^{74}Ge(α,nγ) 1976Ze03,1990KuZR

History

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

1976Ze03: (α,nγ) E=14 MeV. Measured γ, $\gamma\gamma$, $\gamma(\theta)$.
1990KuZR (also 1989KuZV,1990KuZS): (α,nγ) E=17 MeV and (α,3nγ) E=40 MeV. Measured $T_{1/2}$ by RDDS and DSA methods.
Other reaction: ^{76}Ge(α,3nγ); 1976DeXY. Other: 1975FoZW.
The level scheme is from 1976Ze03, except for the highest two levels which are from ^{76}Ge(α,3nγ) study in 1976DeXY.

^{77}Se Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[#]	Comments
0.0	$1/2^-$		
161.80 *14*	$7/2^+$	17.36 s *5*	%IT=100
175.37 *19*	$9/2^+$		No deexciting gammas reported by 1976Ze03.
238.90 *16*	$3/2^-$	18[a] ps *4*	
249.69 *14*	$5/2^-$		
300.92 *16*	$5/2^+$	21[a] ps *14*	$T_{1/2}$: 1990KuZS quote $T_{1/2}$=7 ps to 35 ps. This value is inconsistent with $T_{1/2}\approx$250 ps deduced from RUL(E2)=300 for 125.5γ.
439.50 *17*	$5/2^-$		
520.3 *4*	$3/2^-$		
580.64 *17*	$7/2^-$	34[a] ps *6*	
679.7 *3*	$5/2^+$		
795.9 *4*	$7/2^{(+)}$	0.62 ps *+21−17*	
808.2 *4*	$7/2^-$	0.31 ps *+14−7*	
817.3 *11*	$1/2^-$		
824.2 *3*	$(5/2)^-$	0.45 ps *+21−14*	
910.9 *4*	$(3/2)^+$		
969.9 *9*	$(11/2^+)$	0.62 ps *21*	
978.0 *3*	$9/2^-$	0.69 ps *+35−21*	
1024.2 *9*	$(13/2^+)$	0.35 ps *+14−10*	
1126.4[@] *5*		0.76 ps *+35−21*	
1132.1 *7*			
1172.5 *5*	$9/2^-$	0.38 ps *+14−10*	
1179.3 *8*		0.90[&] ps *+28−14*	
1192.9 *5*		1.18[&] ps *21*	
1252.1 *10*	$5/2^+$	0.62[&] ps *+28−14*	
1351.3 *7*	$(11/2^-)$	0.49 ps *+21−10*	
1616.4 *7*	$(11/2^-)$		
1721.8 *9*	$(13/2^+)$		
1886.4 *10*	$13/2^-$	0.49 ps *+21−14*	
1998.3[@] *10*		0.31 ps *+10−7*	
2055.5 *7*	$(15/2^+)$	0.24 ps *7*	
2091.4 *7*	$(13/2^-)$	0.69 ps *14*	
2103.6 *12*	$(15/2,17/2^+)$	0.35 ps *+14−7*	
2240.0[@] *6*		0.97 ps *35*	
2263.9 *12*	$(15/2^-)$	0.42 ps *+17−10*	
2863.4 *14*	$(17/2^-)$	0.42[&] ps *+14−7*	E(level): level suggested by 1976DeXY and 1989KuZV.
3336.8 *16*	$(21/2^+)$	0.28[&] ps *+14−7*	E(level): level suggested by 1976DeXY and 1989KuZV.
4625 *2*	$(25/2^+)$	0.21[&] ps *+14−7*	Level from 1989KuZV.

[†] From least-squares fit to Eγ data.
[‡] For levels above 500, J^π assignments are generally from $\gamma(\theta)$ data and probable band assignment. Below this energy J^π values

Continued on next page (footnotes at end of table)

^{74}Ge(α,nγ) 1976Ze03,1990KuZR (continued)

^{77}Se Levels (continued)

are from Adopted Levels.
[#] DSAM (1990KuZR), unless otherwise stated.
[@] Level suggested by 1990KuZR.
[&] DSAM (1989KuZV).
[a] RDDS (1990KuZS).

