^{58}Ni(^{28}Si,3$\alpha\gamma$) 1997Ru03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Ameenah R. Farhan	NDS 107, 1923 (2006)	30-Apr-2006

Includes: ^{9}Be(^{78}Kr,X); Ni(^{92}Mo,X); ^{58}Ni(^{19}F,2npγ); ^{60}Ni(^{16}O,2nγ); 85Ni(^{12}F,p2nγ).

1997Ru03: ^{58}Ni(^{28}Si,3$\alpha\gamma$) E=130 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO), (particle)(γ) coin using GAMMASPHERE and MICROBALL arrays.

Others:

2003Bo05 (also 2001Ko15): ^{9}Be(^{78}Kr,X) E=73 MeV/nucleon. Measured Eγ, Iγ, E(ce), I(ce), (recoil)γ coin, (recoil)(ce) coin, lifetime of the 0^+ isomer.

2000Ch07, 1997Ch46 (also 1997Re12): Ni(^{92}Mo,X) E=60 MeV/nucleon. Measured Eγ, Iγ, lifetime of the excited 0^+ isomer.

1999Be11 (also 2000Be43): ^{58}Ni(^{19}F,2npγ) E=60 MeV/nucleon. Measured Eγ, Iγ, E(ce), I(ce), $\gamma\gamma$, γ(ce) coin, lifetime of the excited 0^+ isomer. This work and that by 2003Bo05 is from the same group using two different reactions.

1990Ta12: ^{58}Ni(^{19}F,p2nγ) E=62 MeV. Measured γ, $\gamma\gamma(\theta)$, DCO ratio $T_{1/2}$ by (DSA and recoil-distance methods).

1984Ro01 (also 1981Pi12): ^{60}Ni(^{16}O,2nγ) E=45 MeV, ^{85}Ni(^{12}F,p2nγ) E=68 MeV, measured γ, $\gamma(\theta)$, $T_{1/2}$ by (Doppler-shift recoil-distance method).

1979Ta18: measured γ, $\gamma\gamma$(t), no isomers were found.

1976AlYY: ^{60}Ni(^{16}O,2nγ) E=42 MeV, measured γ, $T_{1/2}$ by (recoil-distance method).

1974No08: measured γ, $\gamma\gamma$. See also 1970No03 from the same group.

2003LiZW: ^{40}Ca(^{36}Ar,2pγ) E=104 MeV. Measured Eγ, Iγ, (recoil)γ coin. Only the g.s. band is shown up to 8^+ In the spectrum figure.

^{74}Kr Levels

E(level)	J$^\pi$[†]	$T_{1/2}$[‡]	Comments
0.0[#]	0^+		
455.61[#] *10*	2^+	16.3 ps *14*	$T_{1/2}$: from recoil-distance method (1990Ta12). Others: 20 ps *4* (1984Ro01), 9.7 ps *30* (1976AlYY).
508 *1*	0^+	13.0 ns *7*	Interpreted as a state with oblate-prolate shape coexistence, dominated by oblate shape. $T_{1/2}$: from 2003Bo05. Others: 23 ns *5* (2000Ch07,reanalyzed result of 29 ns *6* (1997Ch46) using least-squares method and taking into account prompt component), 14 ns *7* (1999Be11,2000Be43,2001Ko15).
1013.32[#] *14*	4^+	9.1 ps *5*	$T_{1/2}$: from recoil-distance method (1984Ro01).
1203.2 *4*	(2^+)		
1781.38[#] *23*	6^+	0.62 ps *10*	
1941.4[@] *3*	$3^{(+)}$		
2613.01[@] *25*	$5^{(+)}$		J$^\pi$: (4^-) proposed in earlier studies (1990Ta12,1991He02).
2655.73[b] *25*	$4^{(-)}$		
2747.93[#] *25*	8^+	0.194 ps *35*	
2811.8[a] *3*	5^-		
3005.1[c] *7*	(5^-)		
3139.00[b] *25*	$6^{(-)}$		
3366.9[a] *3*	7^-		
3452.4[@] *5*	(7^+)		
3698.4[c] *7*	7^-		
3761.3[&] *9*	8^+		
3840.3[b] *3*	$8^{(-)}$		
3892.3[#] *3*	10^+	0.069 ps *21*	
4132.8[a] *4*	9^-		
4469.4?[@] *11*			
4556.5[&] *9*	10^+		

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^{58}Ni(^{28}Si,3$\alpha\gamma$) 1997Ru03 (continued)

