^{80}Se(d,2nγ),^{78}Se(α,pnγ) 1984Do02

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 105, 223 (2005)	22-Jun-2005

1984Do02: ^{80}Se(d,2nγ) E=13.5 MeV, measured γ, $\gamma\gamma$, $\gamma(\theta)$ and ^{78}Se(α,pnγ) E=23, 27 MeV; measured γ, $\gamma\gamma$, $\alpha\gamma$(t). The authors also report results from ^{80}Se(p,nγ) reaction (see ^{80}Se(p,nγ) dataset for details. Relative excitation functions in different reactions used in J^π assignments.

Additional information 1.

^{80}Br Levels

E(level)‡	Jπ†	$T_{1/2}$	Comments
0.0	1+		
37.060 18	2−		
85.86 3	5−		
256.45 3	(2)+		
271.38 3	(2)−		
281.30 3	(3)−		
309.50 3	(4)−		
314.90 10	(1)+		
331.06 4	5+	0.7 ns 2	$T_{1/2}$: from 245γ(t) in (α,pnγ) (1984Do02).
331.42 4	(3)−		
357.24 5	(6+)	0.4 ns 2	$T_{1/2}$: from 271γ(t) in (α,pnγ).
366.63 3	(1,2)−		
379.93 4	(6−)		
380.48 3	(3)−		
385.73 4	(4−)		
390.54 5	(4)−		
447.88 5	(7+)		
456.41 3	(4)−		
469.01 3	(2)+		
469.30 4	(3)−		
492.91 3	(2)−		
500.21 5	(4)−		
523.32 4	(5−)		
549.59 4	(3)+		
572.95 4	(3,4,5)−		
586.14 5	(3+)		
615.33 6	(8+)		
646.46 11			
660.6 2	(2)+		
682.94 4	(3,4−,5−)		
685.30 10	(3−)		
717.59 10	(3,4−,5)		
771.23 6	(4−,5−,6−)		
774.18 5	(7−)		
825.28 6	(6,7+)		
860.66 6	(2+)		
1033.08 9	(8+)		
1141.04 12	(9+)		
1346.8? 3			
1405.9? 3			
1534.7? 3			
1587.5 2	(10+)		

† From ‘Adopted Levels’.

‡ From least-squares fit to Eγ′s.

^{80}Se(d,2nγ),^{78}Se(α,pnγ) 1984Do02 (continued)

γ(^{80}Br)

γ(θ) coefficients (A_2 and A_4) are mainly from (d,2nγ), unless otherwise specified. The data were normalized by 1984Do02 to 260γ (in ^{81}Br) assumed as isotropic.

The placement of all γ rays is from γγ data.