$\gamma(^{77}Se)$

A_2 and A_4 are from (α,nγ) (1976Ze03).

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α[@]	Comments
13.4		175.37	$9/2^+$	161.80	$7/2^+$				E_γ: from level energy difference.
87.9 *1*		249.69	$5/2^-$	161.80	$7/2^+$				Complex peak. Iγ not given by 1976Ze03.
125.5 *1*	2.8 *5*	300.92	$5/2^+$	175.37	$9/2^+$				E_γ: may be an unresolved doublet.
139.1 *1*	15.5 *3*	300.92	$5/2^+$	161.80	$7/2^+$				A_2=−0.38 *8*; A_4=−0.08 *9*
141.1 *1*	1.6 *5*	580.64	$7/2^-$	439.50	$5/2^-$				
161.8 *2*	100.0 *5*	161.80	$7/2^+$	0.0	$1/2^-$	E3		0.884	α(K)=0.738 *11*; α(L)=0.1256 *20*; α(M)=0.0195 *3*; α(N)=0.001419 *22* A_2=+0.014 *15*; A_4=−0.006 *21* Mult.: from the Adopted Gammas.
200.5 *2*	14.4 *2*	439.50	$5/2^-$	238.90	$3/2^-$	[M1+E2]	+0.094 *30*	0.0165 *4*	α(K)=0.0146 *4*; α(L)=0.00158 *4*; α(M)=0.000246 *6*; α(N)=2.09×10^{-5} *5* A_2=−0.11 *3*; A_4=−0.01 *4*
231.1 *2*	1.49 *12*	910.9	$(3/2)^+$	679.7	$5/2^+$				
238.8 *2*	39.7 *3*	238.90	$3/2^-$	0.0	$1/2^-$	M1+E2	+0.18 *3*	0.0110 *3*	α(K)=0.0098 *3*; α(L)=0.00105 *3*; α(M)=0.000164 *5*; α(N)=1.39×10^{-5} *4* A_2=−0.062 *20*; A_4=−0.01 *3*
249.7 *2*	31.4 *3*	249.69	$5/2^-$	0.0	$1/2^-$				A_2=+0.102 *21*; A_4=0.00 *3*
282		520.3	$3/2^-$	238.90	$3/2^-$				E_γ: observed in $\gamma\gamma$-coin only.
297		817.3	$1/2^-$	520.3	$3/2^-$				E_γ: observed in $\gamma\gamma$-coin only.
304		824.2	$(5/2)^-$	520.3	$3/2^-$				E_γ: observed in $\gamma\gamma$-coin only.
331.1 *3*	19.4 *2*	580.64	$7/2^-$	249.69	$5/2^-$				A_2=+0.47 *3*; A_4=+0.08 *4*
341.7 *3*	2.7 *8*	580.64	$7/2^-$	238.90	$3/2^-$				
364.4 *4*	2.17 *25*	1172.5	$9/2^-$	808.2	$7/2^-$				
368.7 *4*	8.68 *21*	808.2	$7/2^-$	439.50	$5/2^-$	[M1+E2]	+0.128 *49*		A_2=−0.05 *7*; A_4=−0.05 *7*
378.1 *4*	0.29 *15*	679.7	$5/2^+$	300.92	$5/2^+$				
384.8 *4*	0.69 *11*	824.2	$(5/2)^-$	439.50	$5/2^-$				
391.2 *4*	0.96 *10*	910.9	$(3/2)^+$	520.3	$3/2^-$				
397.1[a] *4*	1.7[a] *3*	978.0	$9/2^-$	580.64	$7/2^-$				A_2=+0.30 *12*; A_4=+0.15 *17* $\gamma(\theta)$ for doubly placed γ.
397.1[a] *4*	1.7[a] *3*	1192.9		795.9	$7/2^{(+)}$				I_γ: total Iγ=3.36 *14*. Intensity is divided on the basis of (α,3nγ) results where this transition is from 978 level only.
405.6 *4*	1.52 *7*	580.64	$7/2^-$	175.37	$9/2^+$				A_2=+0.04 *14*; A_4=+0.17 *18*
418.8 *4*	3.80 *16*	580.64	$7/2^-$	161.80	$7/2^+$				A_2=+0.30 *14*; A_4=−0.03 *16*
439.4 *4*	18.07 *18*	439.50	$5/2^-$	0.0	$1/2^-$				A_2=+0.30 *4*; A_4=−0.05 *5*
444 *1*	1.0 *5*	1616.4	$(11/2^-)$	1172.5	$9/2^-$				
452		1132.1		679.7	$5/2^+$				E_γ: observed in $\gamma\gamma$-coin only.
494.9 *5*	4.20 *19*	795.9	$7/2^{(+)}$	300.92	$5/2^+$				A_2=−0.33 *12*; A_4=−0.01 *16*
518.0 *5*	11.0 *5*	679.7	$5/2^+$	161.80	$7/2^+$				A_2=+0.01 *12*; A_4=−0.01 *16*
521.0 *5*	5.3 *3*	520.3	$3/2^-$	0.0	$1/2^-$				A_2=−0.02 *15*; A_4=−0.01 *20*

