^{77}Br ε decay (57.04 h) 1974Br10

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	30-Sep-2020

Parent: ^{77}Br: E=0.0; J$^{\pi}$=3/2$^-$; $T_{1/2}$=57.04 h *12*; Q(ε)=1364.7 *28*; %ε+%β^+ decay=100.0
^{77}Br-J$^{\pi}$,$T_{1/2}$: From ^{77}Br Adopted Levels.
^{77}Br-Q(ε): From 2017Wa10.
1974Br10: measured Eγ, Iγ, $\gamma\gamma$-coin and $\gamma\gamma(\theta)$.
1975DzZV: measured ce.
1970Dz10: measured Eγ, Iγ, $\gamma\gamma$-coin.
1969Sa05: measured Eγ, Iγ, ce, $\gamma\gamma$-coin.
1967Ar06: measured Eγ, Iγ.
1963Mo20: measured Eγ, Iγ, $\gamma\gamma$-coin, half-life of the 250-keV level in ^{77}Se by $\gamma\gamma$(t).
1992Hu10: production of online ^{77}Br source and its suitability for time-differential perturbed angular correlation studies.
1984Za08: measured g factor and the half-Life of the 250-keV level in ^{77}Se by $\gamma\gamma$(t) and $\gamma\gamma(\theta$,t,H).
1964En01: measured g-factor of the 248-keV level in ^{77}Se by $\gamma\gamma(\theta$,t,H) method.
Measured half-life of ^{77}Br decay: 2012Ba12, 1975Wa28,
Measured β end-point energy=336 keV (1951Ca28), 361 keV *4* (1963Ku06).
K-capture probability: 1991BeZY (also 1989BeYY).
$\gamma\gamma(\theta)$: 1974Br10, 1984Za08, 1964En01, 1963Mo20.
$\gamma\gamma(\theta$,H,t): 1988Ra04, 1988Mo16.
NMR on oriented ^{77}Br: 1993Oh09, 1992Pr06, 1992Gr20, 1988Gr26.
ε/β^+ measurement: 1954Se51.
β: 1963Ku06, 1951Ca28, 1948Wo08.
Total decay energy of 1365 keV *19* deduced (by RADLIST code) from proposed decay scheme is in agreement with the expected value of 1365 keV *3*, indicating that decay scheme is well established.

^{77}Se Levels

E(level)	J$^{\pi}$†	$T_{1/2}$	Comments
0.0	1/2$^-$	stable	
162.01 *5*	7/2$^+$	17.36 s *5*	%IT=100
175.46 *9*	9/2$^+$		
238.95 *4*	3/2$^-$		
249.75 *4*	5/2$^-$	9.68 ns *6*	$T_{1/2}$: from $\gamma\gamma$(t) (1988Mo16). Other: 9.3 ns *4* (1964En01), 9.56 ns *10* (1984Za08). g-factor=+0.447 *10* (1984Za08). Other: +0.48 *6* (1964En01).
301.09 *6*	5/2$^+$		
439.43 *4*	5/2$^-$		
520.58 *4*	3/2$^-$		
581.01 *6*	7/2$^-$		
679.83 *7*	5/2$^+$		
817.80 *4*	1/2$^-$		
824.39 *4*	(5/2)$^-$		
911.49 *6*	(3/2)$^+$		
1005.09 *4*	3/2$^-$		
1186.79 *11*	(3/2)		
1230.64 *9*	(5/2)$^-$		

† From Adopted Levels.