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 γ-ray  intensities in 78Se(α,pnγ)
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   Eγ          Iγ          Eγ           Iγ
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 26.18        8  1         244.24       5  2
 37.05       53  3         245.20     100  4
 59.48        5.1  2       258.1        < 2
 74.97        ≤  0.5     263.44         2  1
 90.64       65  2         271.4+271.4   12
116.8        < 0.6      274.52       < 2
124.03        1.2  3       294.1+294.3   27  2
137.5         1.6  3      299.5+299.9    5  1
143.40        1.0  3       315.4          6  1
159.0+159.8  0.8     3       343.42         3  1
167.45       54  2         394.25         7  2
175.11        2.6  4       446.4          8  3
195.60        1.7  5       525.7         17  3
213.81        3.8  5       790.6        < 5
218.9+219.4  5     1       919.4        < 5
223.63       20  2         973           12  6
234.32       < 2
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Eγ[†]	Iγ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[a]	Comments
26.18 3	5.0 5	357.24	(6$^+$)	331.06	5$^+$	D		A_2=−0.21 2, A_4=−0.06 3.
37.05 2	52 2	37.060	2$^-$	0.0	1$^+$	E1[&]	1.56	
48.76 4	0.2 1	85.86	5$^-$	37.060	2$^-$	M3[&]	308	
50.12 3	0.8 1	331.42	(3)$^-$	281.30	(3)$^-$			A_2=+0.07 4, A_4=+0.01 5.
59.48 2	14 1	390.54	(4)$^-$	331.06	5$^+$	D		A_2=−0.06 2, A_4=+0.02 3.
74.97 3	0.6 1	331.42	(3)$^-$	256.45	(2)$^+$			A_2=−0.02 5, A_4=−0.03 7.
75.93 3	0.4 1	456.41	(4)$^-$	380.48	(3)$^-$	D		A_2=−0.18 10, A_4=−0.07 14.
80.60 4	0.3 1	549.59	(3)$^+$	469.01	(2)$^+$	D		A_2=−0.18 11, A_4=−0.22 16.
90.64 2	26 1	447.88	(7$^+$)	357.24	(6$^+$)	D		A_2=−0.31 3, A_4=+0.05 6 (from (α,pnγ)).
99.17 3	0.4 1	380.48	(3)$^-$	281.30	(3)$^-$			A_2=+0.17 9, A_4=0.0 1.
104.43 4	0.4 1	385.73	(4$^-$)	281.30	(3)$^-$	D		A_2=−0.19 6, A_4=0.0 1.
112.4 1	0.2 1	492.91	(2)$^-$	380.48	(3)$^-$			
116.8[c]	≤0.1	447.88	(7$^+$)	331.06	5$^+$			
124.03 2	1.6 1	380.48	(3)$^-$	256.45	(2)$^+$	D		A_2=−0.19 3, A_4=+0.05 4.
126.28 3	0.6 2	492.91	(2)$^-$	366.63	(1,2)$^-$			A_2=0.0 1.
137.5 1	1.6 3	523.32	(5$^-$)	385.73	(4$^-$)	D		A_2=−0.18 11, A_4=−0.07 15.
143.40 3	0.9 2	523.32	(5$^-$)	379.93	(6$^-$)	D		A_2=−0.13 7, A_4=+0.11 10.
146.89 2	2.9 1	456.41	(4)$^-$	309.50	(4)$^-$			A_2=+0.16 2, A_4=+0.01 3.
159.0 1	0.7 1	549.59	(3)$^+$	390.54	(4)$^-$	D		A_2=−0.04 8, A_4=+0.03 11.
159.8 1	1.3 1	469.30	(3)$^-$	309.50	(4)$^-$			A_2=−0.01 4, A_4=+0.03 6.
167.45 2	16 1	615.33	(8$^+$)	447.88	(7$^+$)	D+Q		A_2=−0.37 4, A_4=−0.01 5 (from (α,pnγ)).
175.11 2	3.6 2	456.41	(4)$^-$	281.30	(3)$^-$	D		A_2=−0.05 2, A_4=0.00 3.
182.8[c] 1	≈0.2	682.94	(3,4$^-$,5$^-$)	500.21	(4)$^-$			
187.24 4	0.9 2	572.95	(3,4,5)$^-$	385.73	(4$^-$)	D		A_2=−0.12 8, A_4=+0.05 12.
190.6[@] 2	0.6[@]	500.21	(4)$^-$	309.50	(4)$^-$			

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$^{80}Se(d,2n\gamma)$,$^{78}Se(\alpha,pn\gamma)$ 1984Do02 (continued)