$^{77}_{34}Se_{43}$-3

^{74}Ge(α,nγ) 1976Ze03,1990KuZR (continued)

$\gamma(^{77}Se)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Comments
569.2 *6*	4.4 *3*	808.2	$7/2^-$	238.90	$3/2^-$	A_2=+0.35 *17*; A_4=−0.04 *24*
574.3 *6*	2.8 *3*	824.2	$(5/2)^-$	249.69	$5/2^-$	E_γ: may be an unresolved doublet.
585.3 *6*	1.71 *23*	824.2	$(5/2)^-$	238.90	$3/2^-$	
620.7 *6*	2.36 *9*	795.9	$7/2^{(+)}$	175.37	$9/2^+$	A_2=−0.12 *13*; A_4=+0.01 *17*
634.3 *6*	1.73 *10*	795.9	$7/2^{(+)}$	161.80	$7/2^+$	A_2=−0.21 *18*; A_4=0.0 *4*
647[#]		1998.3		1351.3	$(11/2^-)$	
728.4 *7*	10.30 *12*	978.0	$9/2^-$	249.69	$5/2^-$	A_2=+0.39 *3*; A_4=−0.08 *5*
732.9 *7*	10.11 *12*	1172.5	$9/2^-$	439.50	$5/2^-$	A_2=+0.38 *3*; A_4=−0.08 *4*
739.8 *7*	2.6 *4*	1179.3		439.50	$5/2^-$	A_2=+0.04 *10*; A_4=−0.02 *14* I_γ: based on (α,3nγ) results, this γ is now doubly placed. Out of total Iγ=3.37 *12*, 0.8 *4* is assigned from 2091 level.
740.1[#]	0.8 *4*	2091.4	$(13/2^-)$	1351.3	$(11/2^-)$	I_γ: intensity based on (α,3nγ) results.
751.9 *7*	2.83 *10*	1721.8	$(13/2^+)$	969.9	$(11/2^+)$	A_2=−0.91 *6*; A_4=−0.09 *9*
770.7 *8*	11.61 *11*	1351.3	$(11/2^-)$	580.64	$7/2^-$	A_2=+0.37 *3*; A_4=+0.08 *4*
794.5 *8*	13.75 *12*	969.9	$(11/2^+)$	175.37	$9/2^+$	A_2=−0.89 *3*; A_4=+0.05 *4*
802.7[#]		978.0	$9/2^-$	175.37	$9/2^+$	
808.2[a] *8*	3.7[a] *9*	969.9	$(11/2^+)$	161.80	$7/2^+$	A_2=+0.33 *4*; A_4=−0.07 *6* $\gamma(\theta)$ for doubly placed γ. I_γ: total Iγ=9.32 *11*. Intensity is divided on the basis of (α,3nγ).
808.2[a] *8*	5.6[a] *9*	1616.4	$(11/2^-)$	808.2	$7/2^-$	
816.4[#]		978.0	$9/2^-$	161.80	$7/2^+$	
831.5 *8*	1.63 *16*	1132.1		300.92	$5/2^+$	