^{77}Br ε decay (57.04 h) 1974Br10 (continued)

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ ‡	Iε‡	Log *ft*	I(ε+β^+)†‡	Comments
(134 *3*)	1230.64		0.038 *3*	6.71 *4*	0.038 *3*	εK=0.8611 *5*; εL=0.1158 *4*; εM+=0.02312 *9*
(178 *3*)	1186.79		0.010 *1*	7.56 *5*	0.010 *1*	εK=0.8665 *3*; εL=0.11142 *21*; εM+=0.02213 *5*
(360 *3*)	1005.09		4.46 *5*	5.55 *1*	4.46 *5*	εK=0.8741; εL=0.10517 *5*; εM+=0.02072 *1*
(453 *3*)	911.49		0.146 *7*	7.24 *2*	0.146 *7*	εK=0.8756; εL=0.10398 *3*; εM+=0.020449 *7*
(540 *3*)	824.39		4.7 *1*	5.89 *1*	4.7 *1*	εK=0.8765; εL=0.10325 *2*; εM+=0.020285 *5*
(547 *3*)	817.80		10.0 *3*	5.57 *2*	10.0 *3*	εK=0.8765; εL=0.10320 *2*; εM+=0.020275 *5*
(685 *3*)	679.83		0.09 *5*	7.8 *3*	0.09 *5*	εK=0.8774; εL=0.10245 *2*; εM+=0.020107 *3*
(784# *3*)	581.01		0.040 *9*	8.3 *1*	0.040 *9*	εK=0.8779; εL=0.1021; εM+=0.020024 *2* I(ε+β^+): expected EC feeding is zero from ΔJ=2, Δπ=no.
(844 *3*)	520.58		18.6 *4*	5.68 *1*	18.6 *4*	εK=0.8781; εL=0.1019; εM+=0.01998
(925 *3*)	439.43		1.46 *7*	6.87 *2*	1.46 *7*	εK=0.8784; εL=0.1017; εM+=0.01994
(1064 *3*)	301.09		0.060 *12*	8.4 *1*	0.060 *12*	εK=0.8787; εL=0.1014; εM+=0.01987
(1115 *3*)	249.75		0.54 *9*	7.5 *1*	0.54 *9*	εK=0.8788; εL=0.1013; εM+=0.01985
(1126 *3*)	238.95	0.00175 *23*	15.3 *4*	6.02 *1*	15.3 *4*	av Eβ=49.7 *14*; εK=0.8787; εL=0.1013; εM+=0.01985
(1203# *3*)	162.01		<0.12	>8.9^{1u}	<0.12	εK=0.8763; εL=0.10334 *1*; εM+=0.020276 *3*
(1365 *3*)	0.0	0.73 *3*	43.8 *13*	5.74 *2*	44.5 *13*	av Eβ=151.7 *12*; εK=0.8647 *5*; εL=0.09934 *6*; εM+=0.01946 *1* I(ε+β^+): from I(γ±)/Iγ(239γ)=0.0635 *20* (1969Sa05) and γ-ray intensity balance at each level.

† From I($\gamma^\pm$)/Iγ(239γ)=0.0635 *20* (1969Sa05), ε/β^+=59.7 (1971Go40) for g.s. and γ-ray intensity balance at each level.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

γ(^{77}Se)

Iγ normalization: from I($\gamma^{\pm}$)/Iγ(239γ)=0.0635 *20* (1969Sa05), I(γ+ce)(gammas to g.s.), and ε/β^+=59.7 (1971Go40) for g.s.

Total conversion coefficients measured in ce data of 1975DzZV are based on normalization to theoretical conversion coefficient of 1.205 for E3 multipolarity of 161.83γ. But value obtained for this transition from BrIcc code is 0.884. Thus all conversion coefficients listed in this dataset from 1975DzZV have been multiplied by a factor of 0.7336.

The A_2 and A_4 coefficients quoted by 1974Br10 have been corrected (by evaluator) for solid angle and perturbation effects (due to long half-life of 250 level).

E_γ	I_γ #	E_i(level)	J^π_i	E_f	J^π_f	Mult.†	δ†	α@	$I_{(\gamma+ce)}$ #	Comments
13.4	<0.03	175.46	9/2+	162.01	7/2+				0.125 *12*	E_γ: from level energy difference. I_γ: expected to be highly converted. α=4.12 if M1. $I_{(\gamma+ce)}$: estimated by the evaluator from intensity balance for the 175 level.
80.9 *1*	0.09 *3*	520.58	3/2−	439.43	5/2−					
87.59 *7*	6.06 *10*	249.75	5/2−	162.01	7/2+	E1		0.1165		α(K)=0.1037 *15*; α(L)=0.01101 *16*; α(M)=0.001698 *24*; α(N)=0.0001402 *20*
125.57 *8*	0.040 *5*	301.09	5/2+	175.46	9/2+	E2		0.357		α(K)=0.311 *5*; α(L)=0.0399 *6*; α(M)=0.00618 *9*; α(N)=0.000481 *7*
138.95 *9*	0.56 *2*	301.09	5/2+	162.01	7/2+	M1+E2‡	0.75‡ *3*	0.115 *5*		α(K)=0.101 *4*; α(L)=0.0122 *5*; α(M)=0.00189 *7*; α(N)=0.000151 *6*
141.1 *3*	0.011 *3*	581.01	7/2−	439.43	5/2−	(M1)		0.0402		α(K)=0.0357 *6*; α(L)=0.00387 *6*; α(M)=0.000604 *10*; α(N)=5.12×10^{-5} *8*
144.5 *1*	0.025 *5*	824.39	(5/2)−	679.83	5/2+					
161.83 *8*	4.77 *8*	162.01	7/2+	0.0	1/2−	E3		0.884		α(K)=0.737 *11*; α(L)=0.1255 *18*; α(M)=0.0195 *3*; α(N)=0.001418 *21* α(exp)=1.205 (1975DzZV) used as standard, but BrIcc code gives 0.884.
180.68 *7*	1.23 *3*	1005.09	3/2−	824.39	(5/2)−	M1		0.0210 *3*		α(K)=0.0187 *3*; α(L)=0.00201 *3*; α(M)=0.000314 *5*; α(N)=2.66×10^{-5} *4*
187.26 *8*	0.25 *1*	1005.09	3/2−	817.80	1/2−					
189.57 *21*	0.010 *5*	439.43	5/2−	249.75	5/2−					
200.40 *7*	5.25 *20*	439.43	5/2−	238.95	3/2−	M1+E2	+0.09 *3*	0.0165 *4*		α(K)=0.0146 *4*; α(L)=0.00158 *4*; α(M)=0.000246 *6*; α(N)=2.08×10^{-5} *5* δ: from Adopted Gammas. (200γ)(239γ)(θ): A_2=0.038 *15*, A_4=0.09 *4*.
231.49 *13*	0.27 *2*	911.49	(3/2)+	679.83	5/2+	M1(+E2)	<0.3	0.0117 *16*		α(K)=0.0104 *14*; α(L)=0.00112 *17*; α(M)=0.00017 *3*; α(N)=1.48×10^{-5} *21*
238.98 *7*	100	238.95	3/2−	0.0	1/2−	M1+E2	+0.152 *4*	0.01081		α(exp)=0.0092 *14* (1975DzZV) α(K)=0.00960 *14*; α(L)=0.001032 *15*; α(M)=0.0001607 *23*; α(N)=1.363×10^{-5} *20* Additional information 1.
243.35 *8*	0.16 *2*	824.39	(5/2)−	581.01	7/2−					

From ENSDF

γ(^{77}Se) (continued)

E_γ	I_γ #	E_i(level)	J^π_i	E_f	J^π_f	Mult.†	δ†	α@	Comments
249.77 *7*	12.9 *3*	249.75	5/2⁻	0.0	1/2⁻	E2		0.0284	α(K)=0.0251 *4*; α(L)=0.00285 *4*; α(M)=0.000443 *7*; α(N)=3.62×10^{-5} *5*
270.83 *7*	1.39 *5*	520.58	3/2⁻	249.75	5/2⁻	M1+E2	−0.30 *6*	0.0087 *5*	α(K)=0.0077 *4*; α(L)=0.00083 *5*; α(M)=0.000129 *8*; α(N)=1.09×10^{-5} *6* (271γ)(250γ)(θ): A_2=0.122 *11*, A_4=0.03 *2*.
277.47 *15*	0.14 *1*	439.43	5/2⁻	162.01	7/2⁺				
281.65 *7*	9.9 *2*	520.58	3/2⁻	238.95	3/2⁻	M1+E2	+0.12 *4*	0.00699 *16*	α(exp)=0.0064 *16* (1975DzZV) α(K)=0.00622 *15*; α(L)=0.000664 *16*; α(M)=0.0001034 *25*; α(N)=8.79×10^{-6} Additional information 3. (282γ)(239γ)(θ): A_2=−0.175 *7*, A_4=0.03 *2*.
297.23 *8*	18.0 *8*	817.80	1/2⁻	520.58	3/2⁻	M1+E2	−0.17 *3*	0.00624 *13*	α(exp)=0.0041 *10* (1975DzZV) α(K)=0.00555 *12*; α(L)=0.000592 *13*; α(M)=9.23×10^{-5} *20*; α(N)=7.84×10^{-6} *17* Additional information 5. δ: γγ(θ) gives −0.17 *3* or +2.7 *2*, but ce data in (n,γ) agrees with the small value only. (297γ)(282γ)(θ): A_2=−0.136 *13*, A_4=−0.01 *3*. (297γ)(521γ)(θ): A_2=0.145 *7*, A_4=0.02 *2*. (297γ)(282γ)(239γ)(θ): A_2=0.012 *4*, A_4=−0.03 *5*.
303.76 *9*	5.1 *1*	824.39	(5/2)⁻	520.58	3/2⁻	M1		0.00567 *8*	α(K)=0.00504 *7*; α(L)=0.000536 *8*; α(M)=8.35×10^{-5} *12*; α(N)=7.11×10^{-6} *10* Mult.: from ce data in (n,γ). (304γ)(521γ)(θ): A_2=0.185 *22*, A_4=−0.10 *5*. γ(θ): 1992Gr20. δ=−0.09 *5* or +8 *+2−3*.
325.08 *11*	0.10 *2*	1005.09	3/2⁻	679.83	5/2⁺				
331.23 *9*	0.29 *3*	581.01	7/2⁻	249.75	5/2⁻	M1+E2	1.00 *25*	0.0076 *9*	α(K)=0.0067 *8*; α(L)=0.00073 *9*; α(M)=0.000114 *14*; α(N)=9.5×10^{-6} *11*
342.08 *24*	0.027 *5*	581.01	7/2⁻	238.95	3/2⁻				
378.45& *9*	0.04& *3*	679.83	5/2⁺	301.09	5/2⁺				I_γ: from γγ.
378.45& *9*	0.26& *2*	817.80	1/2⁻	439.43	5/2⁻				
384.99 *8*	3.62 *10*	824.39	(5/2)⁻	439.43	5/2⁻	M1+E2	+0.23 *6*	0.00336 *10*	α(exp)=0.0021 *8* (1975DzZV) α(K)=0.00299 *9*; α(L)=0.000317 *10*; α(M)=4.93×10^{-5} *15*; α(N)=4.20×10^{-6} *13* Additional information 7. δ: from γγ(θ) for J^π(824 level)=5/2. (385γ)(440γ)(θ): A_2=0.098 *16*, A_4=0.08 *4*. (385γ)(200γ)(θ): A_2=−0.11 *3*, A_4=0.06 *6*. (385γ)(200γ)(239γ)(θ): A_2=−0.13 *3*, A_4=0.08 *6*.
390.97 *11*	0.097 *11*	911.49	(3/2)⁺	520.58	3/2⁻				
405.87 *22*	0.032 *6*	581.01	7/2⁻	175.46	9/2⁺				

γ(^{77}Se) (continued)

E_γ	I_γ#	E_i(level)	J^π_i	E_f	J^π_f	Mult.†	δ†	α@	Comments
419.15 *19*	0.071 *9*	581.01	7/2⁻	162.01	7/2⁺				
424.22 *15*	0.095 *10*	1005.09	3/2⁻	581.01	7/2⁻				
439.47 *6*	6.77 *15*	439.43	5/2⁻	0.0	1/2⁻	E2		0.00413 *6*	α(K)=0.00366 *6*; α(L)=0.000398 *6*; α(M)=6.19×10^{-5} *9*; α(N)=5.18×10^{-6} *8* Mult.: from α(exp)=0.0026 *7* (1975DzZV). Additional information 2.
472.03 *23*	0.034 *9*	911.49	(3/2)⁺	439.43	5/2⁻				
484.57 *7*	4.33 *10*	1005.09	3/2⁻	520.58	3/2⁻	M1+E2	+0.27 *4*	0.00194 *4*	α(exp)=0.0011 *4* (1975DzZV) α(K)=0.00173 *4*; α(L)=0.000182 *4*; α(M)=2.84×10^{-5} *6*; α(N)=2.42×10^{-6} *5* Additional information 8. (485γ)(521γ)(θ): A_2=0.012 *11*, A_4=0.00 *3*.
504.53 *23*	0.039 *8*	679.83	5/2⁺	175.46	9/2⁺				
517.9 *4*	0.7 *2*	679.83	5/2⁺	162.01	7/2⁺	M1		0.00160 *2*	α(K)=0.001425 *21*; α(L)=0.0001496 *22*; α(M)=2.33×10^{-5} *4*; α(N)=1.99×10^{-6} *3*
520.69 *6*	97.0 *15*	520.58	3/2⁻	0.0	1/2⁻	M1+E2	+0.17 *7*	0.00160 *4*	α(exp)=0.0012 *2* (1975DzZV) α(K)=0.00143 *3*; α(L)=0.000150 *3*; α(M)=2.34×10^{-5} *5*; α(N)=2.00×10^{-6} *4* Additional information 4.
523.4 *2*	0.17 *3*	824.39	(5/2)⁻	301.09	5/2⁺				
565.91 *19*	1.85 *6*	1005.09	3/2⁻	439.43	5/2⁻				
567.90 *8*	3.71 *8*	817.80	1/2⁻	249.75	5/2⁻	E2		0.00188 *3*	α(K)=0.001669 *24*; α(L)=0.000179 *3*; α(M)=2.78×10^{-5} *4*; α(N)=2.34×10^{-6} *4* (568γ)(250γ)(θ): A_2=0.27 *4*, A_4=0.44 *10*.
574.64 *8*	5.14 *10*	824.39	(5/2)⁻	249.75	5/2⁻	M1+E2	+0.33 *9*	0.00132 *4*	α(K)=0.00117 *3*; α(L)=0.000123 *4*; α(M)=1.92×10^{-5} *6*; α(N)=1.64×10^{-6} *5* δ: from γγ(θ) for J^π(824 level)=5/2. (575γ)(250γ)(θ): A_2=0.04 *3*, A_4=0.06 *7*. γ(θ): 1992Gr20.
578.91 *7*	12.8 *3*	817.80	1/2⁻	238.95	3/2⁻	M1+E2		0.0015 *3*	α(K)=0.00134 *24*; α(L)=0.00014 *3*; α(M)=2.2×10^{-5} *5*; α(N)=1.9×10^{-6} *4* δ: −0.16 *4* or +2.6 *3*. (579γ)(239γ)(θ): A_2=0.147 *16*, A_4=0.06 *4*.
585.48 *7*	6.79 *14*	824.39	(5/2)⁻	238.95	3/2⁻	M1+E2	−0.15 *5*	0.00122 *2*	α(K)=0.00189 *17*; α(L)=0.0001141 *18*; α(M)=1.78×10^{-5} *3*; α(N)=1.518×10^{-6} *24*
610.39 *8*	0.093 *9*	911.49	(3/2)⁺	301.09	5/2⁺				
662.43 *9*	0.35 *1*	824.39	(5/2)⁻	162.01	7/2⁺				Assignment taken from ^{76}Se(n,γ) (1985To10).
704.09 *12*	0.069 *8*	1005.09	3/2⁻	301.09	5/2⁺				
749.55 *10*	0.128 *14*	911.49	(3/2)⁺	162.01	7/2⁺				
755.35 *7*	7.22 *14*	1005.09	3/2⁻	249.75	5/2⁻	M1+E2	+0.30 *1*	0.00070 *1*	α(exp)=0.0006 *2* (1975DzZV) α(K)=0.000627 *9*; α(L)=6.54×10^{-5} *10*; α(M)=1.018×10^{-5} *15*; α(N)=8.70×10^{-7} *1*

γ(^{77}Se) (continued)

E_γ	I_γ#	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	δ†	α@	Comments
									Additional information 9. (755γ)(250γ)(θ): A_2=−0.53 *3*, A_4=0.02 *8*. (755γ)(88γ)(θ): A_2=0.27 *5*, A_4=−0.11 *12*. δ: from (755γ)(250γ)(θ) (1988Mo16).
766.11 *8*	0.18 *1*	1005.09	3/2−	238.95	3/2−				
791.26 *11*	0.040 *9*	1230.64	(5/2)−	439.43	5/2−				
817.79 *6*	9.0 *2*	817.80	1/2−	0.0	1/2−	M1		0.00058 *1*	α(K)=0.000518 *8*; α(L)=5.40×10^{-5} *8*; α(M)=8.40×10^{-6} *12*; α(N)=7.19×10^{-7} *10* Mult.: from α(exp)=0.00044 *15* (1975DzZV). Additional information 6.
824.28 *12*	0.057 *6*	824.39	(5/2)−	0.0	1/2−				
885.71 *10*	0.036 *4*	1186.79	(3/2)	301.09	5/2+				
911.36 *26*	0.011 *2*	911.49	(3/2)+	0.0	1/2−				
929.38 *32*	0.012 *4*	1230.64	(5/2)−	301.09	5/2+				
947.5 *4*	0.003 *1*	1186.79	(3/2)	238.95	3/2−				
980.81 *37*	0.016 *3*	1230.64	(5/2)−	249.75	5/2−				
991.72 *20*	0.096 *5*	1230.64	(5/2)−	238.95	3/2−	E2+M1	+6.0 *4*	0.00043 *1*	α(K)=0.000381 *6*; α(L)=3.99×10^{-5} *6*; α(M)=6.21×10^{-6} *9*; α(N)=5.29×10^{-7} *8*
1005.05 *6*	4.00 *8*	1005.09	3/2−	0.0	1/2−	(M1(+E2))	0.00 *5*	0.00038 *1*	α(exp)=0.00037 *15* (1975DzZV) α(K)=0.000366 *9*; α(L)=3.49×10^{-5} *10*; α(M)=5.43×10^{-6} *15*; α(N)=4.65×10^{-7} *12* Additional information 10.
1186.8 *3*	0.007 *2*	1186.79	(3/2)	0.0	1/2−				
1230.5 *2*	0.004 *1*	1230.64	(5/2)−	0.0	1/2−				

† From Adopted Gammas and γγ(θ) data, unless otherwise stated.
‡ From ce data in ^{76}Se(n,γ).
# For absolute intensity per 100 decays, multiply by 0.231 *5*.
@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
& Multiply placed with intensity suitably divided.

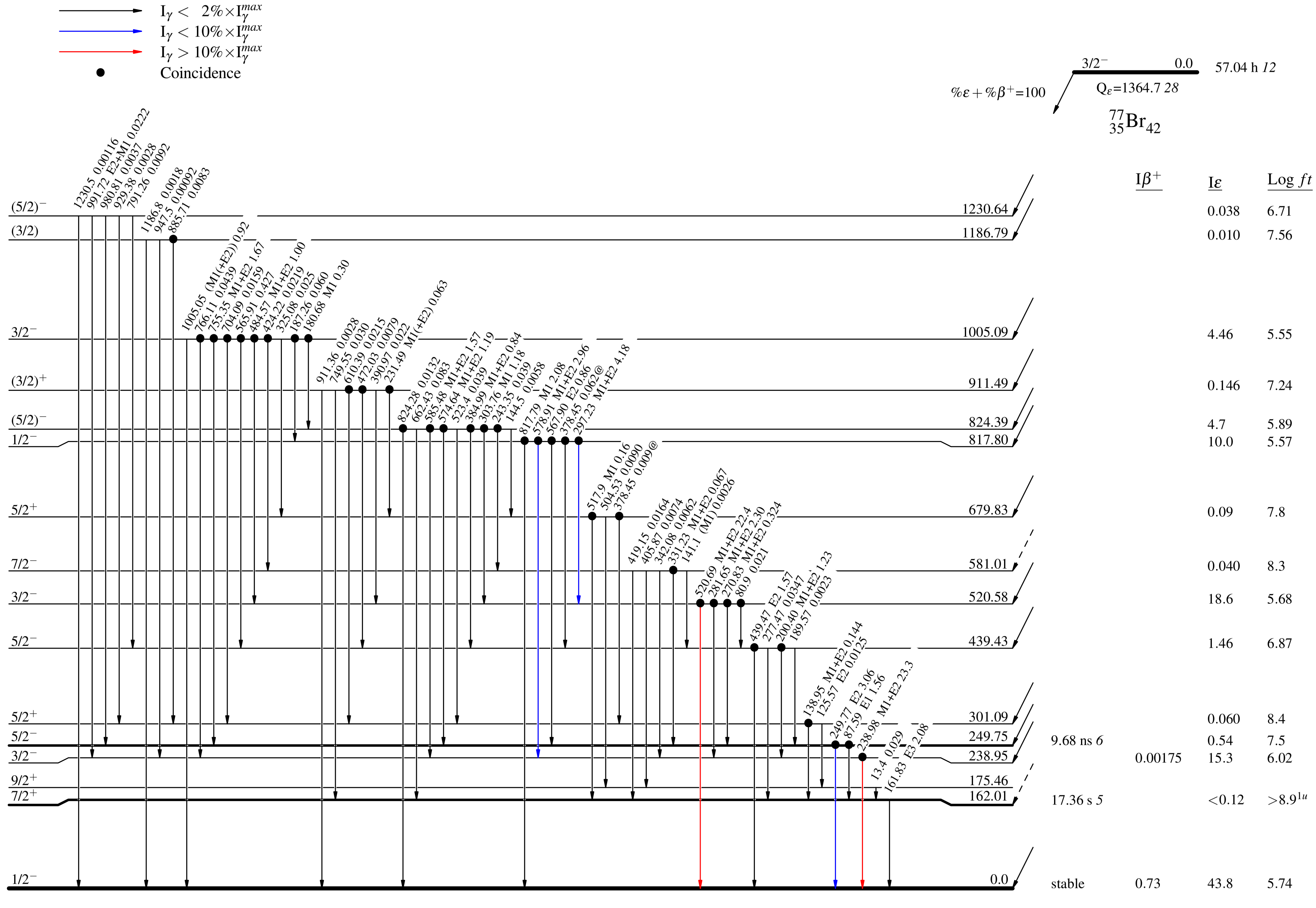
$^{77}_{34}$Se$_{43}$-6

^{77}Br ε decay (57.04 h)   1974Br10

Decay Scheme

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

Legend



$^{77}_{34}Se_{43}$

$^{77}_{34}Se_{43}$-7