$\gamma(^{80}Br)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	Comments
195.60 2	10 1	586.14	(3+)	390.54	(4)−	D	A_2=−0.05 2, A_4=+0.02 2.
207.7 1	0.4 2	1033.08	(8+)	825.28	(6,7+)		A_2=−0.08 9.
211.6 1	1.4 3	492.91	(2)−	281.30	(3)−		
213.81 2	6.4 3	523.32	(5−)	309.50	(4)−	D	A_2=−0.23 3, A_4=+0.02 4.
218.9 1	3 1	500.21	(4)−	281.30	(3)−	D	A_2=−0.17 5.
219.4 1	11 1	256.45	(2)+	37.060	2−		A_2=+0.06 2.
223.63 2	29 1	309.50	(4)−	85.86	5−	D	A_2=−0.20 7, A_4=−0.07 12 (from (α,pnγ)).
226.51 4	1.1 1	682.94	(3,4−,5−)	456.41	(4)−	D	A_2=−0.17 5, A_4=0.0 1.
234.32 2	5.2 2	271.38	(2)−	37.060	2−		A_2=+0.09 2, A_4=−0.01 3.
236.44 4	1.1 1	492.91	(2)−	256.45	(2)+		A_2=+0.04 10.
240.0[c] 1	0.5 2	549.59	(3)+	309.50	(4)−		
244.24 3	16 1	281.30	(3)−	37.060	2−	D	A_2=−0.14 2, A_4=+0.03 2.
245.20 3	100 2	331.06	5+	85.86	5−		A_2=+0.26 2, A_4=−0.04 3 (from (α,pnγ)).
247.91 4	1.6 1	771.23	(4−,5−,6−)	523.32	(5−)		A_2=−0.04 9, A_4=+0.12 12.
263.44 3	7.0 3	572.95	(3,4,5)−	309.50	(4)−	D	A_2=−0.20 3, A_4=+0.01 4.
271.4[b@] 1	8[b@]	271.38	(2)−	0.0	1+		Iγ(doublet)=15 1. A_2=+0.06 1, A_4=+0.01 2.
271.4[b] 1	7[b]	357.24	(6+)	85.86	5−		
274.52 3	1.4 1	860.66	(2+)	586.14	(3+)	D	A_2=−0.06 5, A_4=+0.05 6.
278.2[c] 1	0.4 1	549.59	(3)+	271.38	(2)−		A_2=+0.07 15.
294.1[@] 1	25[@]	379.93	(6−)	85.86	5−		Iγ(294.1γ+294.3γ)=29 1. A_2=−0.12 9, A_4=+0.06 12 (from (α,pnγ)).
294.3[@] 1	4[@]	331.42	(3)−	37.060	2−		For 294.1γ+294.3γ, A_2=+0.03 2, A_4=0.00 2.
299.5[@] 3	1[@]	685.30	(3−)	385.73	(4−)		
299.9[@] 1	10[@]	385.73	(4−)	85.86	5−		Iγ(299.5γ+299.9γ)=11 1. For doublet, A_2=−0.10 2, A_4=+0.03 2.
302.99 5	1.4 2	682.94	(3,4−,5−)	379.93	(6−)		A_2=0.0 1.
314.9 1	4.5 5	314.90	(1)+	0.0	1+		For 314.9γ+315.4γ, A_2=−0.04 2, A_4=+0.03 3.
315.4 1	5.8 5	646.46		331.06	5+		
331.8 2	0.5 2	717.59	(3,4−,5)	385.73	(4−)		
343.42 3	5.7 4	380.48	(3)−	37.060	2−	D	A_2=−0.27 3, A_4=+0.03 4.
366.63 3	4.7 3	366.63	(1,2)−	0.0	1+		A_2=+0.03 3, A_4=+0.02 4.
370.56 4	2.5 2	456.41	(4)−	85.86	5−		A_2=+0.19 7, A_4=+0.06 10.
373.6 1	1.7 2	682.94	(3,4−,5−)	309.50	(4)−	D+Q	A_2=−0.46 6, A_4=+0.04 8.
375.8 1	1.4 2	685.30	(3−)	309.50	(4)−		A_2=−0.04 7, A_4=−0.03 10.
377.39 3	4.1 3	825.28	(6,7+)	447.88	(7+)	D	A_2=−0.07 3, A_4=+0.02 5.
394.25 3	4.5 3	774.18	(7−)	379.93	(6−)		A_2=+0.39 16, A_4=+0.2 2.
408.1 1	1.4 2	717.59	(3,4−,5)	309.50	(4)−	D	A_2=−0.28 15, A_4=+0.1 2.
414.37 4	5.2 3	500.21	(4)−	85.86	5−	D	A_2=−0.21 4, A_4=+0.14 6.
417.8 1	0.8 2	1033.08	(8+)	615.33	(8+)		
432.24 3	4.5 3	469.30	(3)−	37.060	2−		A_2=+0.03 5, A_4=+0.06 6.
437.5 1	0.8 2	523.32	(5−)	85.86	5−		
446.4 2	0.5 3	1587.5	(10+)	1141.04	(9+)	D+Q	A_2=−0.55 9 (from (α,pnγ)).
455.9 1	0.9 2	492.91	(2)−	37.060	2−		
461.8[c]	0.4 3	771.23	(4−,5−,6−)	309.50	(4)−		
469.02 3	4.7 6	469.01	(2)+	0.0	1+	D	A_2=−0.13 5, A_4=+0.02 6.
493.0 1	0.8 2	492.91	(2)−	0.0	1+		
494.2 1	1.8 2	825.28	(6,7+)	331.06	5+		
512.5 2	4 2	549.59	(3)+	37.060	2−		
525.7 1	3.8 4	1141.04	(9+)	615.33	(8+)	D+Q	A_2=−0.55 6, A_4=−0.02 8.
549.6 1	1.8 3	549.59	(3)+	0.0	1+		A_2=+0.5 2.
660.6 2	1.1 4	660.6	(2)+	0.0	1+	D	A_2=−0.5 3.
676.0 2	4.9 5	1033.08	(8+)	357.24	(6+)		
731.5 3	0.7 5	1346.8?		615.33	(8+)		

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^{80}Se(d,2nγ),^{78}Se(α,pnγ) 1984Do02 (continued)

γ(^{80}Br) (continued)