848.8 *8*	26.76 *9*	1024.2	$(13/2^+)$	175.37	$9/2^+$	A_2=+0.271 *10*; A_4=−0.016 *15*
891.3 *9*	4.0 *3*	1192.9		300.92	$5/2^+$	A_2=+0.23 *10*; A_4=−0.09 *14*
908.4 *9*	8.07 *8*	1886.4	$13/2^-$	978.0	$9/2^-$	A_2=+0.42 *5*; A_4=−0.10 *7* E_γ: may be an unresolved doublet.
912.6 *9*	4.23 *15*	2263.9	$(15/2^-)$	1351.3	$(11/2^-)$	A_2=+0.39 *11*; A_4=−0.14 *14*
918.9 *9*	8.38 *13*	2091.4	$(13/2^-)$	1172.5	$9/2^-$	A_2=+0.39 *5*; A_4=+0.01 *7*
951.2[&] *9*	6.95[&] *14*	1126.4		175.37	$9/2^+$	
951.2[&] *9*	6.95[&] *14*	1252.1	$5/2^+$	300.92	$5/2^+$	A_2=−0.13 *7*; A_4=−0.05 *9* $\gamma(\theta)$ for a doublet.
964.5[#]		1126.4		161.80	$7/2^+$	
977.0		2863.4	$(17/2^-)$	1886.4	$13/2^-$	
1031.2 *10*	3.58 *11*	2055.5	$(15/2^+)$	1024.2	$(13/2^+)$	A_2=−0.56 *10*; A_4=+0.07 *13*
1079.4 *10*	3.86 *10*	2103.6	$(15/2,17/2^+)$	1024.2	$(13/2^+)$	A_2=+0.39 *7*; A_4=−0.06 *13*
1085.6[#]		2055.5	$(15/2^+)$	969.9	$(11/2^+)$	
1113.5[#]		2240.0		1126.4		
1215.8[#]		2240.0		1024.2	$(13/2^+)$	
1233.2		3336.8	$(21/2^+)$	2103.6	$(15/2,17/2^+)$	
1288		4625	$(25/2^+)$	3336.8	$(21/2^+)$	Inferred from 1989KuZV.

$^{77}_{34}Se_{43}$-4

^{74}Ge(α,nγ) 1976Ze03,1990KuZR (continued)

$\gamma(^{77}Se)$ (continued)

† From (α,nγ) (1976Ze03), unless otherwise stated.
‡ From (α,nγ) (1976Ze03). The uncertainties quoted by authors are too small. The values quoted are probably statistical uncertainties only.
# From 1990KuZR. Uncertainty of 0.5 keV assigned (evaluator) for fitting purpose.
@ 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 undivided intensity.
a Multiply placed with intensity suitably divided.

