3/2,5/2,7/2 ⁺			
442.7 4	3.2 1	732.38	3/2 ⁺ ,5/2,7/2 ⁺	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	[M1,E2]	0.0148 16	$\alpha(K)=0.0126$ 16; $\alpha(L)=0.00176$ 6; $\alpha(M)=0.000361$ 10
446.8 ^o 3	1.8 1	2185.52	1/2 ⁽⁺⁾ ,3/2,5/2	1738.60				
454.46 13	4.6 1	1461.24		1006.52	1/2 ⁽⁺⁾ ,3/2,5/2			
^x 466.8 3	1.3 1							In coin. with 732γ.
^x 482.6 ^f 1	0.4 1							
491.47 ^t 4	6 ^t 1	710.12		218.627	5/2 ⁺ ,7/2 ⁺			
491.47 ^t 4	26 ^t 3	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	515.11	3/2 ⁺ ,5/2 ⁺			
498.2 5	0.8 1	891.53	3/2,5/2,7/2 ⁺	393.59	5/2 ⁺ ,7/2 ⁺	[D,E2]	0.008 5	$\alpha(K)=0.006$ 4; $\alpha(L)=0.0008$ 5; $\alpha(M)=0.00017$ 11
505.07 8	6.4 1	1020.27	3/2,5/2,7/2 ⁺	515.11	3/2 ⁺ ,5/2 ⁺			

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¹³⁹Xe β⁻ decay (39.68 s) 1988Fa06,1980Le03,1972Ac02 (continued)

γ(¹³⁹Cs) (continued)

E _γ [†]	I _γ ^{‡r}	E _i (level)	J _i ^π	E _f	J _f ^π	Mult.#	δ [#]	α ^P	Comments
513.88 11	15.0 & 15	732.38	3/2 ⁺ ,5/2,7/2 ⁺	218.627	5/2 ⁺ ,7/2 ⁺	[M1,E2]		0.0100 13	α(K)=0.0086 12; α(L)=0.00116 9; α(M)=0.000238 16
515.44 14	6.6 2	515.11	3/2 ⁺ ,5/2 ⁺	0.0	7/2 ⁺	[M1,E2]		0.0099 13	α(K)=0.0085 12; α(L)=0.00115 9; α(M)=0.000236 16 α(N)=5.0×10 ⁻⁵ 4; α(O)=6.8×10 ⁻⁶ 7; α(P)=3.2×10 ⁻⁷ 6
518.8 ^f 1	0.9 1	1461.24		942.59	3/2,5/2,7/2 ⁺				
^x 523.9 ^f 1	0.8 1								In coin. with 818γ.
549.02 ^t 4	1.1 ^t 1	942.59	3/2,5/2,7/2 ⁺	393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)				
549.02 ^t 4	12.3 ^t 3	942.59	3/2,5/2,7/2 ⁺	393.59	5/2 ⁺ ,7/2 ⁺				
565.4 3	1.6 5	1508.43		942.59	3/2,5/2,7/2 ⁺				
569.64 22	2.7 11	1461.24		891.53	3/2,5/2,7/2 ⁺				
579.4 ^f 1	1.0 1	1718.29		1138.86					
585.6 ^f 1	0.8 1	2185.52	1/2 ⁽⁺⁾ ,3/2,5/2	1600.02					
589.8 4	1.5 1	2328.82	3/2,5/2	1738.60					
595.43 13	5.0 15	595.43	(9/2 ⁺)	0.0	7/2 ⁺	(M1+E2)	-4.2 +4-5	0.00599	α(K)=0.00509 8; α(L)=0.000716 11; α(M)=0.0001471 21 α(N)=3.09×10 ⁻⁵ 5; α(O)=4.20×10 ⁻⁶ 6; α(P)=1.86×10 ⁻⁷ 3 Originally placed as deexciting 2104 level; reassigned by 1999No05.
601.84 7	21 11	891.53	3/2,5/2,7/2 ⁺	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺				
612.82 ^t 4	81 ^t 8	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)				
612.82 ^t 4	22 ^t 2	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	393.59	5/2 ⁺ ,7/2 ⁺				
624.3 ^o 7	1.7 1	1138.86		515.11	3/2 ⁺ ,5/2 ⁺				
626.89 11	17 3	1020.27	3/2,5/2,7/2 ⁺	393.59	5/2 ⁺ ,7/2 ⁺				
634.2 ^f 1	0.6 1	2372.86	1/2 ⁽⁺⁾ ,3/2,5/2	1738.60					
646.50 7	11.1 2	646.51	3/2,5/2,7/2 ⁺	0.0	7/2 ⁺				
652.5 ^q 2	4.8 1	942.59	3/2,5/2,7/2 ⁺	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺				Additional information 2.
672.39 18	2.6 1	891.53	3/2,5/2,7/2 ⁺	218.627	5/2 ⁺ ,7/2 ⁺				
675.79 16	2.9 1	2328.82	3/2,5/2	1652.76					
699.6 3	1.5 1	1214.39		515.11	3/2 ⁺ ,5/2 ⁺				
710.40 18	3.5 1	1652.76		942.59	3/2,5/2,7/2 ⁺				
716.96 22	2.9 1	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺				
719.8 ^{@u} 6	1.2 & 5	2372.86	1/2 ⁽⁺⁾ ,3/2,5/2	1652.76					
723.84 6	32.2 4	942.59	3/2,5/2,7/2 ⁺	218.627	5/2 ⁺ ,7/2 ⁺				
730.4 3	2.7 1	1020.27	3/2,5/2,7/2 ⁺	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺				
732.42 6	34.1 4	732.38	3/2 ⁺ ,5/2,7/2 ⁺	0.0	7/2 ⁺	(M1,E2)		0.0041 7	α(K)exp≤0.0048

¹³⁹Xe β⁻ decay (39.68 s) **1988Fa06,1980Le03,1972Ac02 (continued)**

γ(¹³⁹Cs) (continued)