^{74}Kr Levels (continued)

E(level)	Jπ†	$T_{1/2}$‡	E(level)	Jπ†	E(level)	Jπ†
4592.2[c] 7	9−		8318.2[b] 15	16(−)	13012[c] 3	(21−)
4721.3[b] 4	10(−)		8412.5[&] 12	(16+)	13193.3[b] 23	22(−)
5086.3[a] 5	11−		8898.0[a] 7	17−	13896.4[a] 16	(23−)
5179.6[#] 4	12+	0.125 ps 35	9305.9[#] 8	18+	13926[&] 3	(22+)
5570.3[&] 8	12+		9684.3[c] 19	(17−)	14686.9[#] 19	24+
5655.4?[@] 15			9803.2[b] 18	18(−)	14828?[c] 4	(23−)
5658.1[c] 9	11−		9931.4 12	(18+)	15126.3[b] 25	(24−)
5764.2[b] 4	12(−)		10135.5[&] 15	(18+)	15907.5[a] 19	(25−)
6210.6[a] 5	13−		10430.4[a] 8	19−	16011?[&] 4	(24+)
6515.7[#] 5	14+	<0.14 ps	10880.9[#] 13	20+	17067.0[#] 22	(26+)
6853.1[&] 8	14+		11051.9?[&] 13		17299[b] 4	(26−)
6874.3[c] 12	13−		11297.3[c] 21	(19−)	18172.5[a] 22	(27−)
6967.2[b] 11	14(−)		11430.2[b] 21	20(−)	19750?[b] 4	(28−)
7487.6[a] 6	15−		11985.5[&] 18	(20+)	19859[#] 3	(28+)
7858.4[#] 6	16+		12088.4[a] 13	21−	20735[a] 3	(29−)
8219.3[c] 16	(15−)		12649.9[#] 16	22+		

† As proposed by 1997Ru03, based on $\gamma\gamma(\theta)$(DCO) data and band assignments. The assignments are consistent with those in 'Adopted Levels', except that many are in parentheses there due to lack of strong arguments for spin-parity assignments.
‡ From DSA method for levels above 1014. The values are from 1990Ta12, unless otherwise stated.
# Band(A): 0^+, dominantly prolate band. The irregularity around spin 14 interpreted as due to alignment of $\pi g_{9/2}$ $\nu g_{9/2}$ orbitals.
@ Band(B): Band based on (3^+).
& Band(C): $\pi g^2_{9/2}$, α=0.
a Band(D): $\pi 3/2[431]\pi 3/2[312]$, α=1.
b Band(d): $\pi 3/2[431]\pi 3/2[312]$, α=0.
c Band(E): $\pi 3/2[431]\pi 1/2[310]$, α=1.

$\gamma(^{74}Kr)$

All DCO values correspond to gates on ΔJ=2, stretched quadrupole transitions.

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	Comments
52		508	0^+	455.61	2^+	[E2]	E_γ: γ seen by 2003Bo05.
327.3 3	1.5 2	3139.00	$6^{(-)}$	2811.8	5^-	D	DCO=0.66 18
387.9 5	1.3 2	3840.3	$8^{(-)}$	3452.4	(7^+)		
455.6 1	100 3	455.61	2^+	0.0	0^+	E2	DCO=1.09 5 (1990Ta12)
473.2 4	1.0 2	3840.3	$8^{(-)}$	3366.9	7^-		
483.3 1	5.8 3	3139.00	$6^{(-)}$	2655.73	$4^{(-)}$	Q	DCO=0.97 10 Additional information 8.
508 1		508	0^+	0.0	0^+	E0	Ti(E2)/Ti(E0)=1.2 5 (2003Bo05). ρ^2_0=0.085 19 (2003Bo05), 0.090 20 (1997Ch46).
525.9 2	6.8 4	3139.00	$6^{(-)}$	2613.01	$5^{(+)}$	D	DCO=0.57 9 Additional information 9.
555.1† 2	4.2 2	3366.9	7^-	2811.8	5^-		
557.7 1	89 3	1013.32	4^+	455.61	2^+	E2	DCO=0.95 2 Additional information 1.

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^{58}Ni(^{28}Si,3$\alpha\gamma$) 1997Ru03 (continued)

$\gamma(^{74}Kr)$ (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
671.5 *3*	2.3 *3*	2613.01	$5^{(+)}$	1941.4	$3^{(+)}$		DCO=0.96 *12*
693.3 *3*	1.2 *2*	3698.4	7^-	3005.1	(5^-)	(Q)	DCO=0.91 *23*
694.0 *5*		1203.2	(2^+)	508	0^+		E_γ: from 1999Be11.
701.3 *2*	13 *1*	3840.3	$8^{(-)}$	3139.00	$6^{(-)}$	Q	DCO=1.01 *7* Additional information 11.
714.3 *1*	6.1 *3*	2655.73	$4^{(-)}$	1941.4	$3^{(+)}$	D	DCO=0.71 *6* Additional information 5.
738.3 *3*	1.8 *3*	1941.4	$3^{(+)}$	1203.2	(2^+)		DCO=0.58 *16*
747 *1*	1.1 *2*	1203.2	(2^+)	455.61	2^+		
766.9† *5*	17 *3*	4132.8	9^-	3366.9	7^-		
768.0 *2*	72 *5*	1781.38	6^+	1013.32	4^+	E2	DCO=1.07 *2* Additional information 2.
795.2 *6*	1.2 *2*	4556.5	10^+	3761.3	8^+		
831 *1*	0.5 *2*	2613.01	$5^{(+)}$	1781.38	6^+		
839.4 *7*	1.2 *2*	3452.4	(7^+)	2613.01	$5^{(+)}$		
881.0 *2*	12 *1*	4721.3	$10^{(-)}$	3840.3	$8^{(-)}$	Q	DCO=1.06 *6*
893.9 *3*	3.6 *3*	4592.2	9^-	3698.4	7^-	Q	DCO=1.07 *14*
928 *1*	1.1 *2*	1941.4	$3^{(+)}$	1013.32	4^+		
953.5 *2*	17 *1*	5086.3	11^-	4132.8	9^-	E2	DCO=1.01 *5* Additional information 14.
966.5 *1*	56 *2*	2747.93	8^+	1781.38	6^+	E2	DCO=1.05 *3* Additional information 6.
1014 *1*	2.3 *5*	5570.3	12^+	4556.5	10^+	Q	DCO=0.99 *16*
1017 *1*	0.6 *2*	4469.4?		3452.4	(7^+)		
1042.9 *2*	11 *1*	5764.2	$12^{(-)}$	4721.3	$10^{(-)}$	Q	DCO=1.00 *8*
1065.8 *6*	4.0 *4*	5658.1	11^-	4592.2	9^-	Q	DCO=0.97 *11*
1124.2 *2*	16 *1*	6210.6	13^-	5086.3	11^-	E2	DCO=0.96 *6*
1144.4 *1*	44 *2*	3892.3	10^+	2747.93	8^+	E2	DCO=1.01 *3* Additional information 12.
1186 *1*	0.4 *1*	5655.4?		4469.4?			
1203† *1*	9.0 *8*	6967.2	$14^{(-)}$	5764.2	$12^{(-)}$	Q	DCO=1.00 *9*
1204† *1*	1.5 *5*	1203.2	(2^+)	0.0	0^+		
1216.2 *8*	3.8 *3*	6874.3	13^-	5658.1	11^-	Q	DCO=0.96 *16*
1277.0 *3*	14 *1*	7487.6	15^-	6210.6	13^-	E2	DCO=1.08 *6*
1283† *1*	2.5 *5*	6853.1	14^+	5570.3	12^+		
1287.2 *2*	35 *2*	5179.6	12^+	3892.3	10^+	E2	DCO=1.07 *4* Additional information 15.
1336.2 *3*	28 *2*	6515.7	14^+	5179.6	12^+	E2	DCO=1.05 *7* Additional information 16.
1342.6 *4*	22 *2*	7858.4	16^+	6515.7	14^+	E2	DCO=1.12 *8*
1345 *1*	2.7 *3*	8219.3	(15^-)	6874.3	13^-		
1351 *1*	8.1 *6*	8318.2	$16^{(-)}$	6967.2	$14^{(-)}$	Q	DCO=1.09 *11*
1358 *1*	1.9 *3*	3139.00	$6^{(-)}$	1781.38	6^+		
1384.3 *4*	4.2 *4*	4132.8	9^-	2747.93	8^+	D	DCO=0.57 *10* Additional information 13.
1410.4 *3*	12 *1*	8898.0	17^-	7487.6	15^-	E2	DCO=1.04 *6*
1447.5 *4*	16 *1*	9305.9	18^+	7858.4	16^+	E2	DCO=1.10 *4*
1465 *1*	2.2 *3*	9684.3	(17^-)	8219.3	(15^-)		
1485† *1*	6.0 *8*	9803.2	$18^{(-)}$	8318.2	$16^{(-)}$	Q	DCO=0.84 *7*
1486.0† *5*	6.4 *8*	1941.4	$3^{(+)}$	455.61	2^+		DCO=0.84 *7* Additional information 3.
1532.4 *4*	10 *1*	10430.4	19^-	8898.0	17^-	Q	DCO=1.06 *8*
1559 *1*	3.9 *4*	8412.5	(16^+)	6853.1	14^+	(Q)	DCO=1.1 *3*

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^{58}Ni(^{28}Si,3$\alpha\gamma$) 1997Ru03 (continued)

$\gamma(^{74}Kr)$ (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
1575 *1*	10 *1*	10880.9	20^+	9305.9	18^+	Q	DCO=1.05 *5*
1585.7 *3*	10 *1*	3366.9	7^-	1781.38	6^+	D	DCO=0.56 *5* Additional information 10.
1599.6 *3*	4.6 *5*	2613.01	$5^{(+)}$	1013.32	4^+		DCO=0.50 *12* Additional information 4.
1613 *1*	1.8 *3*	11297.3	(19^-)	9684.3	(17^-)		
1627 *1*	4.8 *4*	11430.2	$20^{(-)}$	9803.2	$18^{(-)}$	Q	DCO=1.03 *14*
1643 *1*	0.4 *1*	2655.73	$4^{(-)}$	1013.32	4^+		
1658 *1*	8.1 *6*	12088.4	21^-	10430.4	19^-	Q	DCO=1.08 *11*
1671 *1*	0.8 *3*	3452.4	(7^+)	1781.38	6^+		
1673 *1*	5 *1*	6853.1	14^+	5179.6	12^+	Q	DCO=1.09 *14*
1678† *1*	2.0 *5*	5570.3	12^+	3892.3	10^+		
1715 *2*	1.3 *2*	13012	(21^-)	11297.3	(19^-)		
1723 *1*	3.4 *8*	10135.5	(18^+)	8412.5	(16^+)		
1746 *1*	2.2 *3*	11051.9?		9305.9	18^+		
1763 *1*	3.0 *2*	13193.3	$22^{(-)}$	11430.2	$20^{(-)}$	Q	DCO=1.10 *16*
1769 *1*	8.0 *8*	12649.9	22^+	10880.9	20^+	Q	DCO=0.98 *7*
1799 *1*	6.0 *5*	2811.8	5^-	1013.32	4^+	D	DCO=0.65 *10* Additional information 7.
1808 *1*	6.0 *5*	13896.4	(23^-)	12088.4	21^-	(Q)	DCO=1.18 *23*
1809† *2*	1.5 *4*	4556.5	10^+	2747.93	8^+		
1816 *2*	0.7 *2*	14828?	(23^-)	13012	(21^-)		
1844 *1*	0.5 *1*	4592.2	9^-	2747.93	8^+		
1850 *1*	2.0 *5*	11985.5	(20^+)	10135.5	(18^+)		
1898 *2*	0.9 *2*	8412.5	(16^+)	6515.7	14^+		
1917 *1*	2.3 *4*	3698.4	7^-	1781.38	6^+	D	DCO=0.45 *9*
1933 *1*	1.7 *2*	15126.3	(24^-)	13193.3	$22^{(-)}$		
1940 *2*	1.0 *2*	13926	(22^+)	11985.5	(20^+)		
1980 *1*	1.2 *2*	3761.3	8^+	1781.38	6^+		
1992 *1*	1.6 *2*	3005.1	(5^-)	1013.32	4^+		
2011 *1*	4.0 *4*	15907.5	(25^-)	13896.4	(23^-)	(Q)	DCO=1.04 *20*
2037 *1*	5.1 *6*	14686.9	24^+	12649.9	22^+	Q	DCO=1.07 *10*
2073 *1*	2.4 *3*	9931.4	(18^+)	7858.4	16^+	(Q)	DCO=0.99 *22*
2085 *2*	0.6 *1*	16011?	(24^+)	13926	(22^+)		
2173 *2*	1.0 *2*	17299	(26^-)	15126.3	(24^-)		
2265 *1*	2.2 *4*	18172.5	(27^-)	15907.5	(25^-)	(Q)	DCO=1.20 *26*
2380 *1*	2.5 *5*	17067.0	(26^+)	14686.9	24^+	Q	DCO=1.17 *24*
2451 *2*	0.4 *1*	19750?	(28^-)	17299	(26^-)		
2562 *2*	0.8 *2*	20735	(29^-)	18172.5	(27^-)		
2792 *2*	1.0 *2*	19859	(28^+)	17067.0	(26^+)		

† Doublet structure (1997Ru03).
‡ From $\gamma\gamma(\theta)$(DCO) and/or lifetime data.

^{58}Ni(^{28}Si,3$\alpha\gamma$) 1997Ru03

Level Scheme

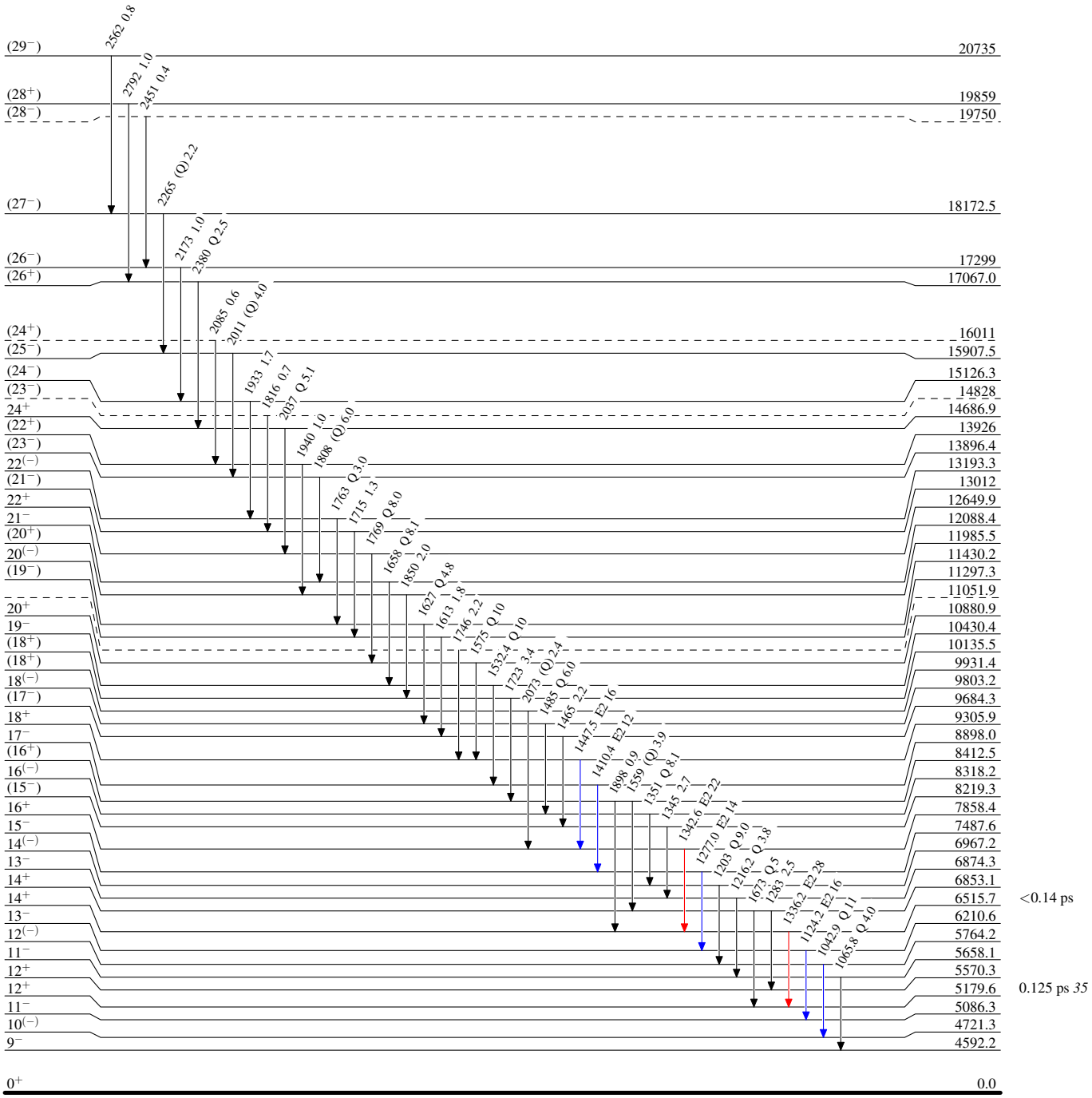
Intensities: Relative I_γ

Legend

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

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

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



$^{74}_{36}Kr_{38}$

^{58}Ni(^{28}Si,3$\alpha\gamma$) 1997Ru03

Level Scheme (continued)

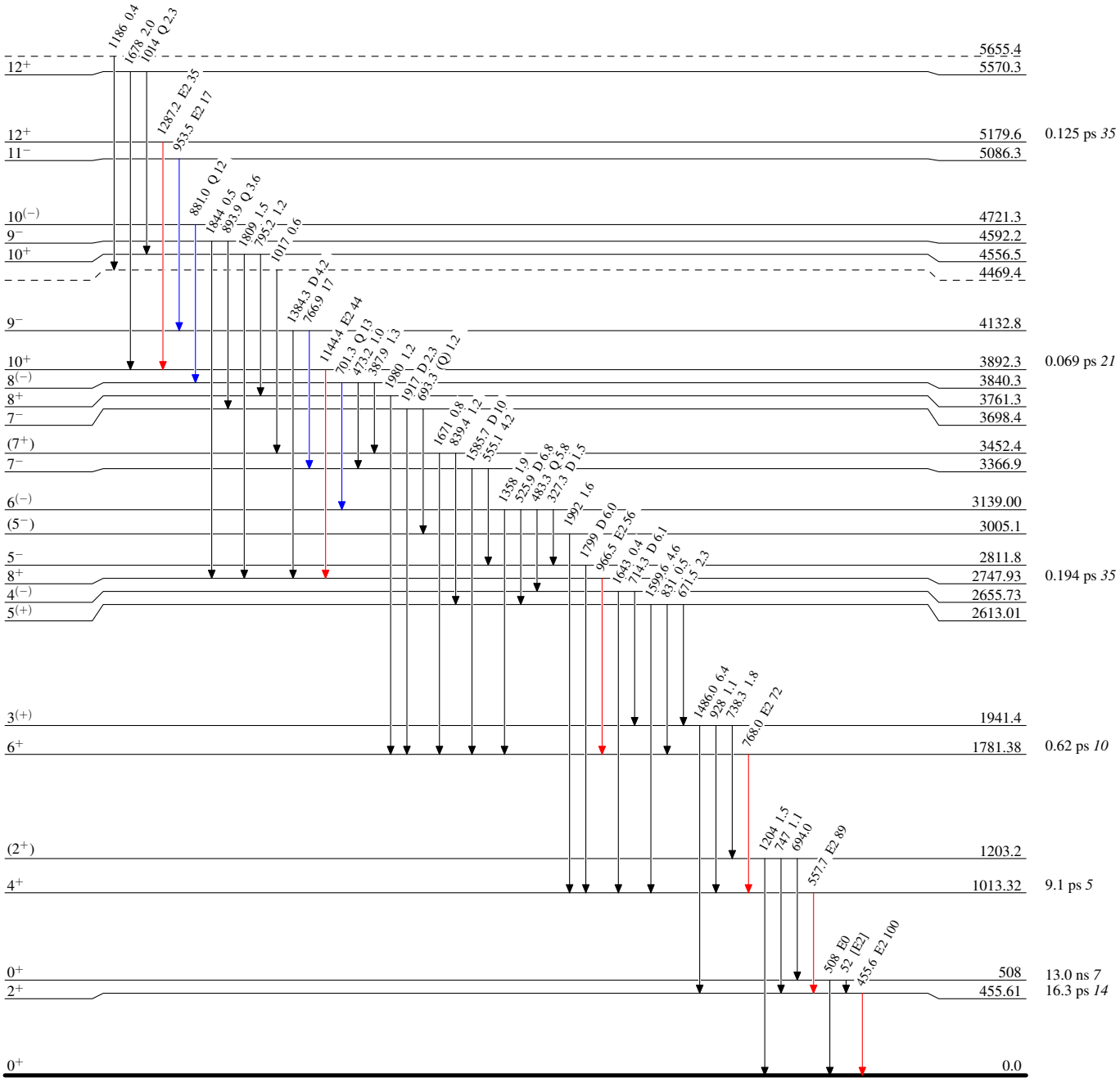
Intensities: Relative I_γ

Legend

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

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

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



$^{74}_{36}Kr_{38}$

^{58}Ni(^{28}Si,3$\alpha\gamma$) 1997Ru03