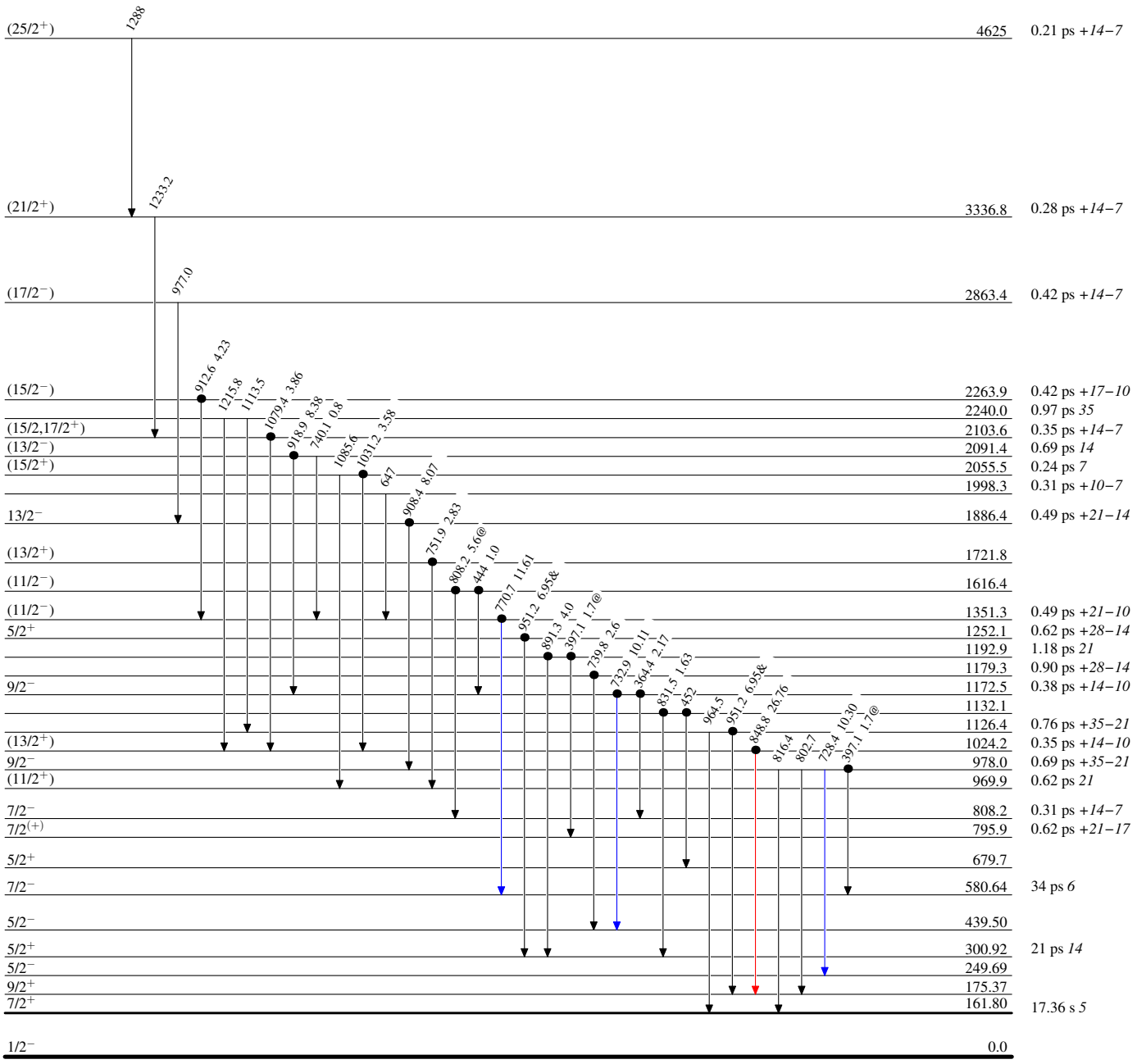
$^{77}_{34}Se_{43}$-5

^{74}Ge(α,nγ) 1976Ze03,1990KuZR

Level Scheme

Intensities: Relative I_γ
& 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



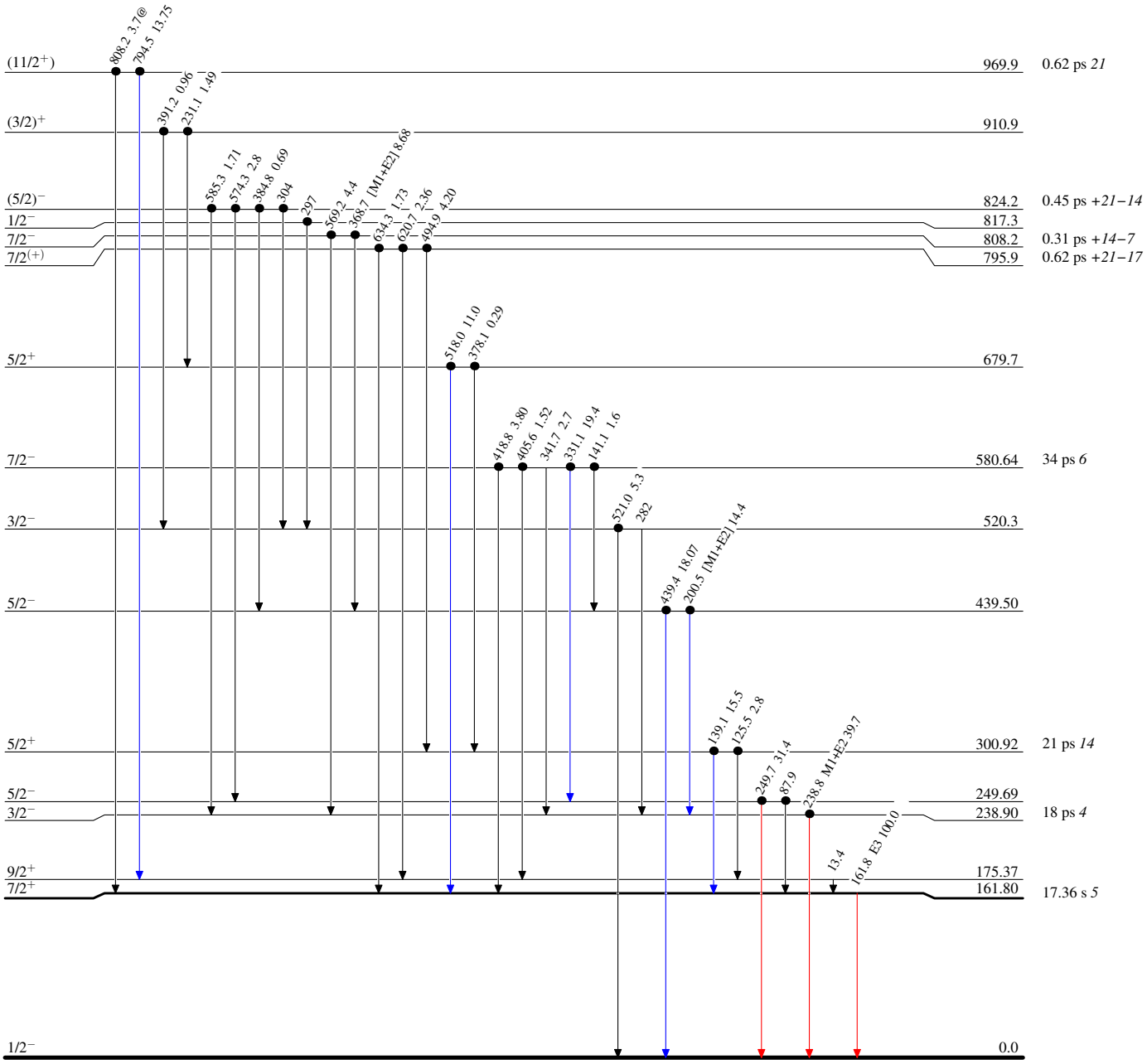
$^{77}_{34}Se_{43}$

^{74}Ge(α,nγ) **1976Ze03,1990KuZR**

Level Scheme (continued)

Intensities: Relative I_γ
& 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



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