<u>E_γ[†]</u>	<u>I_γ^{‡r}</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Comments</u>
						α(K)=0.0036 6; α(L)=0.00046 6; α(M)=9.5×10 ⁻⁵ 12
745.16 ^t 7	8.4 ^t 9	1138.86		393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
745.16 ^t 7	1.0 ^t 1	1138.86		393.59	5/2 ⁺ ,7/2 ⁺	
761.04 16	3.5 1	1652.76		891.53	3/2,5/2,7/2 ⁺	
772.0 ^f 1	1.0 1	2510.45	3/2,5/2	1738.60		
773.4 ^o 5	2.0 1	2185.52	1/2 ⁽⁺⁾ ,3/2,5/2	1411.6		
775.6 4	1.5 1	1508.43		732.38	3/2 ⁺ ,5/2,7/2 ⁺	
783.1 ^{@u} 5	1.1 4	3155.98?	3/2,5/2	2372.86	1/2 ⁽⁺⁾ ,3/2,5/2	
786.7 6	0.4 1	1793.17		1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	
788.04 8	63 1	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	218.627	5/2 ⁺ ,7/2 ⁺	
801.62 9	10.6 2	1020.27	3/2,5/2,7/2 ⁺	218.627	5/2 ⁺ ,7/2 ⁺	
818.29 ^o 15	4.9 1	1037.23		218.627	5/2 ⁺ ,7/2 ⁺	
820.5 ^{gu} 4	1.4 1	2328.82	3/2,5/2	1508.43		
832.41 24	1.3 1	2432.46		1600.02		
847.45 12	4.6 1	2585.95	1/2 ⁽⁺⁾ ,3/2,5/2	1738.60		
^x 868.7 ^f 1	1.0 1					
879.74 18	2.8 2	1395.08		515.11	3/2 ⁺ ,5/2 ⁺	
888.6 5	1.2 1	1831.30		942.59	3/2,5/2,7/2 ⁺	
891.76 18	3.1 2	891.53	3/2,5/2,7/2 ⁺	0.0	7/2 ⁺	
896.3 3	2.6 13	1411.6		515.11	3/2 ⁺ ,5/2 ⁺	
^x 908.9 ^f 1	3.9 2					In coin. with 602γ.
914.9 ^h 2		1510.33		595.43	(9/2 ⁺)	
924.5 6	2.9 2	2063.60	3/2,5/2,7/2 ⁺	1138.86		
926.8 ^q 8	0.6 1	2620.39	1/2 ⁽⁺⁾ ,3/2,5/2	1693.85		Additional information 8.
937.9 ^{gu} 4	1.2 1	2754.04?	3/2,5/2	1816.4?	3/2,5/2,7/2 ⁺	
942.61 22	1.4 8	942.59	3/2,5/2,7/2 ⁺	0.0	7/2 ⁺	
946.5 3	1.1 6	1461.24		515.11	3/2 ⁺ ,5/2 ⁺	
957.3 ^{gu} 4	1.2 1	3924.67?	1/2,3/2,5/2	2967.62	1/2 ⁽⁺⁾ ,3/2,5/2	
960.6 ^q 5	1.0 2	1693.85		732.38	3/2 ⁺ ,5/2,7/2 ⁺	
967.3 ^{oiu} 5	1.2 1	2620.39	1/2 ⁽⁺⁾ ,3/2,5/2	1652.76		
970.3 ^o 4	1.5 1	2185.52	1/2 ⁽⁺⁾ ,3/2,5/2	1214.39		
980.59 ^{gu} 18	2.2 1	2119.49?		1138.86		
^x 980.8 ^f 1	2.2 1					
986.02 ^o 11	5.4 2	1718.29		732.38	3/2 ⁺ ,5/2,7/2 ⁺	
996.4 ^q 2	5.3 2	1214.39		218.627	5/2 ⁺ ,7/2 ⁺	Additional information 3.
1001.7 4	1.1 1	1395.08		393.59	5/2 ⁺ ,7/2 ⁺	
1006.0 ^q 3	4.6 1	1652.76		646.51	3/2,5/2,7/2 ⁺	Additional information 4.
1017.7 3	1.6 2	3745.54	1/2,3/2,5/2	2727.73		
1022.0 ^{qgu} 6	0.7 1	2620.39	1/2 ⁽⁺⁾ ,3/2,5/2	1600.02		Additional information 9.

¹³⁹Xe β⁻ decay (39.68 s) **1988Fa06,1980Le03,1972Ac02 (continued)**

γ(¹³⁹Cs) (continued)

E_γ †	I_γ ‡	E_i (level)	J_i^π	E_f	J_f^π	Comments
1036.3 ^{gu} 3	2.2 2	3155.98?	3/2,5/2	2119.49?		
1046.31 ^o 15	5.3 2	2185.52	1/2 ⁽⁺⁾ ,3/2,5/2	1138.86		
1067.56 ^{tc} 24	0.3 ^f 1	1461.24		393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
1067.56 ^{tc} 24	2.6 ^f 2	1461.24		393.59	5/2 ⁺ ,7/2 ⁺	
1099.48 ^{gu} 5	1.1 1	2119.49?		1020.27	3/2,5/2,7/2 ⁺	
1105.6 3	1.8 1	1395.08		289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
1114.8 ^f 1	2.4 2	1508.43		393.59	5/2 ⁺ ,7/2 ⁺	
1115.0 ^{saf} 1	3.1 ^{sj} 5	1508.43		393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
1115.0 ^{saf} 1	3.1 ^{sj} 5	2328.82	3/2,5/2	1214.39		
1126.5 ^h 2		1721.94		595.43	(9/2 ⁺)	
^x 1129.2 ^f 1	1.4 1					In coin. with 602γ.
1137.52 10	6.4 8	1652.76		515.11	3/2 ⁺ ,5/2 ⁺	
1149.2 ^{gu} 3	2.5 3	2980.3?	1/2 ⁽⁺⁾ ,3/2,5/2	1831.30		
1171.5 4	2.6 1	1461.24		289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
1176.3 6	1.4 1	1395.08		218.627	5/2 ⁺ ,7/2 ⁺	
1178.73 ^t 12	6 ^t 1	1693.85		515.11	3/2 ⁺ ,5/2 ⁺	
1178.73 ^t 12	0.5 ^t 3	2185.52	1/2 ⁽⁺⁾ ,3/2,5/2	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	
^x 1184.6 2						Possible presence in coin. data.
1190.6 6	1.5 6	2585.95	1/2 ⁽⁺⁾ ,3/2,5/2	1395.08		
1199.43 ^{gu} 23	3.2 8	2852.31?	1/2 ⁽⁺⁾ ,3/2,5/2	1652.76		
1206.45 ^t 10	3.4 ^t 2	1600.02		393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
1206.45 ^t 10	6.3 ^t 3	1600.02		393.59	5/2 ⁺ ,7/2 ⁺	
1214.9 ^{@u} 4	1.3 ^{&} 4	1214.39		0.0	7/2 ⁺	
1219.33 21	3.4 6	2727.73		1508.43		
1228.8 5	1.4 1	2967.62	1/2 ⁽⁺⁾ ,3/2,5/2	1738.60		
1233.8 ^f 1	0.7 1	2372.86	1/2 ⁽⁺⁾ ,3/2,5/2	1138.86		
1242.88 8	11.6 2	2185.52	1/2 ⁽⁺⁾ ,3/2,5/2	942.59	3/2,5/2,7/2 ⁺	
1259.26 9	9.8 3	1652.76		393.59	5/2 ⁺ ,7/2 ⁺	
^x 1267.0 ^f 1	0.8 1					In coin. with 218γ.
1273.18 ^{gu} 5	0.8 1	3372.69?	1/2,3/2,5/2	2099.61		
1289.47 19	8.8 2	1508.43		218.627	5/2 ⁺ ,7/2 ⁺	
1291.4 ^o 4	3.1 5	2328.82	3/2,5/2	1037.23		
1297.85 19	7.9 1	2304.67	3/2,5/2	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	
1299.8 9	0.9 1	1693.85		393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
1309.4 ^{@u} 8	1.6 ^{&} 10	1600.02		289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
1309.4 8	5.9 2	2328.82	3/2,5/2	1020.27	3/2,5/2,7/2 ⁺	
1316.4 4	2.7 2	1831.30		515.11	3/2 ⁺ ,5/2 ⁺	
1324.38 ^o 21	3.7 4	1718.29		393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	

^{139}Xe β^- decay (39.68 s) **1988Fa06,1980Le03,1972Ac02** (continued)

$\gamma(^{139}\text{Cs})$ (continued)