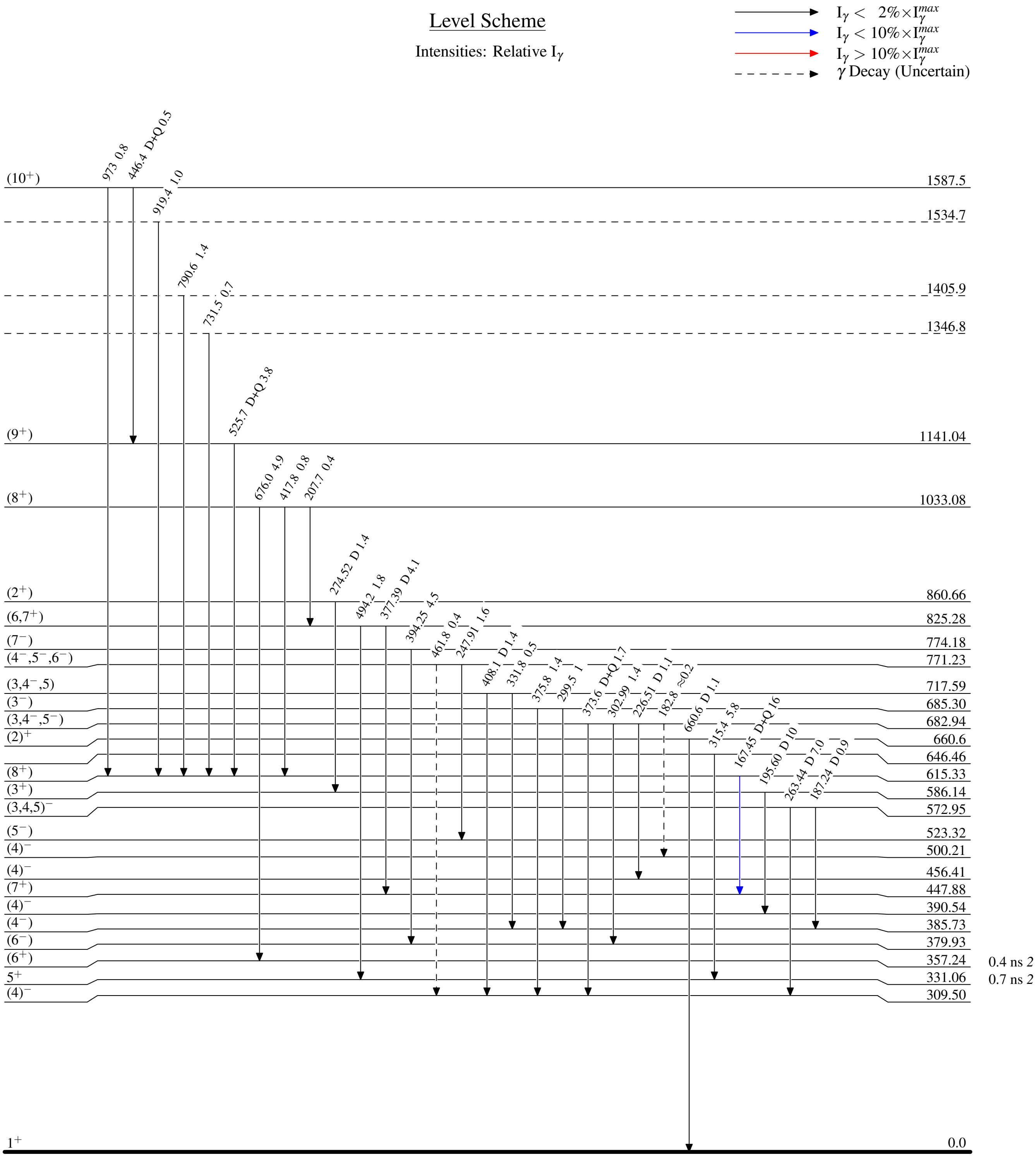
E_γ [†]	I_γ [‡]	E_i(level)	J^π_i	E_f	J^π_f	Comments
790.6 *3*	1.4 *5*	1405.9?		615.33	(8$^+$)	
919.4 *3*	1.0 *5*	1534.7?		615.33	(8$^+$)	
973 *1*	0.8 *6*	1587.5	(10$^+$)	615.33	(8$^+$)	I_γ: from Iγ(973γ)/Iγ(446γ)=1.5 *9* in (α,pnγ).

† From 1984Do02, unless otherwise stated. Values are probably averages from (d,2nγ) and (p,nγ) results.
‡ At E(d)=13.5 MeV and θ=125°.
# D(+Q) for transitions with negative A_2 (ΔJ=0,1) and D,E2 for transitions with positive A_2 (ΔJ=0,1,2). $A_4\approx0$ for all cases. For mult=D, small admixture of mult=Q is possible but is not quoted here.
@ From $\gamma\gamma$ data for unresolved doublet.
& From ‘adopted gammas’.
[a] 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.
[b] Multiply placed with intensity suitably divided.
[c] Placement of transition in the level scheme is uncertain.

