^{96}Zr(^{7}Li,4nγ) 2015Li17

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 145, 25 (2017)	1-Jul-2017

Based on XUNDL. Compiled by B. Singh (McMaster) and S. Kumar (Delhi Univ.), July 8, 2015.

2015Li17: E(^{7}Li)=35 MeV. Target=1.85 mg/cm^2 of ZnO_2 (86%) with 10.3 mg/cm^2 lead backing. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$(DCO) using an array of eight Compton-suppressed HPGe detectors, two planar HPGe detectors, and one clover detector at the HI-13 tandem accelerator facility of CIAE, Beijing. Deduced high-spin levels, J, π, multipolarity, bands, configurations, B(M1)/B(E2), alignments. Comparison with total Routhian surface, triaxial particle-rotor model calculations, and level systematics of neighboring nuclides.

^{99}Tc Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0[#]	9/2$^+$		
140.46[@] *3*	7/2$^+$		
142.64[&] *3*	1/2$^-$	6.0072 h *9*	%IT=99.9963 *6*; %β^-=0.0037 *6* Additional information 1. Half-life and decay modes are from Adopted Levels, Gammas.
181.20[#] *9*	5/2$^+$		
508.92[a] *8*	3/2$^-$		
612.32[&] *7*	5/2$^-$		
726.79[@] *7*	11/2$^+$		
739.01 *9*	7/2$^+$		
761.90[#] *8*	13/2$^+$		
986.02[a] *8*	7/2$^-$		
1176.52[&] *8*	9/2$^-$		
1526.30[@] *8*	15/2$^+$		
1584.87[#] *10*	17/2$^+$		
1604.82[a] *11*	11/2$^-$		
1747.42[&] *8*	13/2$^-$		
2072.90 *21*			
2155.10 *20*	17/2$^+$		
2222.82[a] *9*	15/2$^-$		
2241.7 *3*	(17/2$^+$)		
2329.82[&] *9*	17/2$^-$		
2422.0 *3*	(17/2$^+$)		
2459.1 *3*			
2487.20[@] *10*	19/2$^+$		
2502.22[b] *9*	17/2$^-$		
2552.90[#] *12*	21/2$^+$		
2646.58[a] *11*	19/2$^-$		
2703.48 *14*	21/2$^+$		
2758.5 *3*	(19/2$^+$)		
2760.82[b] *11*	19/2$^-$		
2784.81[&] *11*	21/2$^-$		
2855.98 *17*	23/2$^+$		
3108.32[b] *13*	21/2$^-$		
3129.36[a] *12*	23/2$^-$		
3295.42[b] *12*	23/2$^-$		
3376.52[&] *12*	25/2$^-$		

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^{96}Zr(^{7}Li,4nγ) 2015Li17 (continued)

^{99}Tc Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
3559.21@ *17*	23/2+	3910.89 *23*	25/2+	4303.31@ *17*	27/2+	5076.51@ *22*	31/2+
3622.36 *14*	25/2−	4026.79 *19*	27/2−	4724.91# *20*	29/2+	5340.62& *25*	33/2−
3649.11# *15*	25/2+	4066.81 *16*	(25/2+)	4785.12a *23*	(31/2−)	5596.12# *24*	(33/2+)
3883.31a *15*	27/2−	4203.11& *20*	29/2−	4915.9 *4*	29/2+	6000.6@ *3*	(35/2+)

† From least-squares fit (by evaluators) to Eγ data.
‡ As assigned in 2015Li17, based on previous assignments for low-lying levels and DCO ratios from the present work for higher levels.
# Band(A): π5/2[422] band,α=+1/2.
@ Band(a): π5/2[422] band,α=−1/2.
& Band(B): π1/2[301] band,α=+1/2.
a Band(b): π1/2[301] band,α=−1/2.
b Band(C): Band based on 17/2−.

γ(^{99}Tc)

DCO ratios are for 140° and 90° geometry, and correspond to gates on stretched quadrupole transitions. Expected values are ≈1.0 for ΔJ=2, quadrupole and 0.5 for ΔJ=1, dipole transitions.
Many new γ transitions have been found by 2015Li17.

Eγ	Iγ	Ei(level)	Jiπ	Ef	Jfπ	Mult.	α#	Comments
2.1726† *4*		142.64	1/2−	140.46	7/2+	E3†	1.4×10^{10}†	α(M)=1.211×10^{10} *17* α(N)=1.596×10^{9} *23*; α(O)=3.49×10^{4} *5*
(35.1‡ *2*)		761.90	13/2+	726.79	11/2+			
(58.6‡ *2*)		1584.87	17/2+	1526.30	15/2+			
81.0 *2*	8.1 *17*	3376.52	25/2−	3295.42	23/2−	[M1+E2]	1.6 *11*	α(K)=1.25 *82*; α(L)=0.28 *23*; α(M)=0.051 *42* α(N)=0.0076 *61*; α(O)=2.3×10^{-4} *13*
103.4 *1*	2.8 *10*	612.32	5/2−	508.92	3/2−	[M1+E2]	0.68 *43*	α(K)=0.56 *34*; α(L)=0.103 *76*; α(M)=0.019 *14* α(N)=0.0028 *21*; α(O)=1.06×10^{-4} *56*
107.0 *1*	4.7 *15*	2329.82	17/2−	2222.82	15/2−	[M1+E2]	0.61 *38*	α(K)=0.50 *30*; α(L)=0.090 *66*; α(M)=0.016 *12* α(N)=0.0025 *18*; α(O)=9.5×10^{-5} *50*
138.3 *2*	44.1 *61*	2784.81	21/2−	2646.58	19/2−	M1+E2	0.25 *14*	DCO=1.32 *10* α(K)=0.21 *12*; α(L)=0.033 *22*; α(M)=0.0061 *40* α(N)=9.2×10^{-4} *58*; α(O)=4.2×10^{-5} *20*
140.5 *1*	43.2 *6*	140.46	7/2+	0.0	9/2+	M1+E2	0.24 *13*	DCO=1.40 *20* α(K)=0.20 *11*; α(L)=0.031 *20*; α(M)=0.0057 *37* α(N)=8.7×10^{-4} *54*; α(O)=4.0×10^{-5} *19*

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^{96}Zr(^{7}Li,4nγ) 2015Li17 (continued)

γ(^{99}Tc) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
142.6 *1*	2.4 *8*	1747.42	13/2$^-$	1604.82	11/2$^-$	(M1+E2)	0.23 *13*	α(K)=0.19 *10*; α(L)=0.029 *19*; α(M)=0.0054 *35* α(N)=8.2×10^{-4} *51*; α(O)=3.8×10^{-5} *18*
142.63[†] *3*		142.64	1/2$^-$	0.0	9/2$^+$	M4[†]	40.3[†]	α(K)=29.2 *4*; α(L)=9.08 *13*; α(M)=1.778 *25* α(N)=0.269 *4*; α(O)=0.01071 *15*
152.5 *1*	5.0 *12*	2855.98	23/2$^+$	2703.48	21/2$^+$	M1+E2	0.181 *94*	DCO=1.25 *13* α(K)=0.153 *77*; α(L)=0.023 *14*; α(M)=0.0042 *26* α(N)=6.4×10^{-4} *38*; α(O)=3.1×10^{-5} *14*
172.4 *1*	8.1 *5*	2502.22	17/2$^-$	2329.82	17/2$^-$	(M1+E2)	0.120 *57*	DCO=0.84 *9* α(K)=0.102 *47*; α(L)=0.0146 *82*; α(M)=0.0027 *15* α(N)=4.1×10^{-4} *23*; α(O)=2.06×10^{-5} *83* Mult.: ΔJ=0 transition.
181.2 *1*	11.4 *3*	181.20	5/2$^+$	0.0	9/2$^+$	(E2)	0.1476	DCO=0.55 *9* α(K)=0.1249 *18*; α(L)=0.0187 *3*; α(M)=0.00343 *5* α(N)=0.000522 *8*; α(O)=2.44×10^{-5} *4* Mult.: M1/E2 listed in 2015Li17, but E2 required by ΔJ^π.
187.1 *1*	2.8 *9*	3295.42	23/2$^-$	3108.32	21/2$^-$	(M1+E2)	0.091 *41*	α(K)=0.078 *34*; α(L)=0.0109 *57*; α(M)=0.0020 *11* α(N)=3.1×10^{-4} *16*; α(O)=1.59×10^{-5} *60*
190.5 *1*	2.2 *6*	1176.52	9/2$^-$	986.02	7/2$^-$	M1+E2	0.086 *38*	DCO=0.77 *11* α(K)=0.073 *32*; α(L)=0.0102 *53*; α(M)=0.00186 *97* α(N)=2.9×10^{-4} *15*; α(O)=1.50×10^{-5} *56*
236.5 *1*	2.2 *13*	4303.31	27/2$^+$	4066.81	(25/2$^+$)	(M1+E2)	0.042 *16*	α(K)=0.037 *13*; α(L)=0.0048 *21*; α(M)=8.8×10^{-4} *37* α(N)=1.36×10^{-4} *56*; α(O)=7.7×10^{-6} *23*
247.1 *1*	5.4 *20*	3376.52	25/2$^-$	3129.36	23/2$^-$	M1+E2	0.037 *13*	DCO=0.51 *6* α(K)=0.032 *11*; α(L)=0.0042 *17*; α(M)=7.6×10^{-4} *31* α(N)=1.18×10^{-4} *46*; α(O)=6.7×10^{-6} *19*
258.6 *1*	5.2 *5*	2760.82	19/2$^-$	2502.22	17/2$^-$	M1+E2	0.032 *11*	DCO=0.46 *4* α(K)=0.0277 *87*; α(L)=0.0036 *14*; α(M)=6.5×10^{-4} *25* α(N)=1.01×10^{-4} *38*; α(O)=5.8×10^{-6} *16*
266.9 *2*	2.3 *7*	2422.0	(17/2$^+$)	2155.10	17/2$^+$	(M1+E2)	0.0290 *90*	DCO=0.72 *12* α(K)=0.0251 *76*; α(L)=0.0032 *12*; α(M)=5.8×10^{-4} *22* α(N)=9.1×10^{-5} *33*; α(O)=5.3×10^{-6} *14* Mult.: ΔJ=0 transition.
279.4 *1*	4.0 *4*	2502.22	17/2$^-$	2222.82	15/2$^-$	M1+E2	0.0251 *74*	DCO=0.65 *7* α(K)=0.0218 *62*; α(L)=0.00277 *96*; α(M)=5.0×10^{-4} *18* α(N)=7.9×10^{-5} *27*; α(O)=4.6×10^{-6} *11*
297.6 *1*	2.9 *11*	2784.81	21/2$^-$	2487.20	19/2$^+$	E1	0.00597	DCO=0.61 *9*

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^{96}Zr(^{7}Li,4nγ) 2015Li17 (continued)

$\gamma(^{99}Tc)$ (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
								α(K)=0.00525 *8*; α(L)=0.000597 *9*; α(M)=0.0001077 *16* α(N)=1.704×10^{-5} *24*; α(O)=1.102×10^{-6} *16*
316.7 *1*	30.0 *29*	2646.58	19/2$^-$	2329.82	17/2$^-$	M1+E2	0.017 *5*	DCO=0.51 *2* α(K)=0.015 *4*; α(L)=0.00185 *54*; α(M)=3.37×10^{-4} *98* α(N)=5.3×10^{-5} *15*; α(O)=3.2×10^{-6} *7*
319.8 *2*	1.0 *6*	4203.11	29/2$^-$	3883.31	27/2$^-$	(M1+E2)	0.017 *4*	α(K)=0.014 *4*; α(L)=0.00180 *52*; α(M)=3.26×10^{-4} *94* α(N)=5.1×10^{-5} *14*; α(O)=3.1×10^{-6} *6*
344.5 *1*	14.9 *19*	3129.36	23/2$^-$	2784.81	21/2$^-$	M1+E2	0.013 *3*	DCO=0.65 *5* α(K)=0.0116 *24*; α(L)=0.00143 *36*; α(M)=2.59×10^{-4} *66* α(N)=4.1×10^{-5} *10*; α(O)=2.5×10^{-6} *5*
347.5 *1*	3.3 *6*	3108.32	21/2$^-$	2760.82	19/2$^-$	M1+E2	0.013 *3*	DCO=0.66 *9* α(K)=0.0113 *23*; α(L)=0.0014 *4*; α(M)=2.52×10^{-4} *63* α(N)=4.0×10^{-5} *10*; α(O)=2.4×10^{-6} *4*
351.6 *2*	1.5 *9*	5076.51	31/2$^+$	4724.91	29/2$^+$	M1+E2	0.013 *3*	DCO=0.58 *8* α(K)=0.0109 *22*; α(L)=0.0013 *4*; α(M)=0.00024 *6* α(N)=3.8×10^{-5} *9*; α(O)=2.3×10^{-6} *4*
366.3 *1*	3.4 *2*	508.92	3/2$^-$	142.64	1/2$^-$	M1+E2	0.0111 *21*	DCO=0.64 *10* α(K)=0.0097 *18*; α(L)=0.0012 *3*; α(M)=0.00021 *5* α(N)=3.4×10^{-5} *8*; α(O)=2.1×10^{-6} *4*
373.7 *1*	2.5 *1*	986.02	7/2$^-$	612.32	5/2$^-$	M1+E2	0.0105 *19*	DCO=0.48 *4* α(K)=0.0091 *16*; α(L)=0.00111 *25*; α(M)=0.00020 *5* α(N)=3.2×10^{-5} *7*; α(O)=2.0×10^{-6} *3*
386.2 *2*	1.2 *6*	2459.1		2072.90				
404.4 *2*	1.3 *4*	4026.79	27/2$^-$	3622.36	25/2$^-$	(M1+E2)	0.0084 *13*	α(K)=0.0073 *11*; α(L)=0.00088 *17*; α(M)=0.00016 *3* α(N)=2.5×10^{-5} *5*; α(O)=1.57×10^{-6} *19* Final level J^π=15/2$^-$ in 2015Li17 is a misprint, it should be 25/2$^-$.
404.5 *2*	<1	6000.6	(35/2$^+$)	5596.12	(33/2$^+$)	(M1+E2)	0.0083 *13*	α(K)=0.0073 *11*; α(L)=0.00088 *17*; α(M)=0.00016 *3* α(N)=2.5×10^{-5} *5*; α(O)=1.57×10^{-6} *19*
417.7 *1*	1.2 *5*	4066.81	(25/2$^+$)	3649.11	25/2$^+$	(M1+E2)	0.0076 *11*	α(K)=0.0067 *10*; α(L)=0.00080 *14*; α(M)=0.00015 *3* α(N)=2.3×10^{-5} *4*; α(O)=1.44×10^{-6} *16*
421.6 *2*	1.6 *6*	4724.91	29/2$^+$	4303.31	27/2$^+$	M1+E2	0.0074 *11*	DCO=0.72 *11* α(K)=0.0065 *9*; α(L)=0.00078 *14*; α(M)=0.000141 *25* α(N)=2.2×10^{-5} *4*; α(O)=1.40×10^{-6} *15*
423.7 *2*	2.1 *9*	2646.58	19/2$^-$	2222.82	15/2$^-$	E2	0.00832	DCO=0.91 *11* α(K)=0.00723 *11*; α(L)=0.000898 *13*; α(M)=0.0001630 *23* α(N)=2.55×10^{-5} *4*; α(O)=1.526×10^{-6} *22*
431.0[@] *3*	<1	2760.82	19/2$^-$	2329.82	17/2$^-$	(M1+E2)	0.0070 *10*	α(K)=0.0061 *8*; α(L)=0.00073 *12*; α(M)=0.000132 *22* α(N)=2.1×10^{-5} *4*; α(O)=1.32×10^{-6} *14*

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^{96}Zr(^{7}Li,4nγ) 2015Li17 (continued)

γ(^{99}Tc) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
437.5 *2*	3.5 *1*	1176.52	9/2$^-$	739.01	7/2$^+$	E1	0.00219	DCO=0.56 *5* α(K)=0.00193 *3*; α(L)=0.000218 *3*; α(M)=3.93×10^{-5} *6* α(N)=6.24×10^{-6} *9*; α(O)=4.10×10^{-7} *6*
455.0 *1*	12.4 *21*	2784.81	21/2$^-$	2329.82	17/2$^-$	E2	0.00668	DCO=0.99 *6* α(K)=0.00582 *9*; α(L)=0.000715 *10*; α(M)=0.0001298 *19* α(N)=2.04×10^{-5} *3*; α(O)=1.233×10^{-6} *18*
469.7 *1*	35.6 *4*	612.32	5/2$^-$	142.64	1/2$^-$	E2	0.00607	DCO=0.95 *3* α(K)=0.00529 *8*; α(L)=0.000647 *9*; α(M)=0.0001175 *17* α(N)=1.84×10^{-5} *3*; α(O)=1.123×10^{-6} *16*
475.4 *1*	5.2 *11*	2222.82	15/2$^-$	1747.42	13/2$^-$	M1+E2	0.0053 *6*	DCO=0.72 *5* α(K)=0.0047 *5*; α(L)=0.00055 *8*; α(M)=0.000100 *13* α(N)=1.58×10^{-5} *20*; α(O)=1.01×10^{-6} *8*
477.1 *1*	1.7 *1*	986.02	7/2$^-$	508.92	3/2$^-$	(E2)	0.00579	α(K)=0.00504 *7*; α(L)=0.000617 *9*; α(M)=0.0001119 *16* α(N)=1.757×10^{-5} *25*; α(O)=1.072×10^{-6} *15*
482.8 *2*	1.7 *9*	3129.36	23/2$^-$	2646.58	19/2$^-$	(E2)	0.00559	α(K)=0.00487 *7*; α(L)=0.000594 *9*; α(M)=0.0001078 *16* α(N)=1.694×10^{-5} *24*; α(O)=1.036×10^{-6} *15*
493.0 *1*	3.9 *16*	3622.36	25/2$^-$	3129.36	23/2$^-$	M1+E2	0.0048 *5*	DCO=1.23 *17* α(K)=0.0042 *4*; α(L)=0.00050 *6*; α(M)=9.0×10^{-5} *11* α(N)=1.43×10^{-5} *16*; α(O)=9.2×10^{-7} *6*
506.8 *1*	8.8 *29*	3883.31	27/2$^-$	3376.52	25/2$^-$	M1+E2	0.0045 *4*	DCO=0.65 *5* α(K)=0.0039 *4*; α(L)=0.00046 *5*; α(M)=8.4×10^{-5} *10* α(N)=1.33×10^{-5} *14*; α(O)=8.5×10^{-7} *5*
507.6 *2*	1.1 *4*	4066.81	(25/2$^+$)	3559.21	23/2$^+$	(M1+E2)	0.0045 *4*	α(K)=0.0039 *3*; α(L)=0.00046 *5*; α(M)=8.3×10^{-5} *9* α(N)=1.32×10^{-5} *14*; α(O)=8.5×10^{-7} *5*
519.6 *2*	1.2 *9*	5596.12	(33/2$^+$)	5076.51	31/2$^+$	(M1+E2)	0.0042 *4*	α(K)=0.0037 *3*; α(L)=0.00043 *5*; α(M)=7.8×10^{-5} *8* α(N)=1.24×10^{-5} *12*; α(O)=8.0×10^{-7} *5*
534.6 *1*	2.8 *7*	3295.42	23/2$^-$	2760.82	19/2$^-$	E2	0.00414	DCO=0.91 *13* α(K)=0.00362 *5*; α(L)=0.000436 *7*; α(M)=7.91×10^{-5} *11* α(N)=1.245×10^{-5} *18*; α(O)=7.73×10^{-7} *11*
555.5 *2*	<1	5340.62	33/2$^-$	4785.12	(31/2$^-$)	(M1+E2)	0.00351 *21*	α(K)=0.00307 *18*; α(L)=0.00036 *3*; α(M)=6.5×10^{-5} *6* α(N)=1.03×10^{-5} *8*; α(O)=6.7×10^{-7} *3*
564.2 *1*	35.1 *4*	1176.52	9/2$^-$	612.32	5/2$^-$	E2	0.00355	DCO=1.05 *3* α(K)=0.00310 *5*; α(L)=0.000372 *6*; α(M)=6.74×10^{-5} *10* α(N)=1.063×10^{-5} *15*; α(O)=6.65×10^{-7} *10*
570.2 *4*	1.1 *4*	2155.10	17/2$^+$	1584.87	17/2$^+$	M1+E2	0.00328 *18*	DCO=0.86 *13* α(K)=0.00287 *15*; α(L)=0.00034 *3*; α(M)=6.1×10^{-5} *5* α(N)=9.6×10^{-6} *7*; α(O)=6.27×10^{-7} *21* Mult.: ΔJ=0 transition.

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^{96}Zr(^{7}Li,4nγ) 2015Li17 (continued)

γ(^{99}Tc) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
570.9 *1*	36.0 *27*	1747.42	13/2$^-$	1176.52	9/2$^-$	E2	0.00344	DCO=0.95 *3* α(K)=0.00300 *5*; α(L)=0.000359 *5*; α(M)=6.52×10^{-5} *10* α(N)=1.027×10^{-5} *15*; α(O)=6.43×10^{-7} *9*
576.4 *3*	<1	3129.36	23/2$^-$	2552.90	21/2$^+$	(E1)	1.13×10^{-3}	α(K)=0.000994 *14*; α(L)=0.0001118 *16*; α(M)=2.02×10^{-5} *3* α(N)=3.21×10^{-6} *5*; α(O)=2.13×10^{-7} *3*
582.0 *2*	<1	4785.12	(31/2$^-$)	4203.11	29/2$^-$	(M1+E2)	0.00311 *16*	α(K)=0.00272 *13*; α(L)=0.000318 *22*; α(M)=5.8×10^{-5} *4* α(N)=9.1×10^{-6} *6*; α(O)=5.95×10^{-7} *18*
582.4 *2*	36.7 *32*	2329.82	17/2$^-$	1747.42	13/2$^-$	E2	0.00325	DCO=1.00 *3* α(K)=0.00284 *4*; α(L)=0.000339 *5*; α(M)=6.15×10^{-5} *9* α(N)=9.70×10^{-6} *14*; α(O)=6.09×10^{-7} *9*
586.3 *1*	2.3 *9*	726.79	11/2$^+$	140.46	7/2$^+$	E2	0.00319	DCO=0.97 *11* α(K)=0.00279 *4*; α(L)=0.000333 *5*; α(M)=6.03×10^{-5} *9* α(N)=9.51×10^{-6} *14*; α(O)=5.98×10^{-7} *9*
591.8 *1*	17.8 *27*	3376.52	25/2$^-$	2784.81	21/2$^-$	E2	0.00311	DCO=0.96 *8* α(K)=0.00271 *4*; α(L)=0.000324 *5*; α(M)=5.87×10^{-5} *9* α(N)=9.26×10^{-6} *13*; α(O)=5.83×10^{-7} *9*
603.4 *2*	2.2 *4*	2758.5	(19/2$^+$)	2155.10	17/2$^+$	(M1+E2)	0.00283 *12*	DCO=0.80 *14* α(K)=0.00248 *10*; α(L)=0.000290 *18*; α(M)=5.2×10^{-5} *4* α(N)=8.3×10^{-6} *5*; α(O)=5.43×10^{-7} *13*
606.1 *2*	1.7 *8*	3108.32	21/2$^-$	2502.22	17/2$^-$	(E2)	0.00291	α(K)=0.00254 *4*; α(L)=0.000303 *5*; α(M)=5.48×10^{-5} *8* α(N)=8.65×10^{-6} *13*; α(O)=5.46×10^{-7} *8*
618.0 *2*	1.6 *10*	2222.82	15/2$^-$	1604.82	11/2$^-$	(E2)	0.00276	α(K)=0.00241 *4*; α(L)=0.000286 *4*; α(M)=5.19×10^{-5} *8* α(N)=8.19×10^{-6} *12*; α(O)=5.18×10^{-7} *8*
618.8 *2*	4.2 *16*	1604.82	11/2$^-$	986.02	7/2$^-$	(E2)	0.00275	α(K)=0.00240 *4*; α(L)=0.000285 *4*; α(M)=5.17×10^{-5} *8* α(N)=8.16×10^{-6} *12*; α(O)=5.17×10^{-7} *8*
650.3 *2*	1.9 *14*	4026.79	27/2$^-$	3376.52	25/2$^-$	M1+E2	0.00235 *7*	DCO=0.56 *8* α(K)=0.00206 *6*; α(L)=0.000239 *11*; α(M)=4.32×10^{-5} *19* α(N)=6.9×10^{-6} *3*; α(O)=4.50×10^{-7} *7*
654.2 *2*	1.8 *6*	4303.31	27/2$^+$	3649.11	25/2$^+$	M1+E2	0.00231 *6*	DCO=0.70 *9*

Continued on next page (footnotes at end of table)

^{96}Zr(^{7}Li,4nγ) 2015Li17 (continued)

γ(^{99}Tc) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
								α(K)=0.00203 *5*; α(L)=0.000235 *10*; α(M)=4.26×10^{-5} *18* α(N)=6.8×10^{-6} *3*; α(O)=4.44×10^{-7} *7*
656.8 *5*	1.0 *3*	2241.7	(17/2$^+$)	1584.87	17/2$^+$	M1+E2	0.00229 *6*	DCO=0.59 *5* α(K)=0.00201 *5*; α(L)=0.000233 *10*; α(M)=4.21×10^{-5} *18* α(N)=6.69×10^{-6} *25*; α(O)=4.39×10^{-7} *7*
715.4 *3*	1.9 *6*	2241.7	(17/2$^+$)	1526.30	15/2$^+$	(M1+E2)	0.00185	DCO=0.86 *13* α(K)=0.001627 *24*; α(L)=0.000188 *5*; α(M)=3.40×10^{-5} *9* α(N)=5.39×10^{-6} *13*; α(O)=3.57×10^{-7} *6*
726.8 *1*	14.0 *3*	726.79	11/2$^+$	0.0	9/2$^+$	M1+E2	0.00178 *3*	DCO=1.21 *8* α(K)=0.001566 *23*; α(L)=0.000180 *5*; α(M)=3.27×10^{-5} *8* α(N)=5.19×10^{-6} *11*; α(O)=3.43×10^{-7} *7*
739.0 *1*	4.6 *2*	739.01	7/2$^+$	0.0	9/2$^+$	M1+E2	1.71×10^{-3} *3*	DCO=0.76 *8* α(K)=0.001505 *21*; α(L)=0.000173 *4*; α(M)=3.13×10^{-5} *7* α(N)=4.98×10^{-6} *10*; α(O)=3.30×10^{-7} *7*
742.5 *1*	6.1 *11*	3295.42	23/2$^-$	2552.90	21/2$^+$	E1	6.45×10^{-4}	DCO=0.61 *5* α(K)=0.000568 *8*; α(L)=6.36×10^{-5} *9*; α(M)=1.148×10^{-5} *16* α(N)=1.83×10^{-6} *3*; α(O)=1.225×10^{-7} *18*
744.1 *3*	<1	4303.31	27/2$^+$	3559.21	23/2$^+$	(E2)	1.69×10^{-3}	α(K)=0.001477 *21*; α(L)=0.0001727 *25*; α(M)=3.13×10^{-5} *5* α(N)=4.95×10^{-6} *7*; α(O)=3.20×10^{-7} *5*
744.9 *2*	5.9 *10*	2329.82	17/2$^-$	1584.87	17/2$^+$	E1	6.41×10^{-4}	DCO=0.61 *5* α(K)=0.000564 *8*; α(L)=6.32×10^{-5} *9*; α(M)=1.140×10^{-5} *16* α(N)=1.81×10^{-6} *3*; α(O)=1.216×10^{-7} *17* Mult.: ΔJ=0 transition, but DCO seems too low for a ΔJ=0, dipole transition.
753.9 *2*	1.9 *13*	3883.31	27/2$^-$	3129.36	23/2$^-$	(E2)	1.63×10^{-3}	α(K)=0.001429 *20*; α(L)=0.0001669 *24*; α(M)=3.02×10^{-5} *5* α(N)=4.79×10^{-6} *7*; α(O)=3.09×10^{-7} *5*
754.8 *1*	4.8 *5*	2502.22	17/2$^-$	1747.42	13/2$^-$	E2	1.63×10^{-3}	DCO=1.10 *11* α(K)=0.001425 *20*; α(L)=0.0001664 *24*; α(M)=3.01×10^{-5} *5* α(N)=4.77×10^{-6} *7*; α(O)=3.09×10^{-7} *5*
761.9 *1*	100	761.90	13/2$^+$	0.0	9/2$^+$	E2	1.59×10^{-3}	DCO=1.06 *2*

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^{96}Zr(^{7}Li,4nγ) 2015Li17 (continued)

γ(^{99}Tc) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
								α(K)=0.001392 *20*; α(L)=0.0001624 *23*; α(M)=2.94×10^{-5} *5* α(N)=4.66×10^{-6} *7*; α(O)=3.01×10^{-7} *5*
764.4 *1*	12.0 *15*	1526.30	15/2$^+$	761.90	13/2$^+$	M1+E2	1.58×10^{-3}	DCO=1.04 *5* α(K)=0.001388 *21*; α(L)=0.000159 *3*; α(M)=2.89×10^{-5} *5* α(N)=4.59×10^{-6} *8*; α(O)=3.04×10^{-7} *7*
773.2 *2*	1.9 *15*	5076.51	31/2$^+$	4303.31	27/2$^+$	(E2)	1.53×10^{-3}	α(K)=0.001341 *19*; α(L)=0.0001563 *22*; α(M)=2.83×10^{-5} *4* α(N)=4.48×10^{-6} *7*; α(O)=2.91×10^{-7} *4*
799.5 *1*	10.0 *3*	1526.30	15/2$^+$	726.79	11/2$^+$	E2	1.41×10^{-3}	DCO=1.07 *13* α(K)=0.001234 *18*; α(L)=0.0001435 *20*; α(M)=2.60×10^{-5} *4* α(N)=4.11×10^{-6} *6*; α(O)=2.68×10^{-7} *4*
803.5 *1*	7.7 *21*	2329.82	17/2$^-$	1526.30	15/2$^+$	E1	5.47×10^{-4}	DCO=0.69 *8* α(K)=0.000482 *7*; α(L)=5.38×10^{-5} *8*; α(M)=9.72×10^{-6} *14* α(N)=1.546×10^{-6} *22*; α(O)=1.039×10^{-7} *15*
804.8 *2*	1.0 *5*	986.02	7/2$^-$	181.20	5/2$^+$	(E1)	5.45×10^{-4}	α(K)=0.000480 *7*; α(L)=5.36×10^{-5} *8*; α(M)=9.68×10^{-6} *14* α(N)=1.541×10^{-6} *22*; α(O)=1.036×10^{-7} *15*
823.0 *1*	67.6 *7*	1584.87	17/2$^+$	761.90	13/2$^+$	E2	1.31×10^{-3}	DCO=0.98 *2* α(K)=0.001149 *16*; α(L)=0.0001333 *19*; α(M)=2.41×10^{-5} *4* α(N)=3.82×10^{-6} *6*; α(O)=2.49×10^{-7} *4*
826.6 *3*	12.2 *14*	4203.11	29/2$^-$	3376.52	25/2$^-$	E2	1.30×10^{-3}	DCO=0.96 *7* α(K)=0.001137 *16*; α(L)=0.0001319 *19*; α(M)=2.39×10^{-5} *4* α(N)=3.78×10^{-6} *6*; α(O)=2.47×10^{-7} *4*
837.5 *2*	1.8 *9*	3622.36	25/2$^-$	2784.81	21/2$^-$	(E2)	1.26×10^{-3}	α(K)=0.001101 *16*; α(L)=0.0001276 *18*; α(M)=2.31×10^{-5} *4* α(N)=3.66×10^{-6} *6*; α(O)=2.39×10^{-7} *4* Initial level J^π=15/2$^-$ in 2015Li17 is a misprint, it should be 25/2$^-$.
845.5 *2*	1.3 *6*	986.02	7/2$^-$	140.46	7/2$^+$	(E1)	4.93×10^{-4}	α(K)=0.000434 *6*; α(L)=4.85×10^{-5} *7*; α(M)=8.75×10^{-6} *13* α(N)=1.392×10^{-6} *20*; α(O)=9.37×10^{-8} *14*
871.2 *2*	2.1 *19*	5596.12	(33/2$^+$)	4724.91	29/2$^+$	(E2)	1.14×10^{-3}	α(K)=0.001001 *14*; α(L)=0.0001157 *17*; α(M)=2.09×10^{-5} *3* α(N)=3.32×10^{-6} *5*; α(O)=2.18×10^{-7} *3*
901.8 *3*	<1	4785.12	(31/2$^-$)	3883.31	27/2$^-$	(E2)	1.05×10^{-3}	α(K)=0.000923 *13*; α(L)=0.0001063 *15*; α(M)=1.92×10^{-5} *3* α(N)=3.05×10^{-6} *5*; α(O)=2.01×10^{-7} *3*
902.3 *1*	5.0 *10*	2487.20	19/2$^+$	1584.87	17/2$^+$	M1+E2	0.00107 *3*	DCO=0.86 *8* α(K)=0.00094 *3*; α(L)=0.0001074 *20*; α(M)=1.94×10^{-5} *4* α(N)=3.09×10^{-6} *7*; α(O)=2.07×10^{-7} *8*
924.1 *3*	<1	6000.6	(35/2$^+$)	5076.51	31/2$^+$	(E2)	9.93×10^{-4}	α(K)=0.000871 *13*; α(L)=0.0001002 *14*; α(M)=1.81×10^{-5} *3*

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^{96}Zr(^{7}Li,4nγ) 2015Li17 (continued)

γ(^{99}Tc) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
								α(N)=2.88×10^{-6} *4*; α(O)=1.89×10^{-7} *3* Mult.: (M1/E2) in 2015Li17 is a misprint, ΔJ^π requires (E2).
960.9 *1*	5.4 *14*	2487.20	19/2$^+$	1526.30	15/2$^+$	E2	9.06×10^{-4}	DCO=1.09 *13* α(K)=0.000796 *12*; α(L)=9.13×10^{-5} *13*; α(M)=1.652×10^{-5} *24* α(N)=2.62×10^{-6} *4*; α(O)=1.731×10^{-7} *25*
968.0 *1*	26.0 *25*	2552.90	21/2$^+$	1584.87	17/2$^+$	E2	8.91×10^{-4}	DCO=1.04 *4* α(K)=0.000782 *11*; α(L)=8.97×10^{-5} *13*; α(M)=1.623×10^{-5} *23* α(N)=2.58×10^{-6} *4*; α(O)=1.702×10^{-7} *24*
975.9 *2*	2.6 *11*	2502.22	17/2$^-$	1526.30	15/2$^+$	(E1)	3.71×10^{-4}	α(K)=0.000327 *5*; α(L)=3.64×10^{-5} *5*; α(M)=6.57×10^{-6} *10* α(N)=1.046×10^{-6} *15*; α(O)=7.07×10^{-8} *10*
985.5 *1*	8.7 *3*	1747.42	13/2$^-$	761.90	13/2$^+$	E1	3.64×10^{-4}	DCO=1.05 *10* α(K)=0.000321 *5*; α(L)=3.57×10^{-5} *5*; α(M)=6.44×10^{-6} *9* α(N)=1.027×10^{-6} *15*; α(O)=6.94×10^{-8} *10* Mult.: ΔJ=0 transition.
1006.3 *3*	1.7 *7*	3559.21	23/2$^+$	2552.90	21/2$^+$	M1+E2	0.00084 *3*	DCO=0.80 *11* α(K)=0.000738 *25*; α(L)=8.37×10^{-5} *22*; α(M)=1.51×10^{-5} *4* α(N)=2.41×10^{-6} *7*; α(O)=1.62×10^{-7} *7*
1036.0 *3*	1.3 *8*	1176.52	9/2$^-$	140.46	7/2$^+$	(E1)	3.31×10^{-4}	α(K)=0.000292 *4*; α(L)=3.24×10^{-5} *5*; α(M)=5.85×10^{-6} *9* α(N)=9.33×10^{-7} *13*; α(O)=6.31×10^{-8} *9*
1054.9 *2*	1.4 *8*	3910.89	25/2$^+$	2855.98	23/2$^+$	M1+E2	0.00076 *3*	DCO=1.14 *20* α(K)=0.000665 *24*; α(L)=7.53×10^{-5} *21*; α(M)=1.36×10^{-5} *4* α(N)=2.17×10^{-6} *7*; α(O)=1.46×10^{-7} *7*
1061.8 *1*	11.7 *18*	2646.58	19/2$^-$	1584.87	17/2$^+$	E1	3.16×10^{-4}	DCO=0.56 *4* α(K)=0.000279 *4*; α(L)=3.10×10^{-5} *5*; α(M)=5.59×10^{-6} *8* α(N)=8.90×10^{-7} *13*; α(O)=6.03×10^{-8} *9*
1072.0 *2*	2.6 *12*	3559.21	23/2$^+$	2487.20	19/2$^+$	E2	7.07×10^{-4}	DCO=0.96 *16* α(K)=0.000621 *9*; α(L)=7.09×10^{-5} *10*; α(M)=1.281×10^{-5} *18* α(N)=2.04×10^{-6} *3*; α(O)=1.354×10^{-7} *19*
1075.8 *2*	1.9 *8*	4724.91	29/2$^+$	3649.11	25/2$^+$	E2	7.02×10^{-4}	DCO=0.92 *15* α(K)=0.000617 *9*; α(L)=7.03×10^{-5} *10*; α(M)=1.271×10^{-5} *18* α(N)=2.02×10^{-6} *3*; α(O)=1.343×10^{-7} *19*
1096.2 *1*	10.2 *17*	3649.11	25/2$^+$	2552.90	21/2$^+$	E2	6.73×10^{-4}	DCO=0.95 *6* α(K)=0.000592 *9*; α(L)=6.74×10^{-5} *10*; α(M)=1.218×10^{-5} *17* α(N)=1.94×10^{-6} *3*; α(O)=1.289×10^{-7} *18*
1118.6 *1*	6.5 *13*	2703.48	21/2$^+$	1584.87	17/2$^+$	E2	6.45×10^{-4}	DCO=1.04 *8*

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^{96}Zr(^{7}Li,4nγ) 2015Li17 (continued)

$\gamma(^{99}Tc)$ (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
								α(K)=0.000566 *8*; α(L)=6.44×10^{-5} *9*; α(M)=1.164×10^{-5} *17* α(N)=1.85×10^{-6} *3*; α(O)=1.234×10^{-7} *18*; α(IPF)=1.078×10^{-6} *16*
1137.5 *2*	2.1 *13*	5340.62	33/2$^-$	4203.11	29/2$^-$	E2	6.23×10^{-4}	DCO=1.10 *17* α(K)=0.000546 *8*; α(L)=6.20×10^{-5} *9*; α(M)=1.121×10^{-5} *16* α(N)=1.783×10^{-6} *25*; α(O)=1.190×10^{-7} *17*; α(IPF)=1.87×10^{-6} *3*
1175.9 *2*	4.2 *11*	2760.82	19/2$^-$	1584.87	17/2$^+$	E1	2.89×10^{-4}	DCO=0.64 *6* α(K)=0.000231 *4*; α(L)=2.56×10^{-5} *4*; α(M)=4.62×10^{-6} *7* α(N)=7.37×10^{-7} *11*; α(O)=5.00×10^{-8} *7*; α(IPF)=2.74×10^{-5} *4*
1207.4 *3*	1.1 *7*	3910.89	25/2$^+$	2703.48	21/2$^+$	E2	5.55×10^{-4}	DCO=1.09 *31* α(K)=0.000480 *7*; α(L)=5.44×10^{-5} *8*; α(M)=9.83×10^{-6} *14* α(N)=1.565×10^{-6} *22*; α(O)=1.047×10^{-7} *15*; α(IPF)=8.64×10^{-6} *13*
1266.8 *3*	1.2 *8*	4915.9	29/2$^+$	3649.11	25/2$^+$	E2	5.12×10^{-4}	DCO=1.06 *22* α(K)=0.000434 *6*; α(L)=4.91×10^{-5} *7*; α(M)=8.87×10^{-6} *13* α(N)=1.411×10^{-6} *20*; α(O)=9.47×10^{-8} *14*; α(IPF)=1.89×10^{-5} *3*
1346.1 *2*	2.5 *2*	2072.90		726.79	11/2$^+$			
1393.2 *2*	6.1 *2*	2155.10	17/2$^+$	761.90	13/2$^+$	E2	4.54×10^{-4}	DCO=0.96 *9* α(K)=0.000357 *5*; α(L)=4.02×10^{-5} *6*; α(M)=7.26×10^{-6} *11* α(N)=1.156×10^{-6} *17*; α(O)=7.79×10^{-8} *11*; α(IPF)=4.87×10^{-5} *7*
1460.9 *2*	4.0 *2*	2222.82	15/2$^-$	761.90	13/2$^+$	(E1)	3.90×10^{-4}	α(K)=0.0001583 *23*; α(L)=1.748×10^{-5} *25*; α(M)=3.15×10^{-6} *5* α(N)=5.03×10^{-7} *7*; α(O)=3.43×10^{-8} *5*; α(IPF)=0.000210 *3*

† From Adopted Levels.
‡ From level-energy difference.
# Additional information 2.
@ Placement of transition in the level scheme is uncertain.

^{96}Zr(^{7}Li,4nγ) 2015Li17

Level Scheme

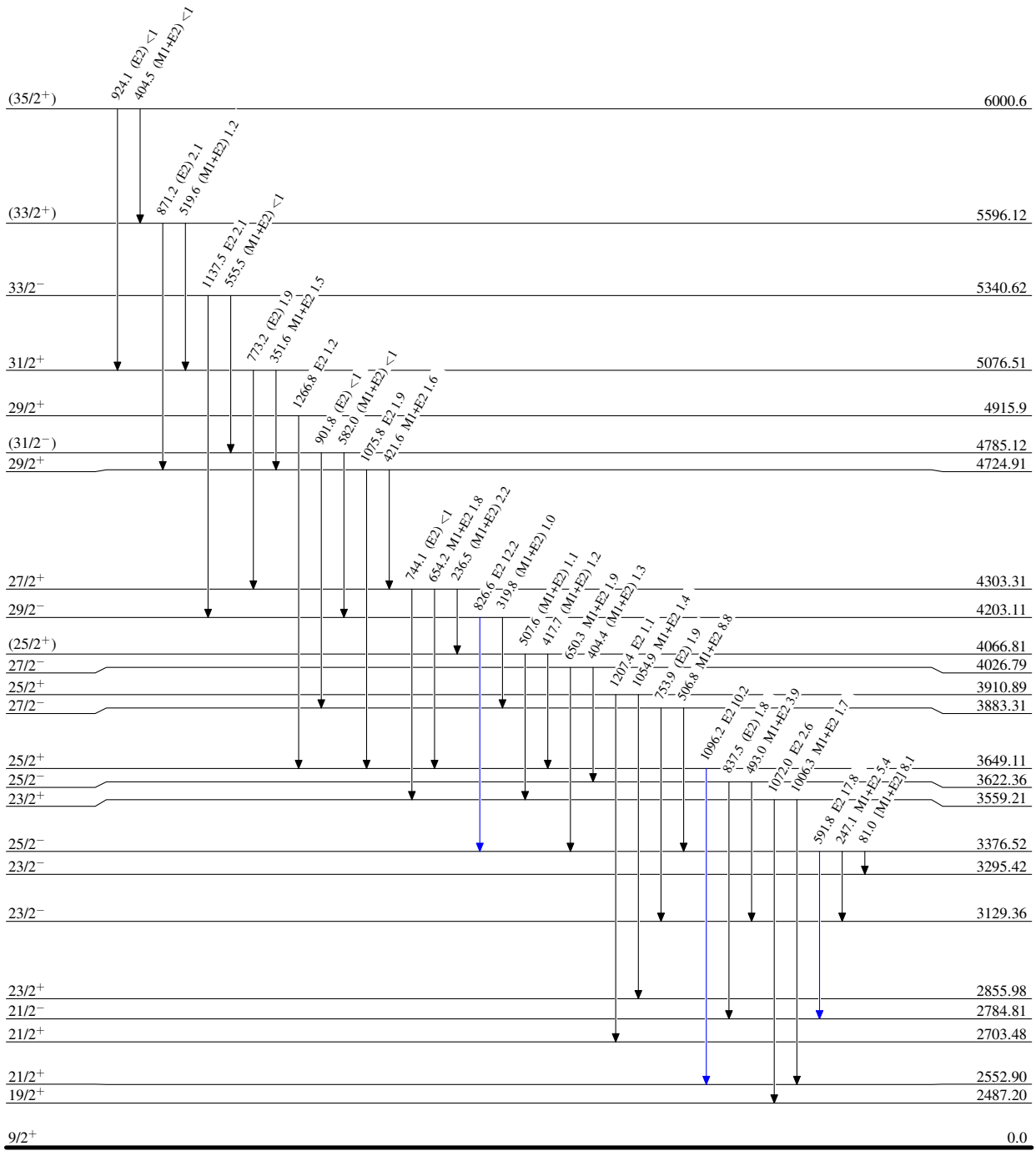
Intensities: Relative I_γ

Legend

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

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

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



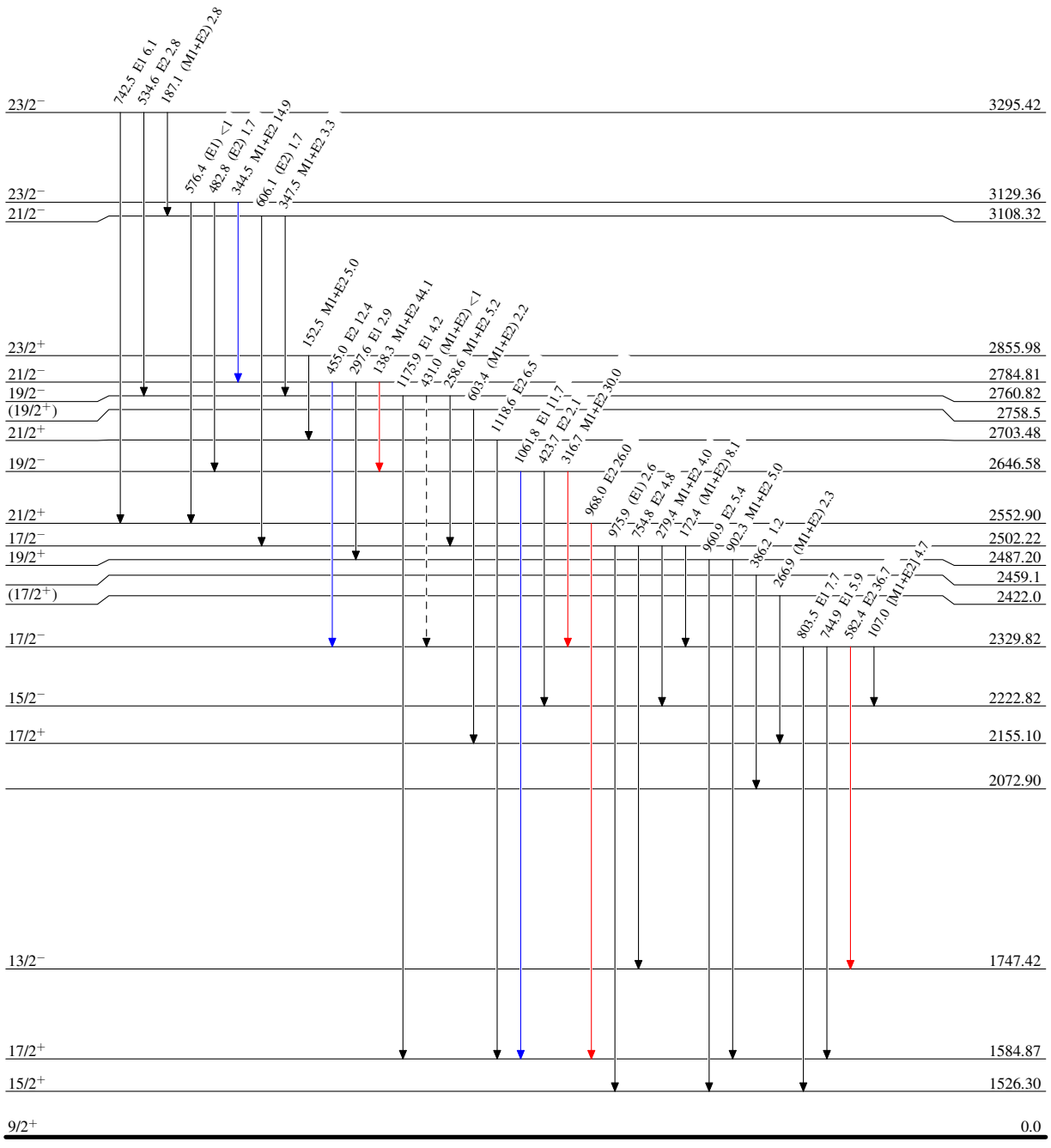
$^{99}_{43}Tc_{56}$

^{96}Zr(^{7}Li,4nγ) **2015Li17**

Level Scheme (continued)

Intensities: Relative I_γ

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



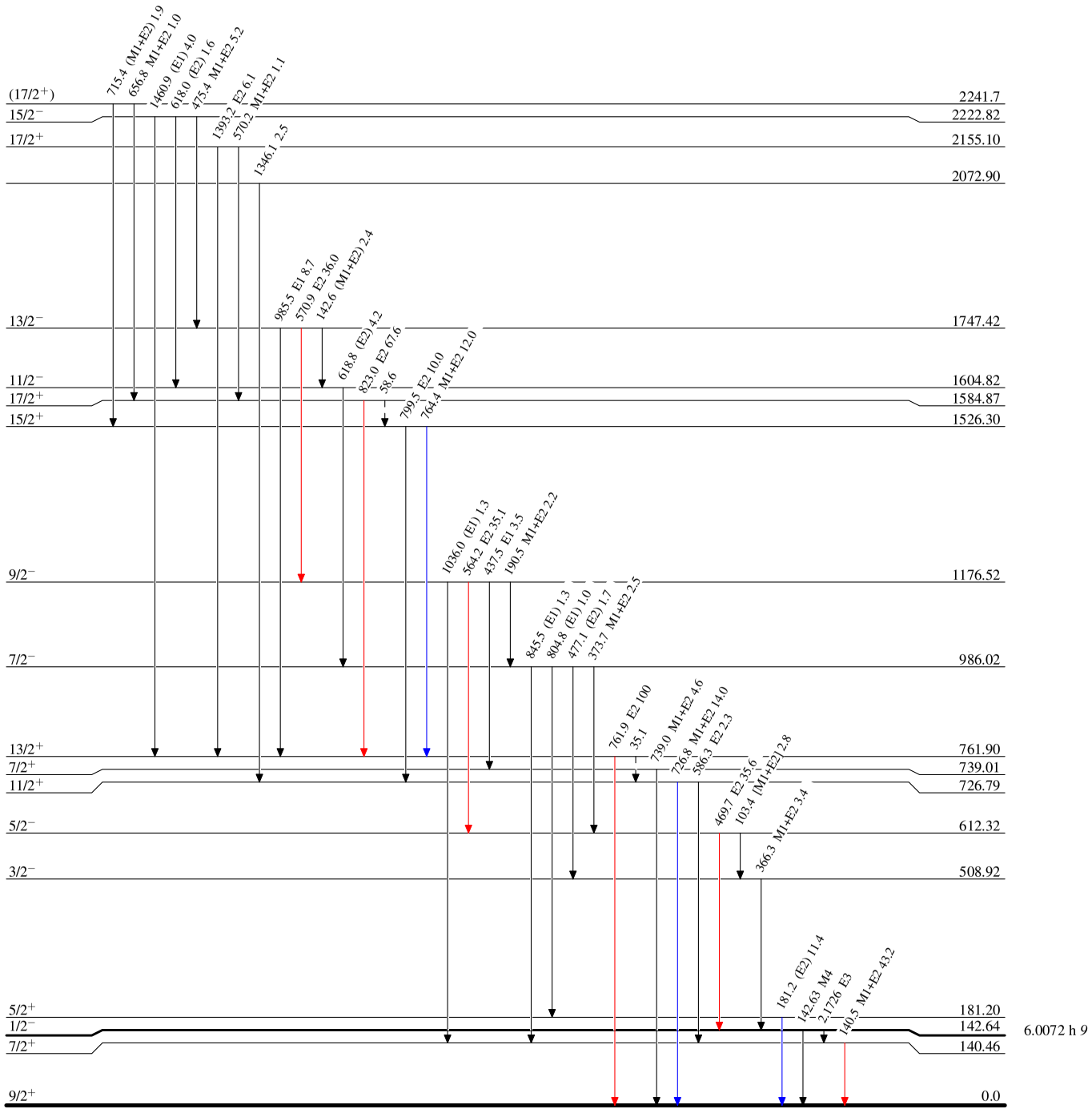
$^{99}_{43}Tc_{56}$

^{96}Zr(^{7}Li,4nγ) 2015Li17

Level Scheme (continued)

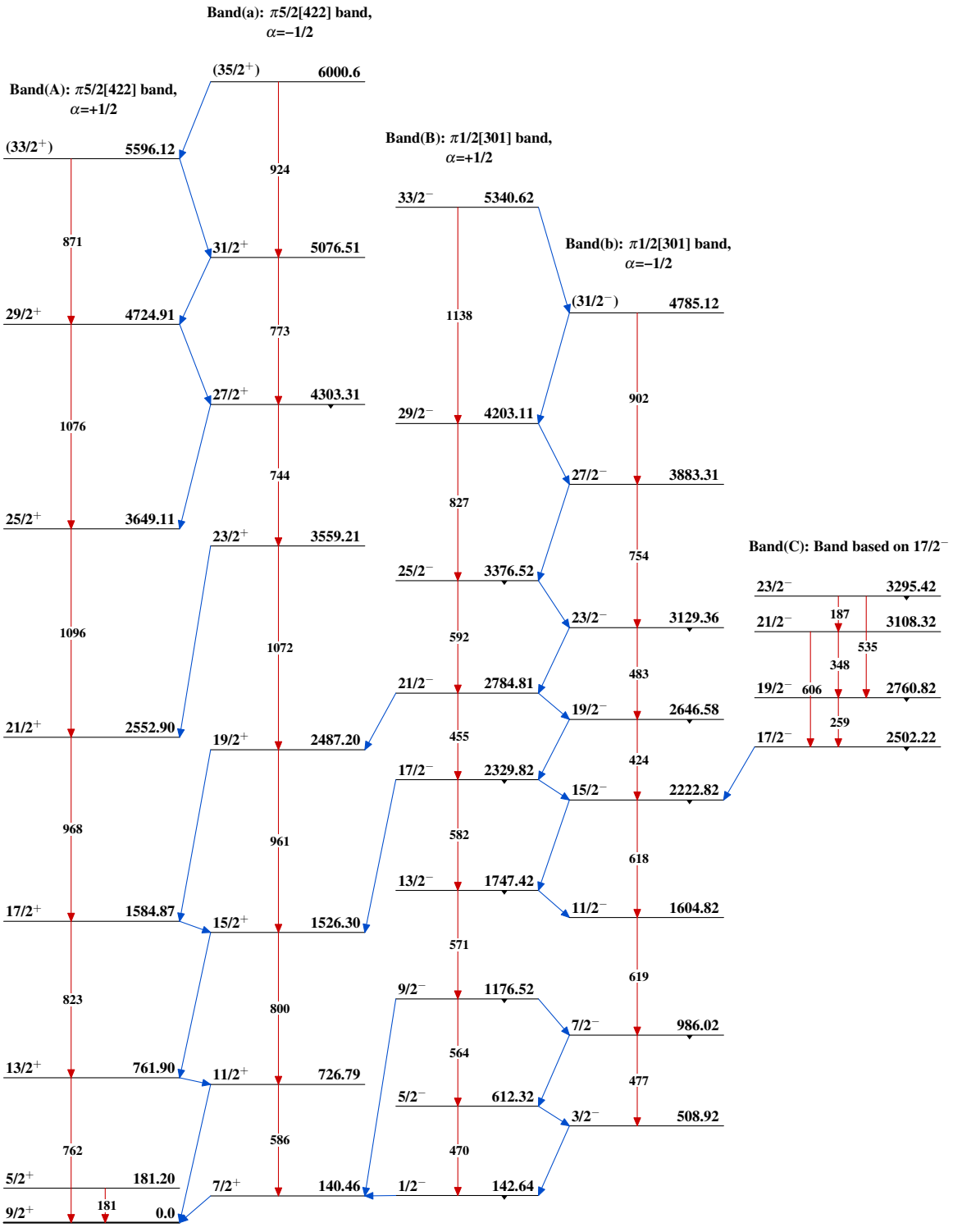
Intensities: Relative I_γ

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



$^{99}_{43}Tc_{56}$

^{96}Zr(^{7}Li,4nγ) 2015Li17



$^{99}_{43}Tc_{56}$