E_γ †	I_γ ‡r	E_i (level)	J_i^π	E_f	J_f^π	Comments
1344.93 ^t 7	18 ^t 1	1738.60		393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
1344.93 ^t 7	1.8 ^t 1	1738.60		393.59	5/2 ⁺ ,7/2 ⁺	
1351.6 ^{gu} 4	1.7 1	3775.83?	1/2,3/2,5/2	2423.83	3/2,5/2,7/2 ⁺	
1362.91 12	5.6 2	1652.76		289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
1367.19 16	3.0 1	2099.61		732.38	3/2 ⁺ ,5/2,7/2 ⁺	
1386.19 11	9.2 4	2328.82	3/2,5/2	942.59	3/2,5/2,7/2 ⁺	
1404.16 25	2.3 1	1693.85		289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
1416.5 ^q 4	3.1 1	2063.60	3/2,5/2,7/2 ⁺	646.51	3/2,5/2,7/2 ⁺	
1416.94 ^{@u} 20	2.8& 4	2423.83	3/2,5/2,7/2 ⁺	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	
1428.70 ^o 21	3.3 1	2937.00	3/2,5/2	1508.43		
1434.13 24	4.4 3	1652.76		218.627	5/2 ⁺ ,7/2 ⁺	
1437.7 7	2.0 7	1831.30		393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
1449.0 ^q 4	2.5 1	1738.60		289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
1453.32 10	8.7 2	2185.52	1/2 ⁽⁺⁾ ,3/2,5/2	732.38	3/2 ⁺ ,5/2,7/2 ⁺	
1458.98 22	4.4 16	2967.62	1/2 ⁽⁺⁾ ,3/2,5/2	1508.43		
1481.5 ^f 1	1.2 2	2620.39	1/2 ⁽⁺⁾ ,3/2,5/2	1138.86		
1490.0 4	3.7 5	2510.45	3/2,5/2	1020.27	3/2,5/2,7/2 ⁺	
1503.1 ^o 6	3.6 1	2510.45	3/2,5/2	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	
1520.17 8	12.7 5	1738.60		218.627	5/2 ⁺ ,7/2 ⁺	
1540.1 ^{qgu} 7	1.1 1	2432.46		891.53	3/2,5/2,7/2 ⁺	Additional information 6.
1543.6 ^{gu} 6	0.5 1	3375.35	3/2,5/2	1831.30		
1579.5 ^{gu} 4	3.5 6	2585.95	1/2 ⁽⁺⁾ ,3/2,5/2	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	
1584.7 ^g 4	2.2 7	2099.61		515.11	3/2 ⁺ ,5/2 ⁺	
1608.7 ^q 6	1.7 1	3208.68	1/2,3/2,5/2	1600.02		Additional information 11.
^x 1611.6 ^f 1	1.6 2					In coin. with 218 γ and 290 γ .
1612.4 ^{@u} 4	2.6 5	1831.30		218.627	5/2 ⁺ ,7/2 ⁺	
1613.8 ^f 1	4.7 3	2620.39	1/2 ⁽⁺⁾ ,3/2,5/2	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	
1615.0 ^{@u} 3	2.8& 5	2754.04?	3/2,5/2	1138.86		
^x 1635.2 ^f 1	1.3 1					
1641.7 3	2.8 2	3745.54	1/2,3/2,5/2	2103.8?	3/2,5/2,7/2 ⁺	
1652.8 ^{@u} 3	2.0& 5	1652.76		0.0	7/2 ⁺	
^x 1653.6 ^f 1	4.6 6					
^x 1665.4 ^f 1	0.8 1					
^x 1666.2 ^{gn} 6	0.8 1					
1670.33 8	19.7 3	2185.52	1/2 ⁽⁺⁾ ,3/2,5/2	515.11	3/2 ⁺ ,5/2 ⁺	
1681.1 3	3.4 15	3375.35	3/2,5/2	1693.85		
1700.2 ^q 5	2.8 9	2432.46		732.38	3/2 ⁺ ,5/2,7/2 ⁺	Additional information 7.
1711.44 ^{gu} 17	5.0 10	3504.64?	3/2,5/2	1793.17		

¹³⁹Xe β⁻ decay (39.68 s) **1988Fa06,1980Le03,1972Ac02 (continued)**

γ(¹³⁹Cs) (continued)

E_γ †	I_γ ‡r	E_i (level)	J_i^π	E_f	J_f^π	Comments
1722.6 ^{gu} 6	1.9 2	3375.35	3/2,5/2	1652.76		
^x 1765.0 ^f 1	0.9 1					
1765.2 ^{gu} 6	0.9 1	2980.3?	1/2 ⁽⁺⁾ ,3/2,5/2	1214.39		
^x 1769.0 ^f 1	0.7 1					In coin. with 218γ.
1773.84 13	5.4 1	2063.60	3/2,5/2,7/2 ⁺	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
1776.9 ^o 4	3.3 2	2797.39	1/2 ⁽⁺⁾ ,3/2,5/2	1020.27	3/2,5/2,7/2 ⁺	
1786.6 ^{@u} 4	1.1 & 4	2432.46		646.51	3/2,5/2,7/2 ⁺	
1790.85 18	7.7 2	2797.39	1/2 ⁽⁺⁾ ,3/2,5/2	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2	
1793.0 5	1.1 2	1793.17		0.0	7/2 ⁺	
1803.99 ^{gu} 25	2.0 2	4227.9?	1/2 ⁻ ,3/2 ⁻ ,5/2 ⁻	2423.83	3/2,5/2,7/2 ⁺	
^x 1804.1 ^f 1	2.0 2					
1814.1 ^{ok} 4	2.2 3	2328.82	3/2,5/2	515.11	3/2 ⁺ ,5/2 ⁺	
1817.6 ^{qgku} 9	2.7 3	1816.4?	3/2,5/2,7/2 ⁺	0.0	7/2 ⁺	
^x 1818.5 ^f 1	2.7 3					
^x 1830.2 ^{taq} 6	0.6 ^t 1					
1830.2 ^{taq} 6	1.4 ^t 1	2967.62	1/2 ⁽⁺⁾ ,3/2,5/2	1138.86		Additional information 10.
1851.8 ^{gu} 5	1.7 1	3504.64?	3/2,5/2	1652.76		
^x 1852.3 ^f 1	1.7 1					In coin. with 732γ.
^x 1853.3 ^f 1	3.4 2					In coin. with 218γ.
1854.5 ^{@u} 5	2.3 & 6	2797.39	1/2 ⁽⁺⁾ ,3/2,5/2	942.59	3/2,5/2,7/2 ⁺	
1857.6 4	2.0 1	2372.86	1/2 ⁽⁺⁾ ,3/2,5/2	515.11	3/2 ⁺ ,5/2 ⁺	
1862.4 7	5.3 3	2510.45	3/2,5/2	646.51	3/2,5/2,7/2 ⁺	
1862.4 ^{gu} 7	1.3 1	2754.04?	3/2,5/2	891.53	3/2,5/2,7/2 ⁺	
1895.98 9	10.7 2	2185.52	1/2 ⁽⁺⁾ ,3/2,5/2	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
1911.42 ^{gu} 21	2.1 1	3372.69?	1/2,3/2,5/2	1461.24		
^x 1911.7 ^f 1	2.1 1					In coin. with 175γ.
1935.1 ^{sgu} 5	2.0 ^s 3	2328.82	3/2,5/2	393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
1935.1 ^{sgu} 5	2.0 ^s 3	2328.82	3/2,5/2	393.59	5/2 ⁺ ,7/2 ⁺	
^x 1939.5 ^f 1	1.7 3					
1939.5 ^{gu} 3	1.7 3	2585.95	1/2 ⁽⁺⁾ ,3/2,5/2	646.51	3/2,5/2,7/2 ⁺	
1967.3 3	2.2 1	2185.52	1/2 ⁽⁺⁾ ,3/2,5/2	218.627	5/2 ⁺ ,7/2 ⁺	
1979.57 ^l 11	9.3 2	2372.86	1/2 ⁽⁺⁾ ,3/2,5/2	393.59	5/2 ⁺ ,7/2 ⁺	
1994.2 ^o 4	1.5 2	2510.45	3/2,5/2	515.11	3/2 ⁺ ,5/2 ⁺	
2006.8 ^{gu} 4	2.0 2	3745.54	1/2,3/2,5/2	1738.60		
^x 2007.6 ^f 1	2.0 2					In coin. with 296γ.
2015.11 17	3.1 1	2304.67	3/2,5/2	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
2021.8 ^{gu} 4	1.8 1	2754.04?	3/2,5/2	732.38	3/2 ⁺ ,5/2,7/2 ⁺	

¹³⁹Xe β⁻ decay (39.68 s) **1988Fa06,1980Le03,1972Ac02 (continued)**

γ(¹³⁹Cs) (continued)

E_γ †	I_γ ‡r	E_i (level)	J_i^π	E_f	J_f^π	Comments
2025.1 5	1.0 2	2967.62	1/2 ⁽⁺⁾ ,3/2,5/2	942.59	3/2,5/2,7/2 ⁺	
2039.1 4	1.4 1	2328.82	3/2,5/2	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
2063.7 ^q 2	7.0 2	2063.60	3/2,5/2,7/2 ⁺	0.0	7/2 ⁺	Additional information 5.
2085.91 10	11.2 2	2304.67	3/2,5/2	218.627	5/2 ⁺ ,7/2 ⁺	
^x 2099.48 ^o 20	2.8 2					In coin. with 218y.
2103.7 ^{@u} 6	1.0& 3	2103.8?	3/2,5/2,7/2 ⁺	0.0	7/2 ⁺	
2110.12 13	6.1 9	2328.82	3/2,5/2	218.627	5/2 ⁺ ,7/2 ⁺	
2116.88 ^l 11	5.7 2	2510.45	3/2,5/2	393.59	5/2 ⁺ ,7/2 ⁺	
2192.32 13	6.0 5	2585.95	1/2 ⁽⁺⁾ ,3/2,5/2	393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
2204.6 6	0.8& 4	2423.83	3/2,5/2,7/2 ⁺	218.627	5/2 ⁺ ,7/2 ⁺	
2227.28 25	6.6 15	2620.39	1/2 ⁽⁺⁾ ,3/2,5/2	393.59	5/2 ⁺ ,7/2 ⁺	
2238.4 ^{mu} 6	2.6 4	2754.04?	3/2,5/2	515.11	3/2 ⁺ ,5/2 ⁺	
^x 2249.7 4	1.2& 3					
2255.3 ^{mu} 7	1.6 3	3146.7?	3/2,5/2	891.53	3/2,5/2,7/2 ⁺	
2291.61 21	7.2& 5	2510.45	3/2,5/2	218.627	5/2 ⁺ ,7/2 ⁺	
2304.97 16	5.2& 5	2304.67	3/2,5/2	0.0	7/2 ⁺	
2328.80 9	11.3&& 7	2328.82	3/2,5/2	0.0	7/2 ⁺	
2366.97 22	2.4 3	2585.95	1/2 ⁽⁺⁾ ,3/2,5/2	218.627	5/2 ⁺ ,7/2 ⁺	
2403.75 13	4.7 4	2797.39	1/2 ⁽⁺⁾ ,3/2,5/2	393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
2423.6 4	0.8& 2	2423.83	3/2,5/2,7/2 ⁺	0.0	7/2 ⁺	
2430.3 ^{mu} 6	0.7 2	3372.69?	1/2,3/2,5/2	942.59	3/2,5/2,7/2 ⁺	
2437.8 3	1.7 3	2727.73		289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
2451.6 6	0.8 3	2967.62	1/2 ⁽⁺⁾ ,3/2,5/2	515.11	3/2 ⁺ ,5/2 ⁺	
2464.6 ^{mu} 5	2.0 3	2754.04?	3/2,5/2	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
2507.6 6	1.4 4	2797.39	1/2 ⁽⁺⁾ ,3/2,5/2	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺	
2510.41 18	4.9& 5	2510.45	3/2,5/2	0.0	7/2 ⁺	
2535.0 ^{mu} 5	1.1 3	2754.04?	3/2,5/2	218.627	5/2 ⁺ ,7/2 ⁺	
2574.04 12	6.1 5	2967.62	1/2 ⁽⁺⁾ ,3/2,5/2	393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
2578.9 5	1.1 3	2797.39	1/2 ⁽⁺⁾ ,3/2,5/2	218.627	5/2 ⁺ ,7/2 ⁺	
2613.7 ^{mu} 7	0.6 3	3504.64?	3/2,5/2	891.53	3/2,5/2,7/2 ⁺	
2633.75 ^{mu} 22	1.9 3	2852.31?	1/2 ⁽⁺⁾ ,3/2,5/2	218.627	5/2 ⁺ ,7/2 ⁺	
2640.1 ^{mu} 6	0.6 3	3372.69?	1/2,3/2,5/2	732.38	3/2 ⁺ ,5/2,7/2 ⁺	
^x 2673.4 5	1.0& 3					
2693.4 5	1.4 4	3208.68	1/2,3/2,5/2	515.11	3/2 ⁺ ,5/2 ⁺	
2736.7 ^{su} 3	2.1 ^s 4	3130.37?	3/2 ⁽⁺⁾ ,5/2	393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)	
2736.7 ^{su} 3	2.1 ^s 4	3130.37?	3/2 ⁽⁺⁾ ,5/2	393.59	5/2 ⁺ ,7/2 ⁺	
2754.2 ^{mu} 4	1.2 3	2754.04?	3/2,5/2	0.0	7/2 ⁺	

¹³⁹Xe β⁻ decay (39.68 s) **1988Fa06,1980Le03,1972Ac02** (continued)

γ(¹³⁹Cs) (continued)

E_γ^\dagger	I_γ^\ddagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π
2761.6 ^{mu} 4	1.2 3	2980.3?	1/2 ⁽⁺⁾ ,3/2,5/2	218.627	5/2 ⁺ ,7/2 ⁺
2769.32 ^{mu} 12	5.3 4	3775.83?	1/2,3/2,5/2	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2
^x 2790.89 14	4.8 ^{&} 4				
2815.03 15	4.0 4	3208.68	1/2,3/2,5/2	393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)
2832.8 ^{mu} 4	1.1 2	4227.9?	1/2 ⁻ ,3/2 ⁻ ,5/2 ⁻	1395.08	
2854.2 4	1.6 3	3745.54	1/2,3/2,5/2	891.53	3/2,5/2,7/2 ⁺
2872.65 ^u 25	2.2 3	3815.27?	1/2,3/2,5/2	942.59	3/2,5/2,7/2 ⁺
^x 2886.6 4	1.5 ^{&} 3				
2903.8 ^{mu} 4	1.4 3	3924.67?	1/2,3/2,5/2	1020.27	3/2,5/2,7/2 ⁺
2911.7 ^u 4	1.2 3	3130.37?	3/2 ⁽⁺⁾ ,5/2	218.627	5/2 ⁺ ,7/2 ⁺
2918.3 ^{mu} 3	2.2 4	3924.67?	1/2,3/2,5/2	1006.52	1/2 ⁽⁺⁾ ,3/2,5/2
2936.2 5	1.0 3	2937.00	3/2,5/2	0.0	7/2 ⁺
^x 2941.8 3	1.4 ^{&} 3				
2989.4 ^{mu} 4	1.3 3	3504.64?	3/2,5/2	515.11	3/2 ⁺ ,5/2 ⁺
^x 3028.6 4	1.2 ^{&} 3				
3110.8 ^{smu} 7	0.7 ^s 4	3504.64?	3/2,5/2	393.63	(3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺)
3110.8 ^{smu} 7	0.7 ^s 4	3504.64?	3/2,5/2	393.59	5/2 ⁺ ,7/2 ⁺
3130.6 ^u 6	1.4 5	3130.37?	3/2 ⁽⁺⁾ ,5/2	0.0	7/2 ⁺
3146.6 ^{mu} 3	1.1 2	3146.7?	3/2,5/2	0.0	7/2 ⁺
3156.3 ^{mu} 4	0.8 2	3155.98?	3/2,5/2	0.0	7/2 ⁺
3168.7 ^u 4	1.1 2	3815.27?	1/2,3/2,5/2	646.51	3/2,5/2,7/2 ⁺
3214.8 ^{mu} 5	0.7 2	3504.64?	3/2,5/2	289.74	3/2 ⁺ ,5/2 ⁺ ,7/2 ⁺
3375.51 19	2.7 3	3375.35	3/2,5/2	0.0	7/2 ⁺
^x 3424.8 5	1.3 ^{&} 4				
3504.7 ^{mu} 3	1.2 2	3504.64?	3/2,5/2	0.0	7/2 ⁺

[†] From 1980Le03, except as noted. E_γ data of 1980Le03 were adopted by evaluators instead of the relatively more precise values of 1988Fa06 since they resulted in a more consistent least-squares analysis.

[‡] From 1988Fa06 for E_γ<2190, except as noted, and 1980Le03 for E_γ≥2190. Intensities for multiply-placed gammas were divided by 1988Fa06 on the basis of γγ-coincidence data.

[#] From α(K)_{exp} and K/L ratios.

[@] Not observed by 1988Fa06.

[&] From 1980Le03.

^a Discrepant with result from least-squares analysis.

^b E_γ=174.862 6, 218.751 10, 289.821 25, 296.611 12 (1979Bo26. Curved-crystal spect) not adopted by evaluators due to uncertainty in nuclide assignments (assignments made by comparison of E_γ with data in 1977B112).

$\gamma(^{139}\text{Cs})$ (continued)

^c Least-squares analysis suggests 174.84 5 and 175.36 9 for the members of 174.97 doublet and 1067.29 11 and 1067.66 8 for the members of the 1067.56 doublet.

^d Primarily E1 or M1 from K/L+ for the doublet. From $\alpha(K)$ exp one member of doublet appears to be E1+M2 and the other M1+E2.

^e Estimate from I_γ , $\alpha(K)$ exp, and K/L+.

^f From 1988Fa06. Maximum uncertainty of 0.1 keV given.

^g Placement from 1980Le03. Not placed by 1988Fa06.

^h From 1999No05.

ⁱ Placement suggested by evaluators based on level energy differences and $\gamma\gamma$ -coincidence. Unplaced by 1988Fa06.

^j Discrepancy between Fig. 1 and Table I of 1988Fa06 on division of intensities.

^k See comment on 1817 level.

^l Member of 394 doublet fed not indicated by 1988Fa06. Final level assigned by evaluators based on the least-squares analysis.

^m Placement considered uncertain by evaluators since placement of γ rays with $E_\gamma < 2200$ were not confirmed by 1988Fa06 and there are no $\gamma\gamma$ -coincidence data.

ⁿ Placed as deexciting 2852 level by 1980Le03. However, existence of 1886 daughter not confirmed by 1988Fa06.

^o Placements of the following γ rays proposed by 1980Le03 were modified on the basis of $\gamma\gamma$ -coincidence data by 1988Fa06: 967.3 γ from 1186 level; 446.8 γ and 2099.5 γ from 2100 level; 1814.1 γ from 2104 level; 326.8 γ from 2120 level; 773.4 γ from 2373 level; 1776.9 γ from 2424 level; 986.0 γ from 2586 level; 624.3 γ from 2728 level; 1428.7 γ and 1994.2 γ from 2937 level; 818.3 γ from 3147 level; 970.3 γ , 1324.4 γ and 1503.1 γ from 3156 level; 1046.3 γ from 3375 level; and 1291.4 γ from 4228 level.

^p Theoretical values from BrIcc v2.3b (16-Dec-2014) 2008Ki07, "Frozen Orbitals" approximation. When $\delta(E2/M1)$ is not given, value overlaps that for pure M1 and for pure E2.

^q Unweighted average of values from 1983Le03 and 1988Fa06 since the two seem discrepant. Uncertainty of 0.1 keV used in 1988Fa06 data.

^r For absolute intensity per 100 decays, multiply by 0.056 6.

^s Multiply placed with undivided intensity.

^t Multiply placed with intensity suitably divided.

^u Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

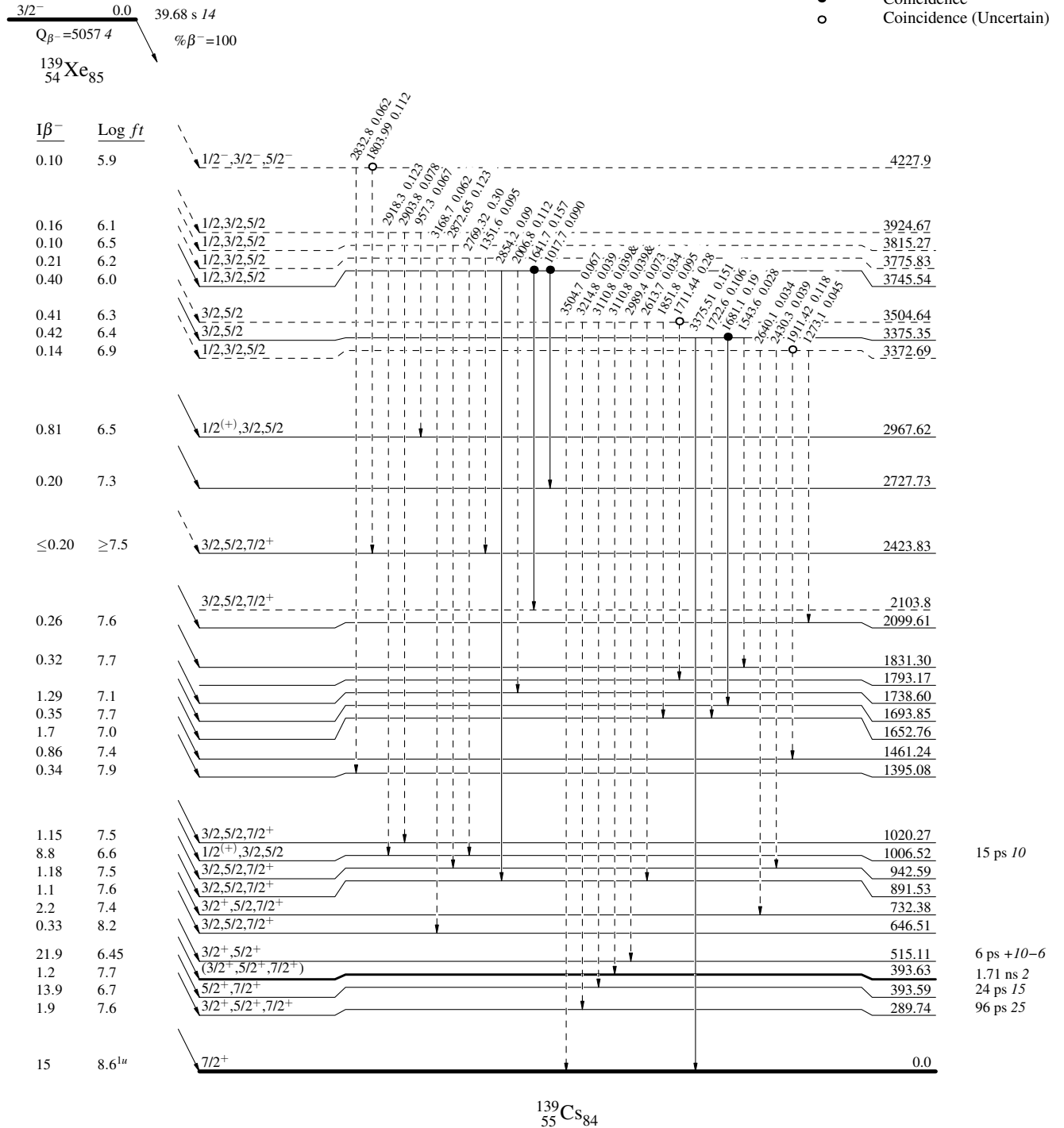
¹³⁹Xe β⁻ decay (39.68 s) 1988Fa06,1980Le03,1972Ac02

Decay Scheme

Legend

Intensities: I_(γ+ce) per 100 parent decays
& Multiply placed: undivided intensity given

- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}
- - - - - γ Decay (Uncertain)
- Coincidence
- Coincidence (Uncertain)



¹³⁹Xe β⁻ decay (39.68 s) 1988Fa06,1980Le03,1972Ac02

Decay Scheme (continued)

Intensities: I_(γ+ce) per 100 parent decays
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

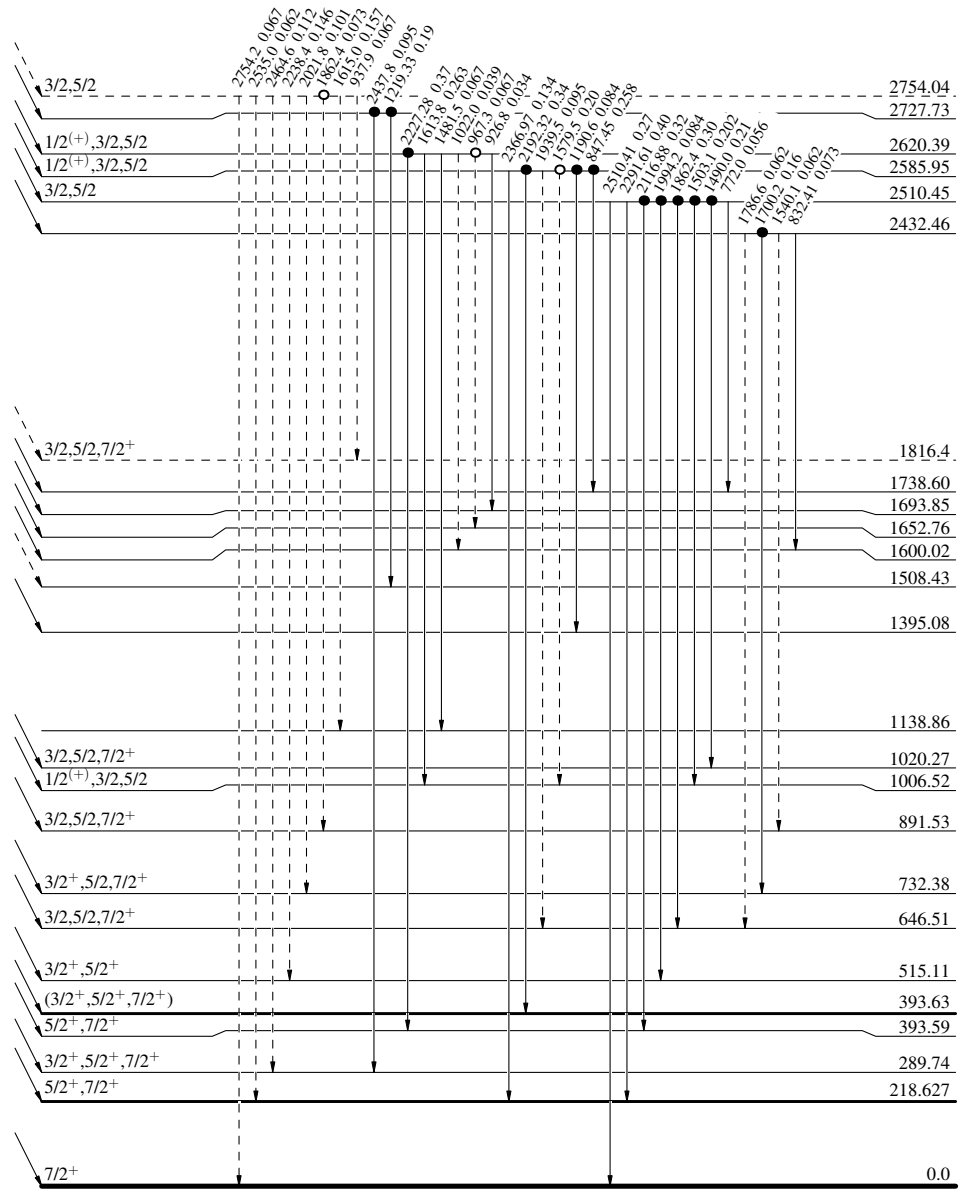
- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}
- - - - - γ Decay (Uncertain)
- Coincidence
- Coincidence (Uncertain)

3/2⁻ 0.0
 Q_{β⁻} = 5057.4
¹³⁹Xe₈₅
 39.68 s 14
 %β⁻ = 100

Iβ ⁻	Log ft
0.41	6.9
0.20	7.3
0.79	6.8
0.98	6.7
1.84	6.5
0.31	7.3

<0.14	≥8.0
1.29	7.1
0.35	7.7
1.7	7.0
0.38	7.7
0.22	7.9
0.34	7.9

1.15	7.5
8.8	6.6
1.1	7.6
2.2	7.4
0.33	8.2
21.9	6.45
1.2	7.7
13.9	6.7
1.9	7.6
4.9	7.2
15	8.6 ^u



¹³⁹Cs₈₄

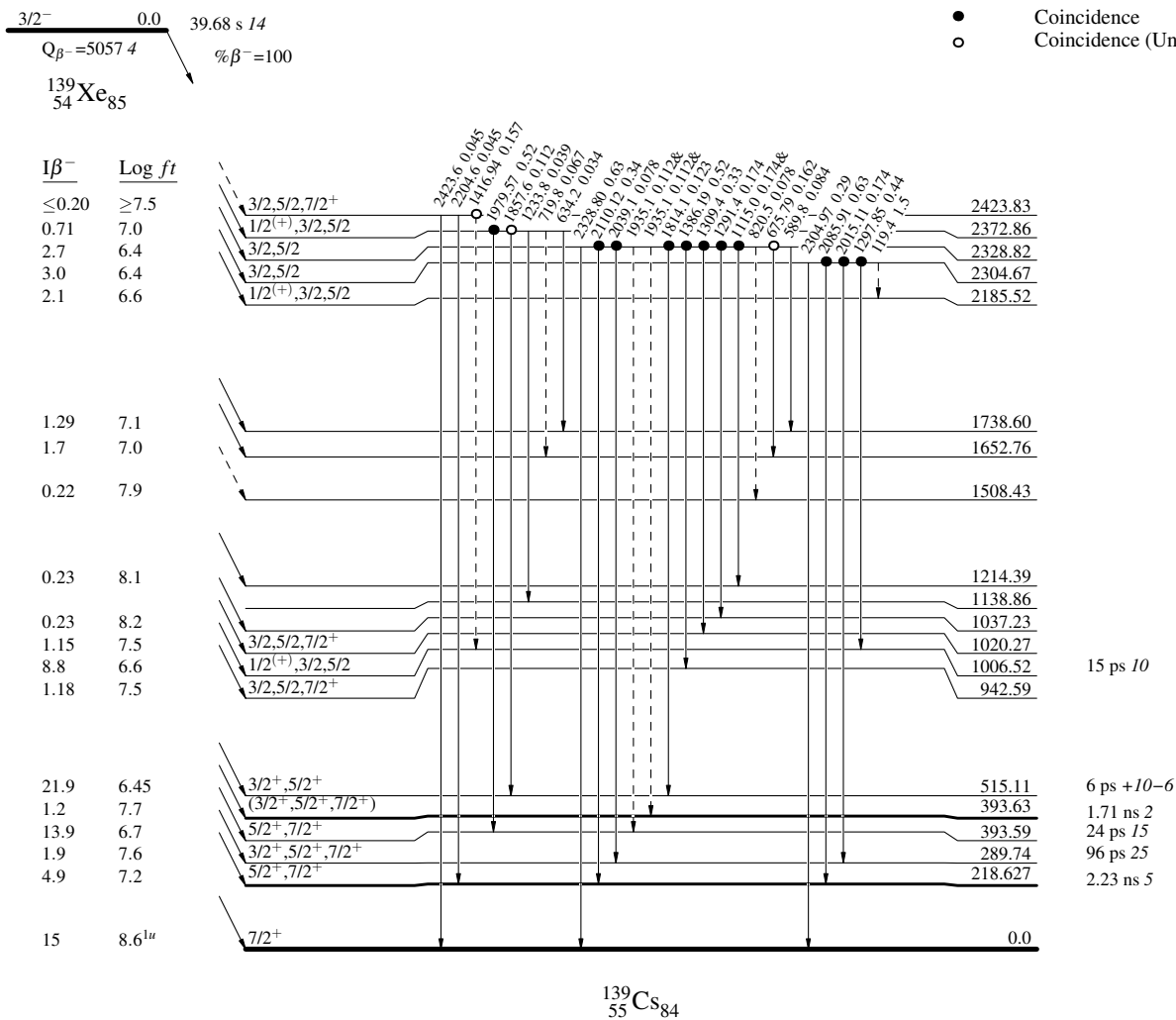
¹³⁹Xe β⁻ decay (39.68 s) 1988Fa06,1980Le03,1972Ac02

Decay Scheme (continued)

Intensities: I_(γ+ce) per 100 parent decays
 & Multiply placed: undivided intensity given
 @ Multiply placed: intensity suitably divided

Legend

- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}
- - - γ Decay (Uncertain)
- Coincidence
- Coincidence (Uncertain)



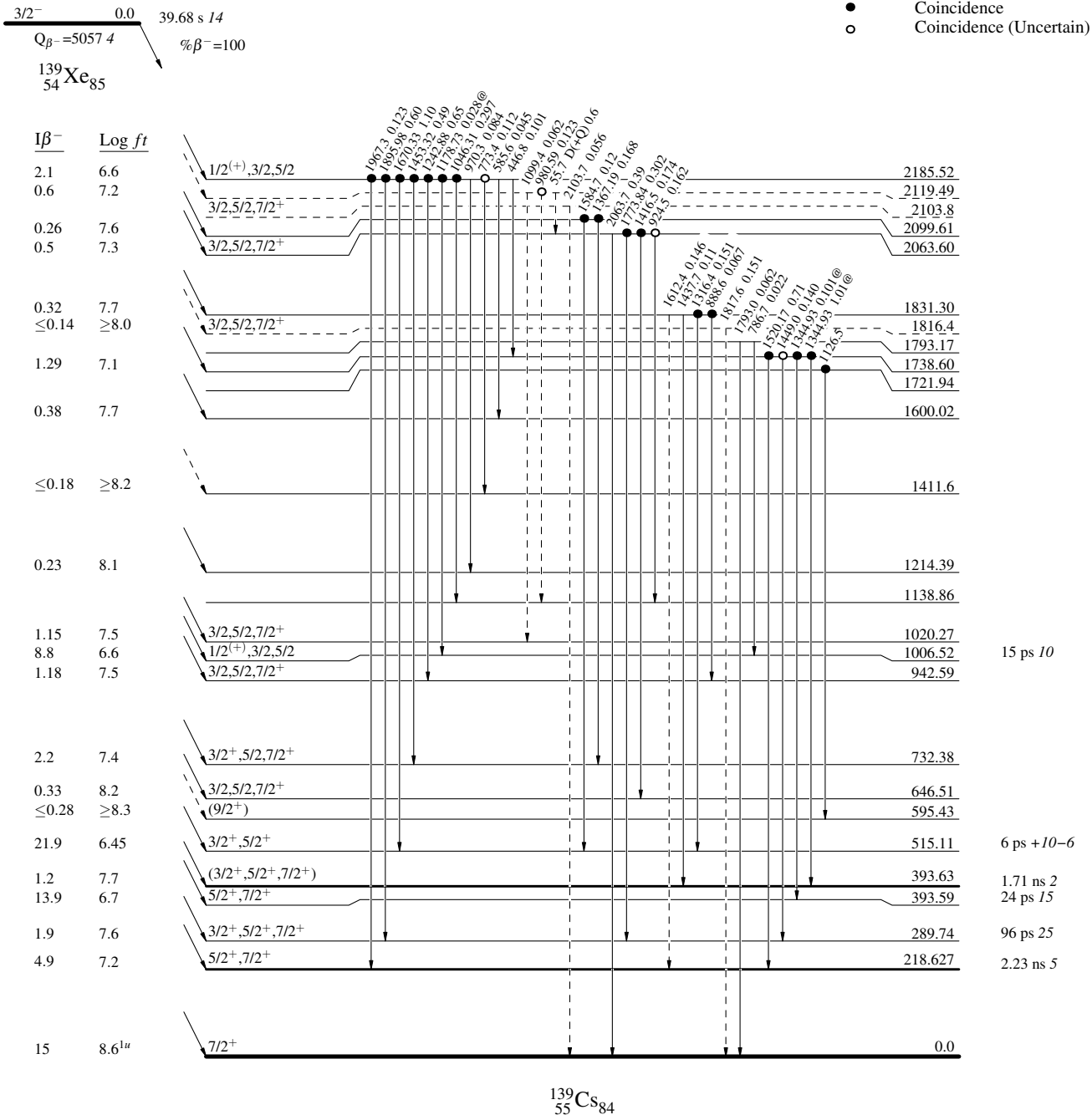
¹³⁹Xe β⁻ decay (39.68 s) 1988Fa06,1980Le03,1972Ac02

Decay Scheme (continued)

Intensities: I_(γ+ce) per 100 parent decays
 & Multiply placed: undivided intensity given
 @ Multiply placed: intensity suitably divided

Legend

- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}
- - - - - γ Decay (Uncertain)
- Coincidence
- Coincidence (Uncertain)



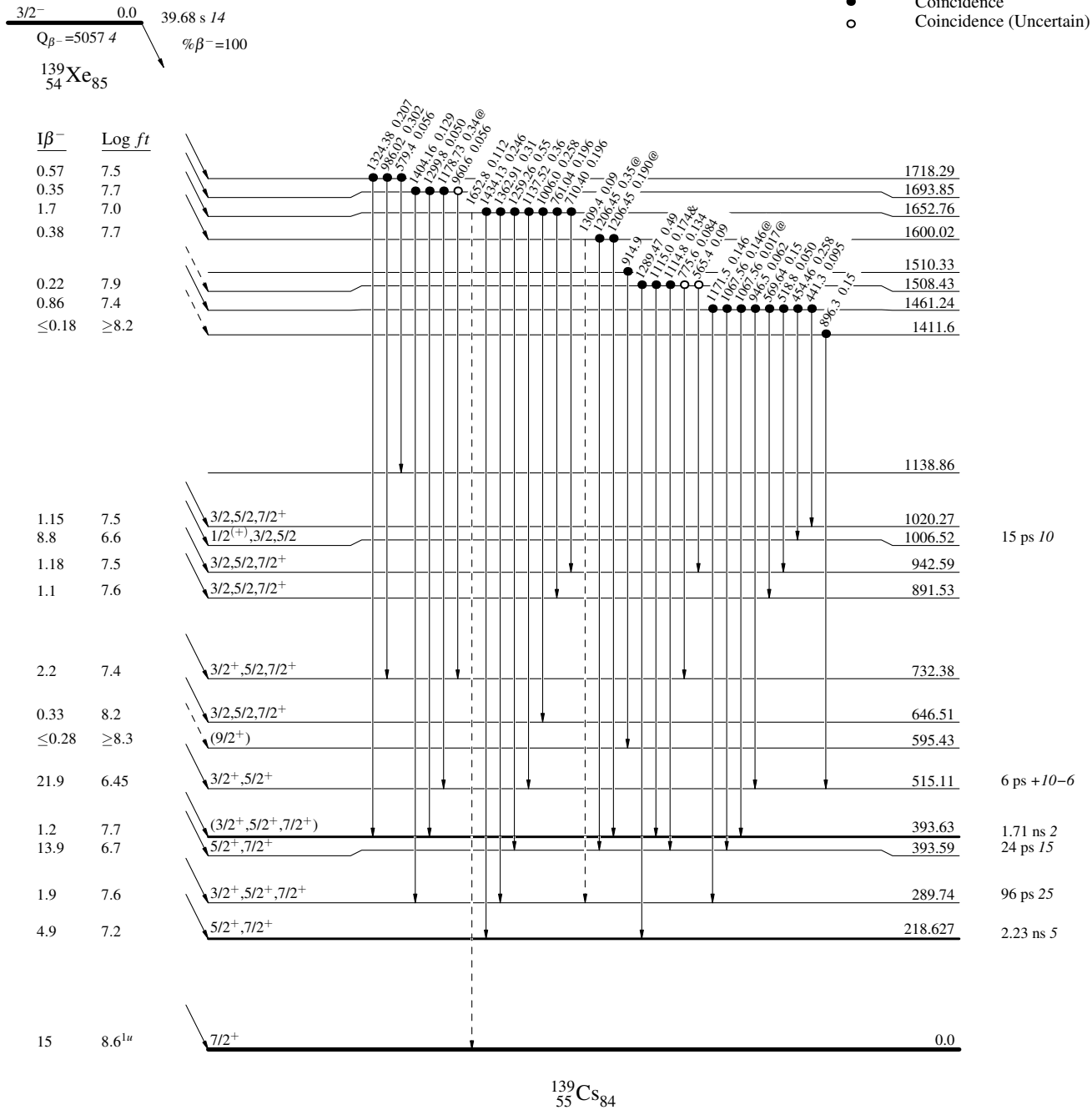
¹³⁹Xe β⁻ decay (39.68 s) 1988Fa06,1980Le03,1972Ac02

Decay Scheme (continued)

Intensities: I_γ(γ_{+ce}) per 100 parent decays
 & Multiply placed: undivided intensity given
 @ Multiply placed: intensity suitably divided

Legend

- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}
- - - - - γ Decay (Uncertain)
- Coincidence
- Coincidence (Uncertain)



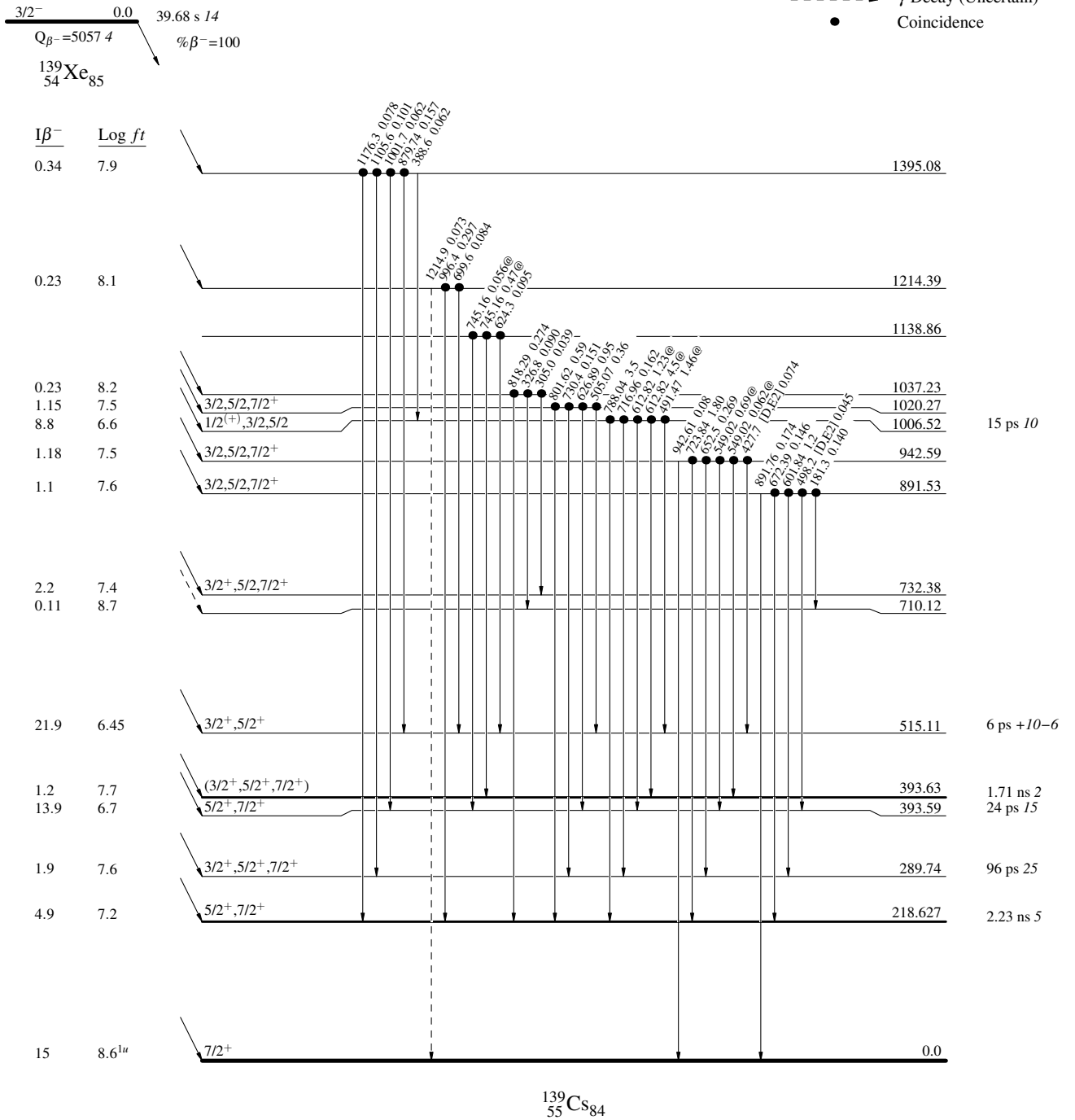
^{139}Xe β^- decay (39.68 s) 1988Fa06,1980Le03,1972Ac02

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

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



^{139}Xe β^- decay (39.68 s) 1988Fa06,1980Le03,1972Ac02

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
 & Multiply placed: undivided intensity given
 @ Multiply placed: intensity suitably divided

Legend

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