^{80}Se(d,2nγ),^{78}Se(α,pnγ) 1984Do02

Level Scheme

Intensities: Relative I_γ



$^{80}_{35}Br_{45}$

^{80}Se(d,2nγ),^{78}Se(α,pnγ) 1984Do02

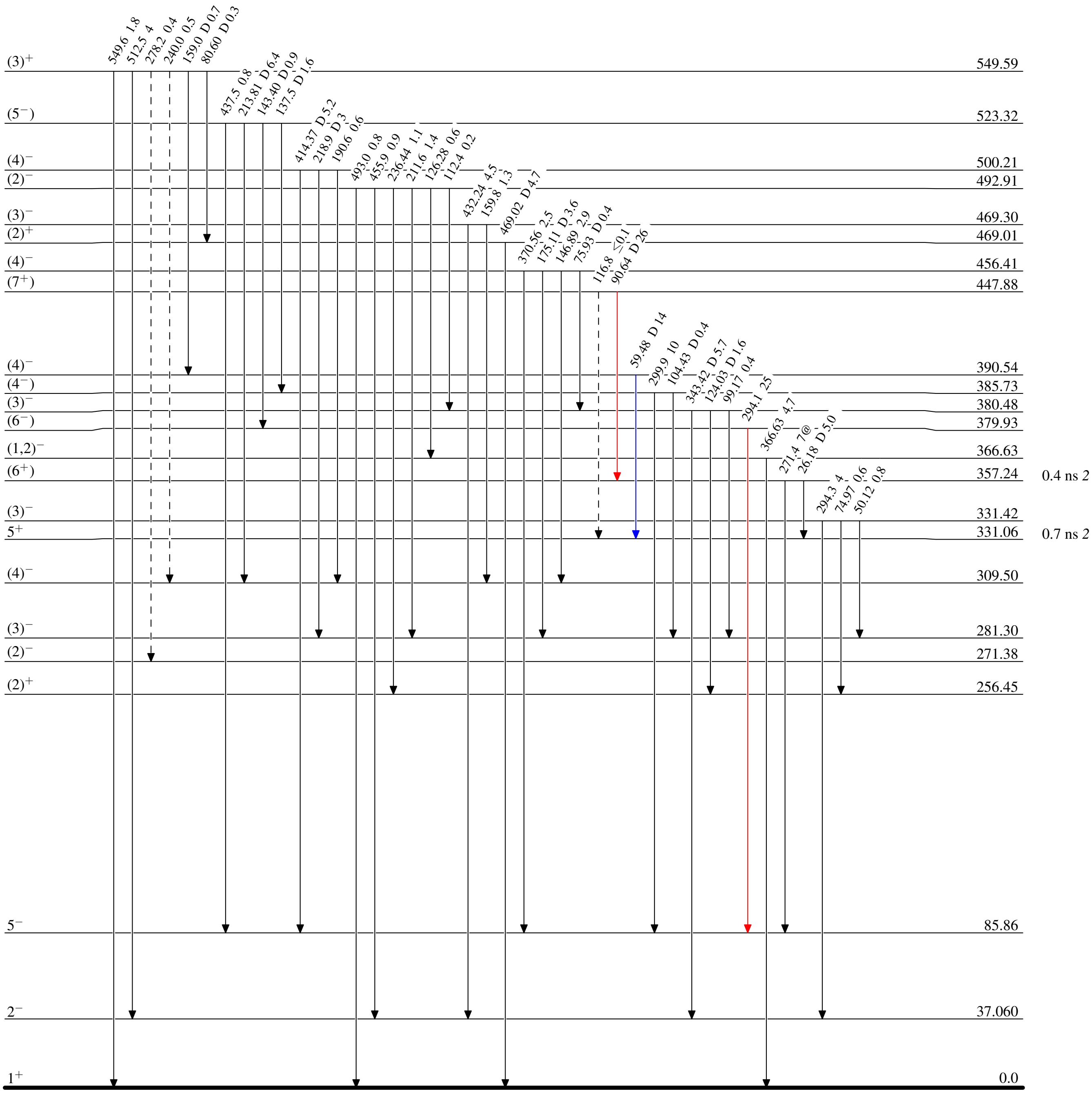
Level Scheme (continued)

Intensities: Relative I_γ

@ 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)



$^{80}_{35}Br_{45}$

^{80}Se(d,2nγ),^{78}Se(α,pnγ) 1984Do02

Level Scheme (continued)

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided