^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 194,460 (2024)	31-Oct-2022

2001Je09: E(^{15}N)=70 MeV, E(^{19}F)=85 MeV. Measured Eγ, Iγ, $\gamma\gamma$ coin, $\gamma\gamma(\theta)$(DCO), level lifetimes by DSAM using Nordball array with 20 Compton-suppressed HPGe detectors and the full 60-element BaF_2 inner ball1 at the Tandem Accelerator facility of Niels Bohr Institute. Deduced high-spin levels, J^π, multipolarities, multipole mixing ratios, rotational band structures, B(M1)/B(E2), alignments, Nilsson configurations. Comparison with theoretical calculations using the "Ultimate Cranker" code.

^{165}Tm Levels

Ratios of reduced transition probabilities (mainly B(M1)/B(E2)) from 2001Je09 are listed under comments. Such ratios are based on experimental γ-ray intensities and are useful in understanding properties of strongly-coupled bands.

E(level)[†]	J^π[‡]	Comments
0.0[c]	1/2$^+$	
11.72[d] *9*	3/2$^+$	
80.57[b] *10*	7/2$^+$	
129.72[c] *10*	5/2$^+$	B(M1)/B(E2)(116.9,129.8)=0.13 *5*.
158.59?[e] *13*	(1/2$^-$)	E(level): from the Adopted Levels.
158.95[d] *13*	7/2$^+$	
160.67[&] *10*	7/2$^-$	
181.78[e] *18*	5/2$^-$	
210.64[a] *17*	9/2$^+$	
252.44[@] *17*	9/2$^-$	
275.77[f] *17*	3/2$^-$	
293.34[e] *15*	9/2$^-$	B(E1)/B(E2)(134.4,111.4)=0.068 *6*.
315.68[g] *10*	5/2$^+$	
361.84[c] *15*	9/2$^+$	B(M1)/B(E2)(202.9,232.2)=0.078 *7*.
365.91[b] *17*	11/2$^+$	B(M1)/B(E2)(155.2,285.3)=0.14 *4*.
368.71[&] *16*	11/2$^-$	B(M1)/B(E2)(116.1,208.0)=0.96 *8*.
413.39[d] *16*	11/2$^+$	B(E1)/B(E2)(119.9,254.6)=0.071 *6*.
419.83[h] *19*	7/2$^+$	
450.23[f] *18*	7/2$^-$	B(E1)/B(E2)(319.9,174.9)=0.06 *6*.
497.24[e] *15*	13/2$^-$	B(M1)/B(E2)(128.4,204.0)=0.0050 *4*; B(E1)/B(E2)(83.9,204.0)=0.075 *4*.
511.02[@] *18*	13/2$^-$	B(M1)/B(E2)(142.2,258.7)=0.87 *6*.
544.93[a] *18*	13/2$^+$	B(M1)/B(E2)(178.9,334.3)=0.10 *3*.
551.93[g] *19*	9/2$^+$	B(M1)/B(E2)(131.9,236.3)=0.30 *7*.
674.98[&] *18*	15/2$^-$	B(M1)/B(E2)(163.9,306.3)=0.72 *4*; B(M1)/B(E2)(177.5,306.3)=0.012 *1*.
688.74[c] *17*	13/2$^+$	B(M1)/B(E2)(275.3,327.0)=0.079 *5*.
701.47[f] *16*	11/2$^-$	B(E1)/B(E2)(339.6,251.4)=0.061 *11*; B(M1)/B(E2)(408.0,251.4)=0.006 *1*.
707.49[h] *22*	11/2$^+$	B(M1)/B(E2)(155.4,287.8)=0.57 *8*.
745.91[b] *17*	15/2$^+$	B(M1)/B(E2)(200.8,380.0)=0.126 *24*.
768.17[d] *17*	15/2$^+$	B(E1)/B(E2)(270.8,354.8)=0.061 *6*.
795.53[e] *17*	17/2$^-$	
865.96[@] *20*	17/2$^-$	B(M1)/B(E2)(190.8,355.0)=0.80 *5*.
891.91[g] *23*	13/2$^+$	B(M1)/B(E2)(184.4,340.0)=0.87 *1*.
967.68[a] *18*	17/2$^+$	B(M1)/B(E2)(221.6,422.8)=0.12 *1*.
1030.35[f] *17*	15/2$^-$	B(M1)/B(E2)(234.8,328.9)=0.010 6; B(E1)/B(E2)(341.5,328.9)=0.07 *1*; B(M1)/B(E2)(533.3,328.9)=0.009 *2*.
1072.13[&] *21*	19/2$^-$	B(M1)/B(E2)(206.0,397.1)=0.75 *4*.

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^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)

^{165}Tm Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	Comments
1089.69[h] 25	15/2$^+$	B(M1)/B(E2)(197.7,382.2)=0.80 *8*.
1101.38[c] 17	17/2$^+$	B(M1)/B(E2)(333.2,412.8)=0.080 *5*; B(M1)/B(E2)(354.8,412.8)=0.010 *1*.
1184.89[e] 18	21/2$^-$	
1205.12[b] 17	19/2$^+$	B(M1)/B(E2)(237.4,436.9)=0.29 *5*; B(E1)/B(E2)(409.4,436.9)=0.09 *1*; B(M1)/B(E2)(237.4,459.4)=0.12 *2*; B(E2)/B(E2)(436.9,459.4)=2.38 *14*; B(E1)/B(E2)(409.4,459.4)=0.036 *2*.
1215.43[d] 17	19/2$^+$	B(M1)/B(E2)(247.6,447.1)=0.060 *6*; B(E1)/B(E2)(419.7,447.1)=0.064 *8*; B(M1)/B(E2)(247.6,469.9)=0.31 *3*; B(E2)/B(E2)(447.1,469.9)=0.20 *2*; B(E1)/B(E2)(419.7,469.9)=0.33 *3*.
1289.95[m] 22	15/2$^-$	
1308.50[@] 22	21/2$^-$	B(M1)/B(E2)(236.2,442.5)=0.73 *4*.
1322.2[g] 3	17/2$^+$	B(M1)/B(E2)(232.5,430.4)=0.78 *8*.
1433.74[f] 18	19/2$^-$	B(M1)/B(E2)(248.9,403.5)=0.023 *13*; B(E1)/B(E2)(332.1,403.5)=0.079 *9*; B(M1)/B(E2)(638.1,403.5)=0.015 *3*.
1442.63[n] 19	17/2$^-$	B(M1)/B(E2)(646.9,945.5)=4.6 *12*.
1466.11[a] 19	21/2$^+$	B(M1)/B(E2)(260.9,498.5)=0.120 *19*; B(M1)/B(E2)(250.6,498.5)=0.052 *7*.
1549.80[&] 22	23/2$^-$	B(M1)/B(E2)(241.1,477.6)=0.77 *4*.
1552.4[h] 3	19/2$^+$	B(M1)/B(E2)(230.0,462.7)=0.68 *6*.
1589.65[c] 18	21/2$^+$	B(M1)/B(E2)(374.3,488.1)=0.054 *3*; B(M1)/B(E2)(384.5,488.1)=0.042 *3*.
1614.76[m] 21	19/2$^-$	B(M1)/B(E2)(819.2,324.9)=0.020 *3*.
1633.54[i] 21	17/2$^-$	
1659.18[e] 19	25/2$^-$	
1728.09[d] 18	23/2$^+$	B(M1)/B(E2)(262.1,512.4)=0.22 *3*; B(M1)/B(E2)(262.1,523.1)=0.079 *11*; B(E2)/B(E2)(512.4,523.1)=2.8 *3*; B(E1)/B(E2)(543.2,523.1)=0.062 *7*; B(E1)/B(E2)(543.2,512.4)=0.174 *16*.
1741.09[k] 24	17/2$^+$	
1744.91[b] 18	23/2$^+$	B(M1)/B(E2)(278.7,529.5)=0.123 *11*; B(M1)/B(E2)(278.7,539.8)=0.74 *7*; B(E2)/B(E2)(529.5,539.8)=0.167 *11*; B(E1)/B(E2)(560.1,529.5)=0.036 *2*; B(E1)/B(E2)(560.1,539.8)=0.213 *14*.
1753.79[j] 21	19/2$^-$	
1807.13[n] 19	21/2$^-$	B(M1)/B(E2)(621.9,364.4)=0.035 *2*; B(M1)/B(E2)(621.9,1012.4)=7.0 *6*; B(E2)/B(E2)(364.4,1012.4)=0.0050 *4*.
1827.25[@] 24	25/2$^-$	B(M1)/B(E2)(277.3,518.8)=0.75 *4*.
1828.6[g] 3	21/2$^+$	B(M1)/B(E2)(275.8,506.6)=0.65 *7*.
1857.30[l] 23	19/2$^+$	
1899.30[i] 21	21/2$^-$	B(M1)/B(E2)(145.5,265.8)=0.61 *13*; B(E1)/B(E2)(694.1,265.5)=0.007 *2*.
1903.89[f] 19	23/2$^-$	B(E1)/B(E2)(314.1,469.9)=0.079 *8*; B(M1)/B(E2)(719.4,469.9)=0.009 *8*.
1989.52[k] 22	21/2$^+$	B(M1)/B(E2)(132.2,248.4)=1.44 *7*; B(E1)/B(E2)(917.4,248.4)=0.019 *10*.
2026.85[a] 19	25/2$^+$	B(M1)/B(E2)(281.9,560.8)=0.195 *15*; B(M1)/B(E2)(298.7,560.8)=0.120 *12*.
2032.19[m] 21	23/2$^-$	B(M1)/B(E2)(847.0,417.5)=0.029 *2*.
2067.75[j] 24	23/2$^-$	B(M1)/B(E2)(168.4,314.0)=0.48 *10*.
2079.4[h] 3	23/2$^+$	B(M1)/B(E2)(250.6,527.1)=0.49 *7*.
2096.18[&] 24	27/2$^-$	B(M1)/B(E2)(268.8,546.4)=0.75 *4*.
2135.89[c] 21	25/2$^+$	B(M1)/B(E2)(407.7,546.3)=0.083 *5*.
2138.71[l] 23	23/2$^+$	B(M1)/B(E2)(149.0,281.5)=1.53; B(E1)/B(E2)(830.2,281.5)=0.008 *2*.
2210.13[e] 22	29/2$^-$	
2252.36[n] 21	25/2$^-$	B(M1)/B(E2)(592.7,445.6)=0.038 *3*; B(M1)/B(E2)(592.7,1067.6)=11.2 *11*; B(E2)/B(E2)(445.6,1067.6)=0.0030 *3*.
2257.08[i] 25	25/2$^-$	B(M1)/B(E2)(189.3,357.8)=0.29 *5*.
2304.86[k] 23	25/2$^+$	B(M1)/B(E2)(166.0,315.5)=0.87 *11*; B(E1)/B(E2)(754.9,315.5)=0.007 *1*.
2305.26[d] 20	27/2$^+$	B(E1)/B(E2)(646.1,577.2)=0.053 *5*.
2329.87[b] 20	27/2$^+$	B(M1)/B(E2)(302.9,585.0)=0.122 *15*; B(E1)/B(E2)(670.8,585.0)=0.024 *2*.

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^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)

^{165}Tm Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]	Comments
2378.6?[g] *4*	(25/2$^+$)		
2408.44[@] *25*	29/2$^-$		B(M1)/B(E2)(312.1,581.2)=0.66 *4*.
2427.30[f] *22*	27/2$^-$		B(M1)/B(E2)(768.1,523.4)=0.008 *13* is questionable, since it overlaps with zero but none of the two γ rays has Iγ=0.
2465.7[j] *3*	27/2$^-$		B(M1)/B(E2)(208.6,398.0)=0.23 *5*.
2488.50[l] *25*	27/2$^+$		B(M1)/B(E2)(183.5,349.8)=0.80 *10*.
2540.94[m] *23*	27/2$^-$		B(M1)/B(E2)(508.5,882.0)=0.006 *1*.
2621.04[a] *21*	29/2$^+$		B(M1)/B(E2)(315.8,594.3)=0.053 *6*; B(M1)/B(E2)(291.1,594.3)=0.18 *3*.
2662.85[c] *23*	29/2$^+$		B(M1)/B(E2)(357.6,526.9)=0.096 *6*.
2671.2?[h] *4*	(27/2$^+$)		
2689.5[k] *3*	29/2$^+$		B(M1)/B(E2)(200.9,384.7)=0.68 *8*.
2692.3[i] *3*	29/2$^-$		B(M1)/B(E2)(226.5,435.3)=0.23 *5*.
2694.4[&] *3*	31/2$^-$		B(M1)/B(E2)(285.8,598.3)=0.72 *4*.
2770.8[n] *3*	29/2$^-$		
2828.40[e] *24*	33/2$^-$	0.187 ps *35*	
2858.52[d] *23*	31/2$^+$		B(E1)/B(E2)(553.3,648.4)=0.023 *4*.
2893.50[b] *23*	31/2$^+$		B(M1)/B(E2)(272.3,563.7)=0.256 *18*.
2907.6[l] *3*	31/2$^+$		B(M1)/B(E2)(217.9,419.1)=0.69 *8*.
2934.5[j] *3*	31/2$^-$		B(M1)/B(E2)(242.1,468.8)=0.28 *9*.
2999.42[f] *24*	31/2$^-$		B(M1)/B(E2)(572.1,789.5)=0.004 *9* is questionable, since it overlaps with zero but none of the two γ rays has Iγ=0.
3015.4[@] *3*	33/2$^-$		B(M1)/B(E2)(320.8,607.0)=0.73 *4*.
3098.70[c] *25*	33/2$^+$		B(M1)/B(E2)(240.2,435.8)=0.076 *5*.
3123.3[m] *3*	31/2$^-$		
3126.74[a] *24*	33/2$^+$		B(M1)/B(E2)(233.0,505.9)=0.36 *4*.
3142.5[k] *3*	33/2$^+$		B(M1)/B(E2)(234.7,453.0)=0.70 *9*.
3193.2[i] *3*	33/2$^-$		B(M1)/B(E2)(258.7,500.9)=0.17 *5*.
3266.8[&] *3*	35/2$^-$		B(M1)/B(E2)(251.2,572.5)=1.41 *8*.
3325.3[d] *3*	35/2$^+$		
3345.0[n] *4*	33/2$^-$		
3373.62[b] *25*	35/2$^+$		B(M1)/B(E2)(246.8,480.3)=0.249 *21*.
3393.3[l] *3*	35/2$^+$		B(M1)/B(E2)(250.6,485.8)=0.57 *7*.
3465.2[j] *4*	35/2$^-$		B(M1)/B(E2)(271.8,530.6)=0.28 *9*.
3502.6[e] *3*	37/2$^-$	0.180 ps *28*	
3519.1[@] *3*	37/2$^-$		B(M1)/B(E2)(252.1,503.7)=1.40 *8*; B(M1)/B(E2)(252.1,690.8)=24 *3*; B(E2)/B(E2)(503.7,690.8)=0.058 *8*.
3582.0[c] *3*	37/2$^+$		B(M1)/B(E2)(256.8,483.3)=0.082 *6*.
3618.3[f] *3*	35/2$^-$		B(M1)/B(E2)(618.9,789.7)=0.012 *26*.
3622.0[a] *3*	37/2$^+$		B(M1)/B(E2)(248.4,495.3)=0.209 *18*.
3659.3[k] *3*	37/2$^+$		B(M1)/B(E2)(265.7,516.8)=0.63 *8*.
3738.8?[m] *4*	(35/2$^-$)		
3748.9[i] *4*	37/2$^-$		B(M1)/B(E2)(283.4,556.0)=0.11 *5*.
3766.2[&] *3*	39/2$^-$		B(M1)/B(E2)(247.0,499.4)=1.2 *7*.
3841.0[d] *4*	39/2$^+$		
3905.0[b] *3*	39/2$^+$		B(M1)/B(E2)(283.0,531.5)=0.227 *22*.
3914.5?[n] *4*	(37/2$^-$)		
3940.7[l] *3*	39/2$^+$		B(M1)/B(E2)(281.2,547.4)=0.58 *9*.
4038.1[@] *3*	41/2$^-$		B(M1)/B(E2)(271.8,519.0)=1.06 *6*.

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^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)

^{165}Tm Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]	Comments
4046.1[j] 4	39/2$^-$		
4140.4[c] 4	41/2$^+$		
4187.3[a] 3	41/2$^+$		
4219.9[e] 4	41/2$^-$	0.152 ps *21*	
4234.3[k] 3	41/2$^+$		B(M1)/B(E2)(293.4,575.2)=0.59 *9*.
4276.3[f] 3	39/2$^-$		B(M1)/B(E2)(658.0,773.8)=0.058 *25*.
4318.8[&] 3	43/2$^-$		B(M1)/B(E2)(280.7,552.8)=1.18 *7*.
4353.0[i] 4	41/2$^-$		
4429.3[d] 4	43/2$^+$		
4510.5[b] 4	43/2$^+$		
4544.3[l] 4	43/2$^+$		
4633.8[@] 4	45/2$^-$		B(M1)/B(E2)(314.9,595.6)=0.88 *6*.
4673.6[j] 5	43/2$^-$		
4775.2[c] 4	45/2$^+$	0.19 ps *4*	
4827.1[a] 4	45/2$^+$		
4862.1[k] 4	45/2$^+$		
4944.0[&] 4	47/2$^-$		B(M1)/B(E2)(309.8,625.3)=1.26 *8*.
4961.8[e] 4	45/2$^-$	0.104 ps *14*	
4964.5?[f] 4	(43/2$^-$)		B(M1)/B(E2)(688.1,744.6)=0.160 *16*.
5003.3[i] 5	45/2$^-$		
5090.1[d] 5	47/2$^+$	0.201 ps *+35−28*	
5185.4[b] 4	47/2$^+$		
5203.4[l] 4	47/2$^+$		
5309.0[@] 4	49/2$^-$		B(M1)/B(E2)(364.8,675.5)=1.26 *20*.
5347.3[j] 5	47/2$^-$		
5483.6[c] 5	49/2$^+$	0.139 ps *+28−35*	
5525.9[k] 4	49/2$^+$		B(E2)/B(E2)(663.7,698.9)=1.17 *24*.
5550.5[a] 4	49/2$^+$		
5640.2[&] 4	51/2$^-$		
5701.2[i] 5	49/2$^-$		
5724.6[e] 5	49/2$^-$	0.069 ps *+21−28*	
5819.5[d] 5	51/2$^+$	0.125 ps *+21−14*	
5891.2?[l] 4	(51/2$^+$)		B(E2)/B(E2)(687.8,705.9)=0.99 *26*.
5931.4?[b] 4	(51/2$^+$)		
6060.6[@] 4	53/2$^-$		
6071.9?[j] 6	(51/2$^-$)		
6245.5?[k] 4	(53/2$^+$)		
6263.5[c] 5	53/2$^+$	0.14 ps *+5−4*	
6332.0?[a] 5	(53/2$^+$)		
6402.5[&] 5	55/2$^-$		
6452.5?[i] 6	(53/2$^-$)		
6520.9[e] 5	53/2$^-$		
6613.4[d] 6	55/2$^+$	0.15 ps *+5−3*	
6883.5[@] 5	57/2$^-$		
7109.9[c] 6	57/2$^+$		
7228.8[&] 5	59/2$^-$		

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^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)

^{165}Tm Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
7481.2[d] 6	59/2+	8112.0[&] 6	63/2−	8997.6?[c] 8	(65/2+)
7774.1[@] 5	61/2−	8410.1[d] 7	63/2+	9053.5[&] 7	67/2−
8023.3[c] 6	61/2+	8730.9[@] 6	65/2−	9405.5?[d] 10	(67/2+)
				10050.9[&] 13	71/2−

† From least-squares fit to Eγ data.
‡ As proposed by 2001Je09 based on their γγ(θ) data and band assignments. All assignments are consistent with those in the Adopted Levels, except that some are in parentheses there due to lack of strong supporting arguments.
# From DSAM (2001Je09).
@ Band(A): π7/2[523], α=+1/2.
& Band(a): π7/2[523], α=−1/2.
a Band(B): π7/2[404], α=+1/2.
b Band(b): π7/2[404], α=−1/2.
c Band(C): π1/2[411], α=+1/2.
d Band(c): π1/2[411], α=−1/2.
e Band(D): π1/2[541], α=+1/2.
f Band(d): π1/2[541], α=−1/2.
g Band(E): π5/2[402], α=+1/2.
h Band(e): π5/2[402], α=−1/2.
i Band(F): π7/2[404]⊗ν5/2[642]⊗ν5/2[523], α=+1/2.
j Band(f): π7/2[404]⊗ν5/2[642]⊗ν5/2[523], α=−1/2.
k Band(G): π7/2[523]⊗ν5/2[642]⊗ν5/2[523], α=+1/2.
l Band(g): π7/2[523]⊗ν5/2[642]⊗ν5/2[523], α=−1/2.
m Band(H): γ band (K±2) built on π1/2[541], even J+1/2.
n Band(h): γ band (K±2) built on π1/2[541], odd J+1/2.

γ(^{165}Tm)

DCO ratios are for 37° and 79°. The DCO ratios correspond to gates on ΔJ=2, quadrupole transitions. The ratio of 1 implies ΔJ=2, quadrupole (most likely E2, definitely E2 from RUL when level lifetime is known) and DCO=0.60 *3* implies ΔJ=1, dipole transition.

Eγ†	Iγ†	Ei(level)	J^π_i	E_f	J^π_f	Mult.#	Comments
11.60‡ *10*		11.72	3/2+	0.0	1/2+		
68.86‡ *5*		80.57	7/2+	11.72	3/2+		
80.11‡ *2*		160.67	7/2−	80.57	7/2+		
83.9 *2*	13.9 *6*	497.24	13/2−	413.39	11/2+	D	DCO=0.70 *4*
91.7 *2*	21.7 *11*	252.44	9/2−	160.67	7/2−	D+Q	DCO=0.90 *4*
104.1 *2*	0.50 *8*	419.83	7/2+	315.68	5/2+		
111.4 *2*	5.8 *5*	293.34	9/2−	181.78	5/2−	(E2)	DCO=1.07 *7*
116.1 *2*	23.7 *12*	368.71	11/2−	252.44	9/2−	D+Q	DCO=0.88 *4*
116.2 *2*	0.27 *20*	1857.30	19/2+	1741.09	17/2+		
116.9 *2*	8.2 *4*	129.72	5/2+	11.72	3/2+	D+Q	DCO=0.73 *6* Eγ: poor fit. Level-energy difference=118.0 Eγ=118.06 *5* in the Adopted Gammas.
119.9 *2*	6.6 *5*	413.39	11/2+	293.34	9/2−	D	DCO=0.72 *5*
120.3 *2*	1.26 *20*	1753.79	19/2−	1633.54	17/2−		

Continued on next page (footnotes at end of table)

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)

γ(^{165}Tm) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	Comments
128.4 *2*	3.39 *19*	497.24	13/2$^-$	368.71	11/2$^-$			
129.8 *2*	1.0 *4*	129.72	5/2$^+$	0.0	1/2$^+$	(E2)		DCO=1.40 *24*
130.0 *2*	8.3 *19*	210.64	9/2$^+$	80.57	7/2$^+$	(M1+E2)	+1.00 *12*	DCO=1.27 *3*
131.9 *2*	0.51 *8*	551.93	9/2$^+$	419.83	7/2$^+$			
132.2 *2*	1.52 *14*	1989.52	21/2$^+$	1857.30	19/2$^+$			
134.4 *2*	73 *3*	293.34	9/2$^-$	158.95	7/2$^+$	D		DCO=0.66 *3*
142.2 *2*	25.6 *11*	511.02	13/2$^-$	368.71	11/2$^-$	D+Q		DCO=0.87 *6*
145.5 *2*	2.1 *3*	1899.30	21/2$^-$	1753.79	19/2$^-$	D+Q		DCO=1.40 *26*
147.0 *2*	72 *3*	158.95	7/2$^+$	11.72	3/2$^+$	(E2)		DCO=1.00 *26*
149.0 *2*	4.3 *4*	2138.71	23/2$^+$	1989.52	21/2$^+$	(D+Q)[@]		DCO=1.00 *11*
155.2 *2*	16.3 *7*	365.91	11/2$^+$	210.64	9/2$^+$	(M1+E2)	+1.00 *16*	DCO=1.24 *6*
155.4 *2*	0.90 *9*	707.49	11/2$^+$	551.93	9/2$^+$			
156.51[‡] *15*		315.68	5/2$^+$	158.95	7/2$^+$			
158.20[‡] *25*		158.59?	(1/2$^-$)	0.0	1/2$^+$			
163.9 *2*	37.3 *15*	674.98	15/2$^-$	511.02	13/2$^-$	D+Q		DCO=0.85 *3*
166.0 *2*	5.6 *5*	2304.86	25/2$^+$	2138.71	23/2$^+$	(D+Q)[@]		DCO=1.06 *12*
168.4 *2*	2.3 *3*	2067.75	23/2$^-$	1899.30	21/2$^-$			
169.9 *2*	0.5 *4*	181.78	5/2$^-$	11.72	3/2$^+$	D		DCO=0.63 *3*
174.9 *2*	0.03 *2*	450.23	7/2$^-$	275.77	3/2$^-$			
177.5 *2*	0.80 *6*	674.98	15/2$^-$	497.24	13/2$^-$			
178.9 *2*	11.9 *5*	544.93	13/2$^+$	365.91	11/2$^+$	(M1+E2)	+1.00 *14*	DCO=1.23 *5*
183.5 *2*	6.2 *5*	2488.50	27/2$^+$	2304.86	25/2$^+$	D+Q[@]		DCO=0.96 *10*
184.4 *2*	1.05 *7*	891.91	13/2$^+$	707.49	11/2$^+$			
185.88[‡] *6*		315.68	5/2$^+$	129.72	5/2$^+$			
189.3 *2*	2.0 *3*	2257.08	25/2$^-$	2067.75	23/2$^-$	D+Q		DCO=1.4 *4*
190.8 *2*	43.3 *18*	865.96	17/2$^-$	674.98	15/2$^-$	D+Q		DCO=0.83 *3*
197.7 *2*	1.03 *7*	1089.69	15/2$^+$	891.91	13/2$^+$			
200.8 *2*	9.1 *4*	745.91	15/2$^+$	544.93	13/2$^+$	(M1+E2)	+0.67 *+17−11*	DCO=1.15 *6*
200.9 *2*	5.5 *5*	2689.5	29/2$^+$	2488.50	27/2$^+$	(D+Q)[@]		DCO=0.97 *13*
202.9 *2*	6.2 *4*	361.84	9/2$^+$	158.95	7/2$^+$	D		DCO=0.57 *5*
204.0 *2*	85 *3*	497.24	13/2$^-$	293.34	9/2$^-$	(E2)		DCO=1.08 *5*
206.0 *2*	37.1 *15*	1072.13	19/2$^-$	865.96	17/2$^-$	D+Q		DCO=0.80 *3*
208.0 *2*	4.3 *3*	368.71	11/2$^-$	160.67	7/2$^-$	(E2)		DCO=1.00 *5*
208.6 *2*	1.28 *22*	2465.7	27/2$^-$	2257.08	25/2$^-$	D+Q		DCO=1.36 *24*
217.9 *2*	5.1 *4*	2907.6	31/2$^+$	2689.5	29/2$^+$	(D+Q)[@]		DCO=0.96 *16*
221.6 *2*	6.7 *3*	967.68	17/2$^+$	745.91	15/2$^+$	(M1+E2)	+0.57 *6*	DCO=1.10 *4*
226.5 *2*	1.05 *18*	2692.3	29/2$^-$	2465.7	27/2$^-$	D+Q		DCO=1.5 *5*
230.0 *2*	0.89 *5*	1552.4	19/2$^+$	1322.2	17/2$^+$			
232.2 *2*	4.4 *3*	361.84	9/2$^+$	129.72	5/2$^+$	(E2)		DCO=1.06 *5*
232.5 *2*	0.96 *7*	1322.2	17/2$^+$	1089.69	15/2$^+$			
233.0 *2*	2.59 *12*	3126.74	33/2$^+$	2893.50	31/2$^+$	(M1+E2)	+0.32 *12*	DCO=0.89 *10*
234.7 *2*	4.1 *4*	3142.5	33/2$^+$	2907.6	31/2$^+$	D+Q		DCO=0.88 *8*
234.8 *5*	0.14 *8*	1030.35	15/2$^-$	795.53	17/2$^-$			
235.21[‡] *9*		315.68	5/2$^+$	80.57	7/2$^+$			
236.2 *2*	30.4 *12*	1308.50	21/2$^-$	1072.13	19/2$^-$	D+Q		DCO=0.80 *3*
236.3 *2*	0.38 *6*	551.93	9/2$^+$	315.68	5/2$^+$			
237.4 *2*	3.45 *16*	1205.12	19/2$^+$	967.68	17/2$^+$	(M1+E2)	+0.45 *+19−14*	DCO=1.01 *12*
240.2 *2*	1.46 *8*	3098.70	33/2$^+$	2858.52	31/2$^+$	D		DCO=0.65 *13*
241.1 *2*	27.3 *11*	1549.80	23/2$^-$	1308.50	21/2$^-$	D+Q		DCO=0.78 *4*
242.1 *2*	0.83 *22*	2934.5	31/2$^-$	2692.3	29/2$^-$			
246.8 *2*	2.30 *11*	3373.62	35/2$^+$	3126.74	33/2$^+$	(M1+E2)	+0.21 *13*	DCO=0.79 *10*
247.0 *2*	9.0 *4*	3766.2	39/2$^-$	3519.1	37/2$^-$	D+Q		DCO=0.74 *8*
247.6 *2*	1.50 *10*	1215.43	19/2$^+$	967.68	17/2$^+$			

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^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)

γ(^{165}Tm) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	Comments
248.4 *2*	0.30 *15*	1989.52	21/2$^+$	1741.09	17/2$^+$			
248.4 *2*	1.60 *9*	3622.0	37/2$^+$	3373.62	35/2$^+$	(M1+E2)	+0.25 *10*	DCO=0.82 *8*
248.9 *10*	0.27 *16*	1433.74	19/2$^-$	1184.89	21/2$^-$			
250.6 *10*	1.20 *15*	1466.11	21/2$^+$	1215.43	19/2$^+$			
250.6 *2*	0.49 *6*	2079.4	23/2$^+$	1828.6	21/2$^+$			
250.6 *2*	3.2 *3*	3393.3	35/2$^+$	3142.5	33/2$^+$	D+Q		DCO=0.87 *10*
251.2 *2*	8.7 *4*	3266.8	35/2$^-$	3015.4	33/2$^-$	D+Q		DCO=0.71 *3*
251.4 *2*	0.81 *12*	701.47	11/2$^-$	450.23	7/2$^-$	(E2)		DCO=1.03 *14*
252.1 *2*	9.2 *4*	3519.1	37/2$^-$	3266.8	35/2$^-$	D+Q		DCO=0.69 *4*
254.6 *2*	43.8 *18*	413.39	11/2$^+$	158.95	7/2$^+$	(E2)		DCO=1.04 *7*
256.8 *2*	1.03 *6*	3582.0	37/2$^+$	3325.3	35/2$^+$	D		DCO=0.50 *14*
258.7 *2*	8.3 *5*	511.02	13/2$^-$	252.44	9/2$^-$	(E2)		DCO=1.05 *15*
258.7 *2*	0.70 *16*	3193.2	33/2$^-$	2934.5	31/2$^-$			
260.9 *2*	3.81 *17*	1466.11	21/2$^+$	1205.12	19/2$^+$	(M1+E2)	+0.46 *+19−13*	DCO=1.02 *12*
262.1 *10*	1.34 *15*	1728.09	23/2$^+$	1466.11	21/2$^+$			
265.7 *2*	2.9 *3*	3659.3	37/2$^+$	3393.3	35/2$^+$			
265.8 *2*	1.04 *18*	1899.30	21/2$^-$	1633.54	17/2$^-$	(E2)		DCO=0.81 *15*
268.8 *2*	16.5 *7*	2096.18	27/2$^-$	1827.25	25/2$^-$	D+Q		DCO=0.75 *3*
270.8 *2*	8.3 *7*	768.17	15/2$^+$	497.24	13/2$^-$	D		DCO=0.59 *3*
271.8 *2*	0.48 *12*	3465.2	35/2$^-$	3193.2	33/2$^-$			
271.8 *2*	8.1 *3*	4038.1	41/2$^-$	3766.2	39/2$^-$	D+Q		DCO=0.70 *5*
272.3 *2*	1.97 *10*	2893.50	31/2$^+$	2621.04	29/2$^+$	(M1+E2)	+0.11 *10*	DCO=0.70 *9*
275.3 *2*	7.9 *3*	688.74	13/2$^+$	413.39	11/2$^+$	D		DCO=0.47 *4*
275.8 *2*	0.88 *7*	1828.6	21/2$^+$	1552.4	19/2$^+$			
276.2 *2*	0.03 *2*	275.77	3/2$^-$	0.0	1/2$^+$			
277.3 *2*	20.5 *8*	1827.25	25/2$^-$	1549.80	23/2$^-$	D+Q		DCO=0.78 *3*
278.7 *2*	2.25 *11*	1744.91	23/2$^+$	1466.11	21/2$^+$	(M1+E2)	+0.26 *+12−11*	DCO=0.83 *11*
280.7 *2*	5.65 *24*	4318.8	43/2$^-$	4038.1	41/2$^-$	D+Q		DCO=0.70 *11*
281.2 *2*	2.2 *3*	3940.7	39/2$^+$	3659.3	37/2$^+$			
281.5 *2*	1.09 *20*	2138.71	23/2$^+$	1857.30	19/2$^+$	(E2)		DCO=1.07 *14*
281.9 *2*	3.17 *15*	2026.85	25/2$^+$	1744.91	23/2$^+$	(M1+E2)	+0.27 *8*	DCO=0.85 *7*
283.0 *2*	1.48 *8*	3905.0	39/2$^+$	3622.0	37/2$^+$	(M1+E2)	+0.27 *13*	DCO=0.84 *11*
283.4 *2*	0.31 *14*	3748.9	37/2$^-$	3465.2	35/2$^-$			
285.3 *2*	20.8 *10*	365.91	11/2$^+$	80.57	7/2$^+$	(E2)		DCO=1.04 *3*
285.8 *2*	10.0 *4*	2694.4	31/2$^-$	2408.44	29/2$^-$	D+Q		DCO=0.73 *4*
287.8 *2*	0.57 *6*	707.49	11/2$^+$	419.83	7/2$^+$			
291.1 *2*	1.85 *10*	2621.04	29/2$^+$	2329.87	27/2$^+$	(M1(+E2))	+0.27 *37*	DCO=0.85 *30*
293.4 *2*	1.40 *18*	4234.3	41/2$^+$	3940.7	39/2$^+$			
298.3 *2*	108 *4*	795.53	17/2$^-$	497.24	13/2$^-$	(E2)		DCO=1.00 *7*
298.7 *2*	2.17 *20*	2026.85	25/2$^+$	1728.09	23/2$^+$			
302.9 *2*	1.75 *9*	2329.87	27/2$^+$	2026.85	25/2$^+$	(M1+E2)	+0.29 *18*	DCO=0.86 *16*
304.03[‡] *6*		315.68	5/2$^+$	11.72	3/2$^+$			
306.3 *2*	22.1 *9*	674.98	15/2$^-$	368.71	11/2$^-$	(E2)		DCO=1.04 *4*
309.8 *2*	3.41 *15*	4944.0	47/2$^-$	4633.8	45/2$^-$	D+Q		DCO=0.69 *20*
312.1 *2*	13.2 *5*	2408.44	29/2$^-$	2096.18	27/2$^-$	D+Q		DCO=0.79 *10*
314.0 *2*	2.1 *3*	2067.75	23/2$^-$	1753.79	19/2$^-$	(E2)		DCO=0.96 *17*
314.1 *2*	1.13 *10*	1903.89	23/2$^-$	1589.65	21/2$^+$	D		DCO=0.65 *13*
314.9 *2*	3.97 *18*	4633.8	45/2$^-$	4318.8	43/2$^-$	D+Q		DCO=0.70 *23*
315.5 *2*	3.0 *3*	2304.86	25/2$^+$	1989.52	21/2$^+$	(E2)		DCO=1.13 *23*
315.8 *2*	0.65 *7*	2621.04	29/2$^+$	2305.26	27/2$^+$			
319.9 *3*	0.4 *4*	450.23	7/2$^-$	129.72	5/2$^+$	D		DCO=0.64 *13*
320.8 *2*	8.8 *4*	3015.4	33/2$^-$	2694.4	31/2$^-$	D+Q		DCO=0.70 *3*
324.9 *2*	0.56 *6*	1614.76	19/2$^-$	1289.95	15/2$^-$			
327.0 *2*	12.5 *5*	688.74	13/2$^+$	361.84	9/2$^+$	(E2)		DCO=1.02 *6*
328.9 *2*	2.89 *20*	1030.35	15/2$^-$	701.47	11/2$^-$	(E2)		DCO=1.02 *8*

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^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)

γ(^{165}Tm) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. #	δ #	Comments
332.1 *2*	2.04 *20*	1433.74	19/2$^-$	1101.38	17/2$^+$	D		DCO=0.61 *10*
333.3 *2*	6.0 *3*	1101.38	17/2$^+$	768.17	15/2$^+$	D		DCO=0.51 *5*
334.3 *2*	29.8 *13*	544.93	13/2$^+$	210.64	9/2$^+$	(E2)		DCO=1.04 *5*
339.6 *2*	2.5 *3*	701.47	11/2$^-$	361.84	9/2$^+$	D		DCO=0.59 *4*
340.0 *2*	0.61 *6*	891.91	13/2$^+$	551.93	9/2$^+$			
341.5 *2*	2.60 *19*	1030.35	15/2$^-$	688.74	13/2$^+$	D		DCO=0.62 *4*
349.8 *2*	4.5 *4*	2488.50	27/2$^+$	2138.71	23/2$^+$	(E2)		DCO=0.98 *12*
354.8 *2*	29.6 *12*	768.17	15/2$^+$	413.39	11/2$^+$	(E2)		DCO=1.01 *7*
354.8 *2*	0.88 *9*	1101.38	17/2$^+$	745.91	15/2$^+$			E_γ: level-energy difference=355.5.
355.0 *2*	30.5 *12*	865.96	17/2$^-$	511.02	13/2$^-$	(E2)		DCO=0.97 *5*
357.6 *2*	2.79 *14*	2662.85	29/2$^+$	2305.26	27/2$^+$	D+Q		DCO=0.73 *14*
357.8 *2*	4.2 *5*	2257.08	25/2$^-$	1899.30	21/2$^-$	(E2)		DCO=1.05 *17*
364.4 *2*	2.35 *12*	1807.13	21/2$^-$	1442.63	17/2$^-$	(E2)		DCO=0.91 *17*
364.8 *2*	2.1 *3*	5309.0	49/2$^-$	4944.0	47/2$^-$			
374.3 *2*	3.02 *14*	1589.65	21/2$^+$	1215.43	19/2$^+$	D		DCO=0.43 *3*
380.0 *2*	34.0 *14*	745.91	15/2$^+$	365.91	11/2$^+$	(E2)		DCO=1.00 *6*
382.2 *2*	0.94 *7*	1089.69	15/2$^+$	707.49	11/2$^+$			
384.5 *2*	2.51 *13*	1589.65	21/2$^+$	1205.12	19/2$^+$	D		DCO=0.54 *14*
384.7 *2*	5.8 *5*	2689.5	29/2$^+$	2304.86	25/2$^+$	(E2)		DCO=1.02 *8*
389.3 *2*	93 *4*	1184.89	21/2$^-$	795.53	17/2$^-$	(E2)		DCO=0.98 *6*
397.1 *2*	38.8 *16*	1072.13	19/2$^-$	674.98	15/2$^-$	(E2)		DCO=1.00 *4*
398.0 *2*	4.3 *6*	2465.7	27/2$^-$	2067.75	23/2$^-$	(E2)		DCO=1.05 *14*
403.5 *2*	5.8 *3*	1433.74	19/2$^-$	1030.35	15/2$^-$	(E2)		DCO=0.99 *5*
407.7 *2*	3.28 *15*	2135.89	25/2$^+$	1728.09	23/2$^+$	D		DCO=0.46 *8*
408.0 *2*	0.47 *6*	701.47	11/2$^-$	293.34	9/2$^-$	(M1(+E2))	−0.03 *+16−23*	DCO=0.58 *12*
409.4 *2*	3.95 *18*	1205.12	19/2$^+$	795.53	17/2$^-$	D		DCO=0.56 *4*
412.8 *2*	16.9 *7*	1101.38	17/2$^+$	688.74	13/2$^+$	(E2)		DCO=1.00 *3*
417.5 *2*	2.89 *14*	2032.19	23/2$^-$	1614.76	19/2$^-$	(E2)		DCO=0.91 *10*
419.1 *2*	6.4 *5*	2907.6	31/2$^+$	2488.50	27/2$^+$	(E2)		DCO=1.04 *9*
419.7 *2*	7.1 *6*	1215.43	19/2$^+$	795.53	17/2$^-$	D		DCO=0.55 *3*
422.8 *2*	35.3 *14*	967.68	17/2$^+$	544.93	13/2$^+$	(E2)		DCO=1.01 *4*
430.4 *2*	1.01 *7*	1322.2	17/2$^+$	891.91	13/2$^+$			
435.3 *2*	4.4 *6*	2692.3	29/2$^-$	2257.08	25/2$^-$	(E2)		DCO=1.11 *17*
435.8 *2*	15.1 *6*	3098.70	33/2$^+$	2662.85	29/2$^+$	(E2)		DCO=1.01 *4*
436.9 *2*	8.1 *4*	1205.12	19/2$^+$	768.17	15/2$^+$	(E2)		DCO=0.98 *6*
442.5 *2*	37.1 *15*	1308.50	21/2$^-$	865.96	17/2$^-$	(E2)		DCO=1.02 *6*
445.6 *2*	4.09 *19*	2252.36	25/2$^-$	1807.13	21/2$^-$	(E2)		DCO=0.98 *17*
447.1 *2*	20.4 *17*	1215.43	19/2$^+$	768.17	15/2$^+$	(E2)		DCO=0.99 *3*
453.0 *2*	6.0 *5*	3142.5	33/2$^+$	2689.5	29/2$^+$	(E2)		DCO=0.96 *11*
459.4 *2*	24.9 *10*	1205.12	19/2$^+$	745.91	15/2$^+$	(E2)		DCO=1.00 *3*
462.7 *2*	1.58 *10*	1552.4	19/2$^+$	1089.69	15/2$^+$			
466.8 *2*	21.8 *9*	3325.3	35/2$^+$	2858.52	31/2$^+$	(E2)		DCO=1.00 *4*
468.8 *2*	3.3 *5*	2934.5	31/2$^-$	2465.7	27/2$^-$	(E2)		DCO=0.99 *11*
469.9 *2*	5.12 *23*	1215.43	19/2$^+$	745.91	15/2$^+$	(E2)		DCO=1.03 *6*
469.9 *2*	8.1 *4*	1903.89	23/2$^-$	1433.74	19/2$^-$	(E2)		DCO=1.04 *10*
474.3 *2*	71 *3*	1659.18	25/2$^-$	1184.89	21/2$^-$	(E2)		DCO=0.99 *5*
477.6 *2*	43.9 *18*	1549.80	23/2$^-$	1072.13	19/2$^-$	(E2)		DCO=0.97 *5*
480.3 *2*	10.4 *4*	3373.62	35/2$^+$	2893.50	31/2$^+$	(E2)		DCO=1.03 *4*
483.3 *2*	13.6 *6*	3582.0	37/2$^+$	3098.70	33/2$^+$	(E2)		DCO=1.03 *8*
485.8 *2*	6.6 *6*	3393.3	35/2$^+$	2907.6	31/2$^+$	(E2)		DCO=1.00 *12*
488.1 *2*	20.3 *8*	1589.65	21/2$^+$	1101.38	17/2$^+$	(E2)		DCO=0.99 *4*
495.3 *2*	9.7 *4*	3622.0	37/2$^+$	3126.74	33/2$^+$	(E2)		DCO=1.01 *5*
498.5 *2*	31.5 *13*	1466.11	21/2$^+$	967.68	17/2$^+$	(E2)		DCO=1.01 *3*
499.4 *2*	11.0 *5*	3766.2	39/2$^-$	3266.8	35/2$^-$	(E2)		DCO=0.99 *6*
500.9 *2*	5.2 *7*	3193.2	33/2$^-$	2692.3	29/2$^-$	(E2)		DCO=0.94 *11*

Continued on next page (footnotes at end of table)

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)

γ(^{165}Tm) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	δ#	Comments
503.7 *2*	9.2 *4*	3519.1	37/2$^-$	3015.4	33/2$^-$	(E2)		DCO=0.96 *6*
505.9 *2*	11.9 *5*	3126.74	33/2$^+$	2621.04	29/2$^+$	(E2)		DCO=0.99 *4*
506.6 *2*	1.50 *10*	1828.6	21/2$^+$	1322.2	17/2$^+$			
508.5 *2*	6.2 *3*	2540.94	27/2$^-$	2032.19	23/2$^-$	(E2)		DCO=0.98 *12*
512.4 *2*	8.2 *4*	1728.09	23/2$^+$	1215.43	19/2$^+$	(E2)		DCO=0.95 *6*
515.7 *2*	17.1 *7*	3841.0	39/2$^+$	3325.3	35/2$^+$	(E2)		DCO=0.99 *4*
516.8 *2*	6.2 *5*	3659.3	37/2$^+$	3142.5	33/2$^+$	(E2)		DCO=1.06 *12*
518.4 *2*	4.77 *24*	2770.8	29/2$^-$	2252.36	25/2$^-$	(E2)		DCO=0.99 *8*
518.8 *2*	33.2 *14*	1827.25	25/2$^-$	1308.50	21/2$^-$	(E2)		DCO=0.98 *4*
519.0 *2*	9.9 *4*	4038.1	41/2$^-$	3519.1	37/2$^-$	(E2)		DCO=1.01 *7*
523.1 *2*	25.7 *21*	1728.09	23/2$^+$	1205.12	19/2$^+$	(E2)		DCO=0.98 *4*
523.4 *2*	5.9 *3*	2427.30	27/2$^-$	1903.89	23/2$^-$	(E2)		DCO=0.97 *10*
526.9 *2*	17.9 *7*	2662.85	29/2$^+$	2135.89	25/2$^+$	(E2)		DCO=0.99 *3*
527.1 *2*	1.78 *11*	2079.4	23/2$^+$	1552.4	19/2$^+$			
529.5 *2*	22.7 *9*	1744.91	23/2$^+$	1215.43	19/2$^+$	(E2)		DCO=1.02 *6*
530.6 *2*	2.5 *4*	3465.2	35/2$^-$	2934.5	31/2$^-$	(E2)		DCO=0.96 *14*
531.5 *2*	7.9 *3*	3905.0	39/2$^+$	3373.62	35/2$^+$	(E2)		DCO=1.01 *6*
533.3 *2*	1.58 *10*	1030.35	15/2$^-$	497.24	13/2$^-$	(M1(+E2))	−0.22 *+24−78*	DCO=0.44 *17*
539.8 *2*	4.19 *20*	1744.91	23/2$^+$	1205.12	19/2$^+$	(E2)		DCO=0.99 *10*
543.2 *2*	8.5 *7*	1728.09	23/2$^+$	1184.89	21/2$^-$	D		DCO=0.52 *3*
546.3 *2*	19.8 *8*	2135.89	25/2$^+$	1589.65	21/2$^+$	(E2)		DCO=0.99 *5*
546.4 *2*	38.3 *16*	2096.18	27/2$^-$	1549.80	23/2$^-$	(E2)		DCO=1.01 *5*
547.4 *2*	6.0 *5*	3940.7	39/2$^+$	3393.3	35/2$^+$			
550.0 *2*	0.90 *9*	2378.6?	(25/2$^+$)	1828.6	21/2$^+$			
551.1 *2*	43.5 *18*	2210.13	29/2$^-$	1659.18	25/2$^-$	Q		DCO=1.01 *7*
552.8 *2*	7.7 *3*	4318.8	43/2$^-$	3766.2	39/2$^-$	Q		DCO=1.03 *16*
553.3 *2*	25.2 *10*	2858.52	31/2$^+$	2305.26	27/2$^+$	Q		DCO=1.02 *4*
556.0 *2*	4.6 *7*	3748.9	37/2$^-$	3193.2	33/2$^-$	Q		DCO=0.95 *12*
558.4 *2*	9.1 *4*	4140.4	41/2$^+$	3582.0	37/2$^+$	Q		DCO=0.95 *9*
560.1 *2*	4.46 *20*	1744.91	23/2$^+$	1184.89	21/2$^-$	D		DCO=0.59 *13*
560.8 *2*	26.1 *11*	2026.85	25/2$^+$	1466.11	21/2$^+$	Q		DCO=0.98 *5*
563.7 *2*	14.8 *6*	2893.50	31/2$^+$	2329.87	27/2$^+$	Q		DCO=1.00 *4*
565.4 *2*	6.9 *3*	4187.3	41/2$^+$	3622.0	37/2$^+$	Q		DCO=0.94 *7*
569.5 *2*	1.23 *9*	3914.5?	(37/2$^-$)	3345.0	33/2$^-$			
572.1 *2*	5.1 *3*	2999.42	31/2$^-$	2427.30	27/2$^-$	Q		DCO=0.99 *11*
572.5 *2*	16.5 *7*	3266.8	35/2$^-$	2694.4	31/2$^-$	Q		DCO=0.99 *7*
574.2 *2*	3.60 *19*	3345.0	33/2$^-$	2770.8	29/2$^-$			
575.2 *2*	4.1 *4*	4234.3	41/2$^+$	3659.3	37/2$^+$	Q		DCO=0.97 *19*
577.2 *2*	28.8 *20*	2305.26	27/2$^+$	1728.09	23/2$^+$	Q		DCO=0.99 *3*
580.9 *2*	2.5 *5*	4046.1	39/2$^-$	3465.2	35/2$^-$			
581.2 *2*	30.3 *12*	2408.44	29/2$^-$	1827.25	25/2$^-$	Q		DCO=1.01 *6*
582.4 *2*	4.16 *21*	3123.3	31/2$^-$	2540.94	27/2$^-$	Q		DCO=0.94 *6*
585.0 *2*	22.6 *9*	2329.87	27/2$^+$	1744.91	23/2$^+$	Q		DCO=1.00 *3*
588.3 *2*	12.0 *5*	4429.3	43/2$^+$	3841.0	39/2$^+$	Q		DCO=0.92 *10*
591.8 *2*	1.13 *9*	2671.2?	(27/2$^+$)	2079.4	23/2$^+$			
592.7 *2*	2.69 *15*	2252.36	25/2$^-$	1659.18	25/2$^-$			
594.3 *2*	19.8 *8*	2621.04	29/2$^+$	2026.85	25/2$^+$	Q		DCO=0.99 *4*
595.6 *2*	7.5 *3*	4633.8	45/2$^-$	4038.1	41/2$^-$	Q		DCO=1.02 *23*
598.3 *2*	31.6 *13*	2694.4	31/2$^-$	2096.18	27/2$^-$	Q		DCO=0.98 *5*
603.5 *2*	4.9 *4*	4544.3	43/2$^+$	3940.7	39/2$^+$			
604.1 *2*	3.6 *6*	4353.0	41/2$^-$	3748.9	37/2$^-$			
605.5 *2*	6.8 *3*	4510.5	43/2$^+$	3905.0	39/2$^+$	Q		DCO=0.98 *7*
607.0 *2*	20.9 *9*	3015.4	33/2$^-$	2408.44	29/2$^-$	Q		DCO=0.99 *10*
615.5 *2*	2.07 *13*	3738.8?	(35/2$^-$)	3123.3	31/2$^-$	Q		DCO=0.90 *15*
618.3 *2*	27.3 *11*	2828.40	33/2$^-$	2210.13	29/2$^-$	E2		DCO=0.98 *4*

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^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)

γ(^{165}Tm) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	Comments
618.9 *2*	3.35 *22*	3618.3	35/2$^-$	2999.42	31/2$^-$	Q		DCO=0.99 *12*
621.9 *2*	4.39 *21*	1807.13	21/2$^-$	1184.89	21/2$^-$	D[&]		DCO=0.88 *18*
625.3 *2*	6.0 *3*	4944.0	47/2$^-$	4318.8	43/2$^-$	Q		DCO=0.95 *15*
627.5 *2*	1.6 *4*	4673.6	43/2$^-$	4046.1	39/2$^-$			
627.7 *2*	3.1 *3*	4862.1	45/2$^+$	4234.3	41/2$^+$			
634.8 *2*	5.9 *3*	4775.2	45/2$^+$	4140.4	41/2$^+$	E2		DCO=0.89 *9*
638.1 *2*	3.53 *17*	1433.74	19/2$^-$	795.53	17/2$^-$	(M1+E2)	−0.36 *+16−38*	DCO=0.37 *9*
639.9 *2*	4.20 *19*	4827.1	45/2$^+$	4187.3	41/2$^+$	Q		DCO=0.94 *4*
646.1 *2*	8.4 *6*	2305.26	27/2$^+$	1659.18	25/2$^-$	D		DCO=0.54 *3*
646.9 *2*	0.92 *16*	1442.63	17/2$^-$	795.53	17/2$^-$	D+Q[&]		DCO=0.74 *18*
648.4 *2*	4.0 *7*	2858.52	31/2$^+$	2210.13	29/2$^-$	D		DCO=0.50 *4*
650.3 *2*	1.7 *3*	5003.3	45/2$^-$	4353.0	41/2$^-$			
658.0 *2*	2.4 *10*	4276.3	39/2$^-$	3618.3	35/2$^-$	Q		DCO=1.01 *28*
659.1 *2*	1.86 *22*	5203.4	47/2$^+$	4544.3	43/2$^+$			
660.8 *2*	6.8 *3*	5090.1	47/2$^+$	4429.3	43/2$^+$	E2		DCO=0.89 *5*
663.7 *2*	0.92 *18*	5525.9	49/2$^+$	4862.1	45/2$^+$			
670.8 *2*	3.17 *15*	2329.87	27/2$^+$	1659.18	25/2$^-$	D		DCO=0.75 *16*
673.7 *2*	1.0 *3*	5347.3	47/2$^-$	4673.6	43/2$^-$			
674.3 *2*	13.4 *6*	3502.6	37/2$^-$	2828.40	33/2$^-$	E2		DCO=0.98 *6*
674.9 *2*	2.19 *13*	5185.4	47/2$^+$	4510.5	43/2$^+$	Q		DCO=1.09 *11*
675.5 *2*	3.31 *17*	5309.0	49/2$^-$	4633.8	45/2$^-$	Q		DCO=0.94 *13*
687.8 *2*	0.77 *20*	5891.2?	(51/2$^+$)	5203.4	47/2$^+$			
688.1 *2*	1.49 *10*	4964.5?	(43/2$^-$)	4276.3	39/2$^-$			
690.8 *2*	2.6 *4*	3519.1	37/2$^-$	2828.40	33/2$^-$			
694.1 *2*	2.4 *4*	1899.30	21/2$^-$	1205.12	19/2$^+$	D		DCO=0.65 *14*
696.2 *2*	3.21 *15*	5640.2	51/2$^-$	4944.0	47/2$^-$	(Q)		DCO=0.82 *16*
697.9 *2*	0.91 *26*	5701.2	49/2$^-$	5003.3	45/2$^-$			
698.9 *2*	1.39 *10*	5525.9	49/2$^+$	4827.1	45/2$^+$			
705.9 *2*	0.87 *6*	5891.2?	(51/2$^+$)	5185.4	47/2$^+$			
708.4 *2*	2.94 *14*	5483.6	49/2$^+$	4775.2	45/2$^+$	E2		DCO=0.96 *13*
717.3 *2*	6.6 *3*	4219.9	41/2$^-$	3502.6	37/2$^-$	E2		DCO=0.98 *10*
719.4 *2*	3.33 *18*	1903.89	23/2$^-$	1184.89	21/2$^-$	(M1+E2)	−1.0 *+5−9*	DCO=0.24 *8*
719.6 *2*	0.41 *6*	6245.5?	(53/2$^+$)	5525.9	49/2$^+$			
723.4 *2*	1.19 *8*	5550.5	49/2$^+$	4827.1	45/2$^+$			
724.6 *2*	0.8 *3*	6071.9?	(51/2$^-$)	5347.3	47/2$^-$			
729.4 *2*	2.61 *13*	5819.5	51/2$^+$	5090.1	47/2$^+$	E2		DCO=1.11 *14*
741.9 *2*	2.96 *14*	4961.8	45/2$^-$	4219.9	41/2$^-$	(E2)		DCO=1.06 *31*
744.6 *2*	0.92 *7*	4964.5?	(43/2$^-$)	4219.9	41/2$^-$			
746.0 *2*	0.55 *6*	5931.4?	(51/2$^+$)	5185.4	47/2$^+$			
751.3 *2*	0.45 *24*	6452.5?	(53/2$^-$)	5701.2	49/2$^-$			
751.6 *2*	1.70 *10*	6060.6	53/2$^-$	5309.0	49/2$^-$			
754.9 *2*	4.0 *4*	2304.86	25/2$^+$	1549.80	23/2$^-$	D		DCO=0.74 *14*
762.3 *2*	1.67 *9*	6402.5	55/2$^-$	5640.2	51/2$^-$			
762.8 *2*	1.68 *9*	5724.6	49/2$^-$	4961.8	45/2$^-$	(E2)		DCO=0.90 *33*
768.1 *2*	2.99 *16*	2427.30	27/2$^-$	1659.18	25/2$^-$	(M1+E2)	−1.7 *+7−22*	DCO=0.31 *8*
773.8 *2*	0.75 *7*	4276.3	39/2$^-$	3502.6	37/2$^-$			
779.9 *2*	1.29 *8*	6263.5	53/2$^+$	5483.6	49/2$^+$	(E2)		DCO=1.09 *45*
781.5 *2*	0.45 *6*	6332.0?	(53/2$^+$)	5550.5	49/2$^+$			
786.1 *2*	1.53 *24*	1753.79	19/2$^-$	967.68	17/2$^+$	D		DCO=0.59 *21*
789.5 *3*	1.33 *25*	2999.42	31/2$^-$	2210.13	29/2$^-$	(M1+E2)	−2.1 *+6−16*	DCO=0.34 *8*
789.7 *2*	1.77 *19*	3618.3	35/2$^-$	2828.40	33/2$^-$	(M1+E2)	−2.1 *+6−16*	DCO=0.34 *8* δ: note that $\delta(789.7\gamma)=\delta(789.5\gamma)$. The mixing ratio may be for the unresolved doublet.
792.8 *2*	0.74 *16*	1289.95	15/2$^-$	497.24	13/2$^-$	D+Q		DCO=0.35 *14*

Continued on next page (footnotes at end of table)

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)

γ(^{165}Tm) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
793.9 *2*	1.22 *8*	6613.4	55/2$^+$	5819.5	51/2$^+$		
796.3 *2*	0.75 *5*	6520.9	53/2$^-$	5724.6	49/2$^-$		
819.2 *2*	2.47 *17*	1614.76	19/2$^-$	795.53	17/2$^-$	D+Q	DCO=0.36 *11*
822.9 *2*	0.72 *7*	6883.5	57/2$^-$	6060.6	53/2$^-$		
826.3 *2*	0.58 *6*	7228.8	59/2$^-$	6402.5	55/2$^-$		
830.2 *2*	3.7 *3*	2138.71	23/2$^+$	1308.50	21/2$^-$	D	DCO=0.56 *6*
846.3 *2*	0.50 *8*	7109.9	57/2$^+$	6263.5	53/2$^+$		
847.0 *2*	5.9 *3*	2032.19	23/2$^-$	1184.89	21/2$^-$	D+Q	DCO=0.40 *6*
867.8 *2*	0.36 *4*	7481.2	59/2$^+$	6613.4	55/2$^+$		
882.0 *2*	1.02 *9*	2540.94	27/2$^-$	1659.18	25/2$^-$	D+Q	DCO=0.26 *16*
883.2 *3*	0.29 *4*	8112.0	63/2$^-$	7228.8	59/2$^-$		
887.7 *2*	5.3 *6*	1633.54	17/2$^-$	745.91	15/2$^+$	D	DCO=0.61 *6*
890.6 *2*	0.44 *6*	7774.1	61/2$^-$	6883.5	57/2$^-$		
913.4 *3*	0.17 *4*	8023.3	61/2$^+$	7109.9	57/2$^+$		
917.4 *2*	6.1 *6*	1989.52	21/2$^+$	1072.13	19/2$^-$	D	DCO=0.60 *5*
928.9 *4*	0.12 *4*	8410.1	63/2$^+$	7481.2	59/2$^+$		
941.5 *4*	0.10 *4*	9053.5	67/2$^-$	8112.0	63/2$^-$		
945.5 *2*	0.39 *8*	1442.63	17/2$^-$	497.24	13/2$^-$		
956.8 *3*	0.20 *10*	8730.9	65/2$^-$	7774.1	61/2$^-$		
974.3 *5*	0.08 *4*	8997.6?	(65/2$^+$)	8023.3	61/2$^+$		
991.4 *2*	4.7 *5*	1857.30	19/2$^+$	865.96	17/2$^-$	D	DCO=0.54 *5*
995.4 *6*	0.02 *1*	9405.5?	(67/2$^+$)	8410.1	63/2$^+$		
997.4 *10*	0.05 *4*	10050.9	71/2$^-$	9053.5	67/2$^-$		
1012.4 *2*	1.92 *13*	1807.13	21/2$^-$	795.53	17/2$^-$		DCO=0.77 *14* E_γ: level-energy difference=1011.60. Mult.: DCO seems to indicate D, ΔJ=2 but it is inconsistent with E2, ΔJ=2 from level scheme.
1066.0 *3*	1.8 *7*	1741.09	17/2$^+$	674.98	15/2$^-$	D	DCO=0.51 *23*
1067.6 *2*	1.11 *9*	2252.36	25/2$^-$	1184.89	21/2$^-$		DCO=0.76 *25* Mult.: DCO seems to indicate D, ΔJ=2 but it is inconsistent with E2, ΔJ=2 from level scheme.

[†] Probably from both the reactions; 2001Je09 do not specify as to which of the two reaction was used to obtain gamma-ray intensities listed in their table 1.
[‡] From adopted gammas.
[#] From $\gamma\gamma(\theta)$(DCO) values. The mult=Q corresponds to ΔJ=2, stretched quadrupole (most likely E2) and mult=D (most likely E1) or D+Q (most likely M1+E2) to ΔJ=1, in rare cases to ΔJ=0. In case of significant admixtures, M1+E2 is more likely than E1+M2 from RUL. When either level lifetimes are known or Eγ is low (<550 keV), ΔJ=2, Q transitions are further restricted to E2, using RUL(M2)=1 and assuming timing resolution=20 ns in $\gamma\gamma$ coin experiment.
[@] DCO also consistent with ΔJ=2, quadrupole transition.
[&] ΔJ=0, dipole transition.

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09

Level Scheme

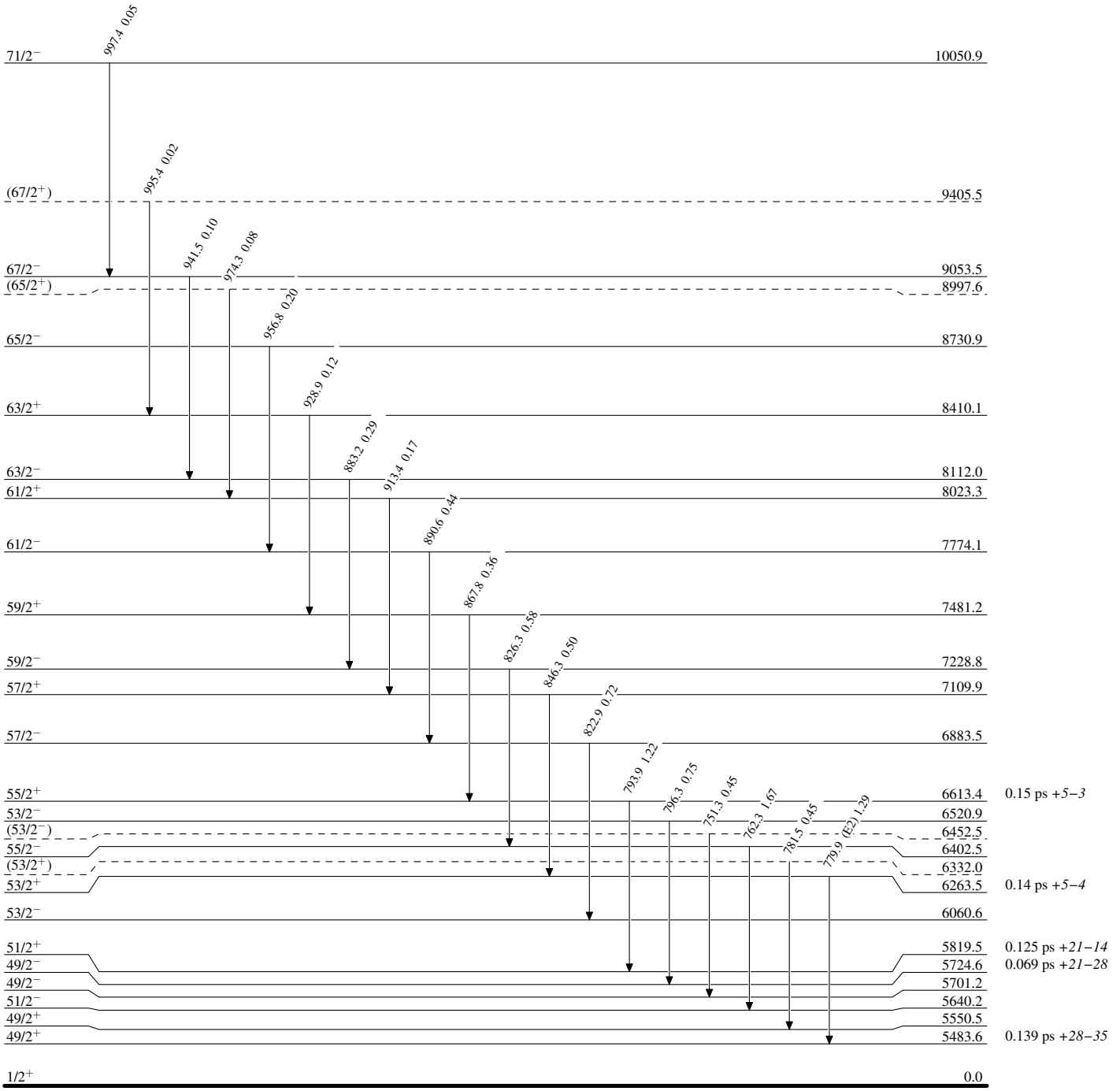
Intensities: Relative I_γ

Legend

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

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

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



$^{165}_{69}Tm_{96}$

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09

Level Scheme (continued)

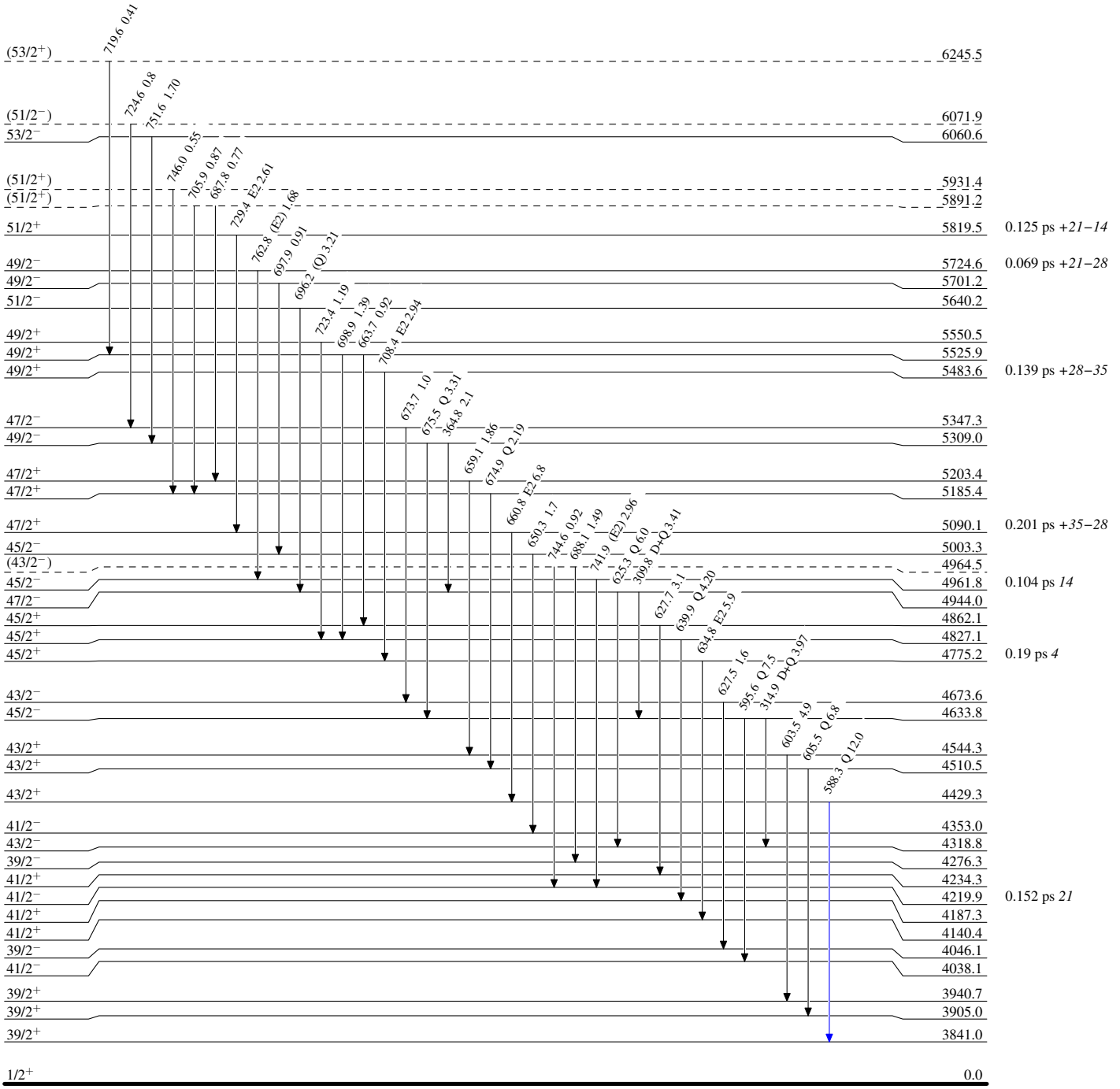
Intensities: Relative I_γ

Legend

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

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

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



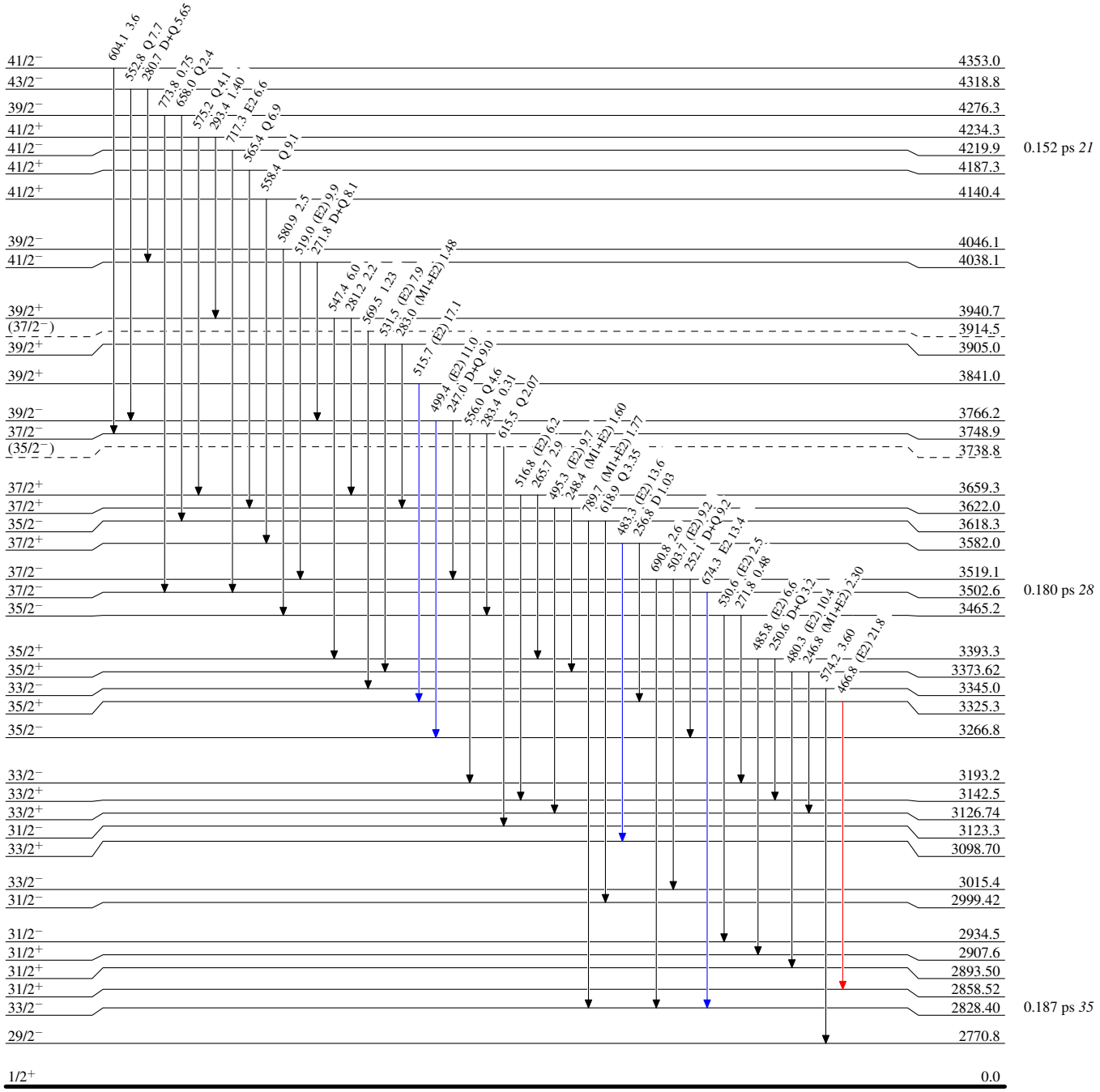
$^{165}_{69}Tm_{96}$

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09

Level Scheme (continued)

Intensities: Relative I_γ

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



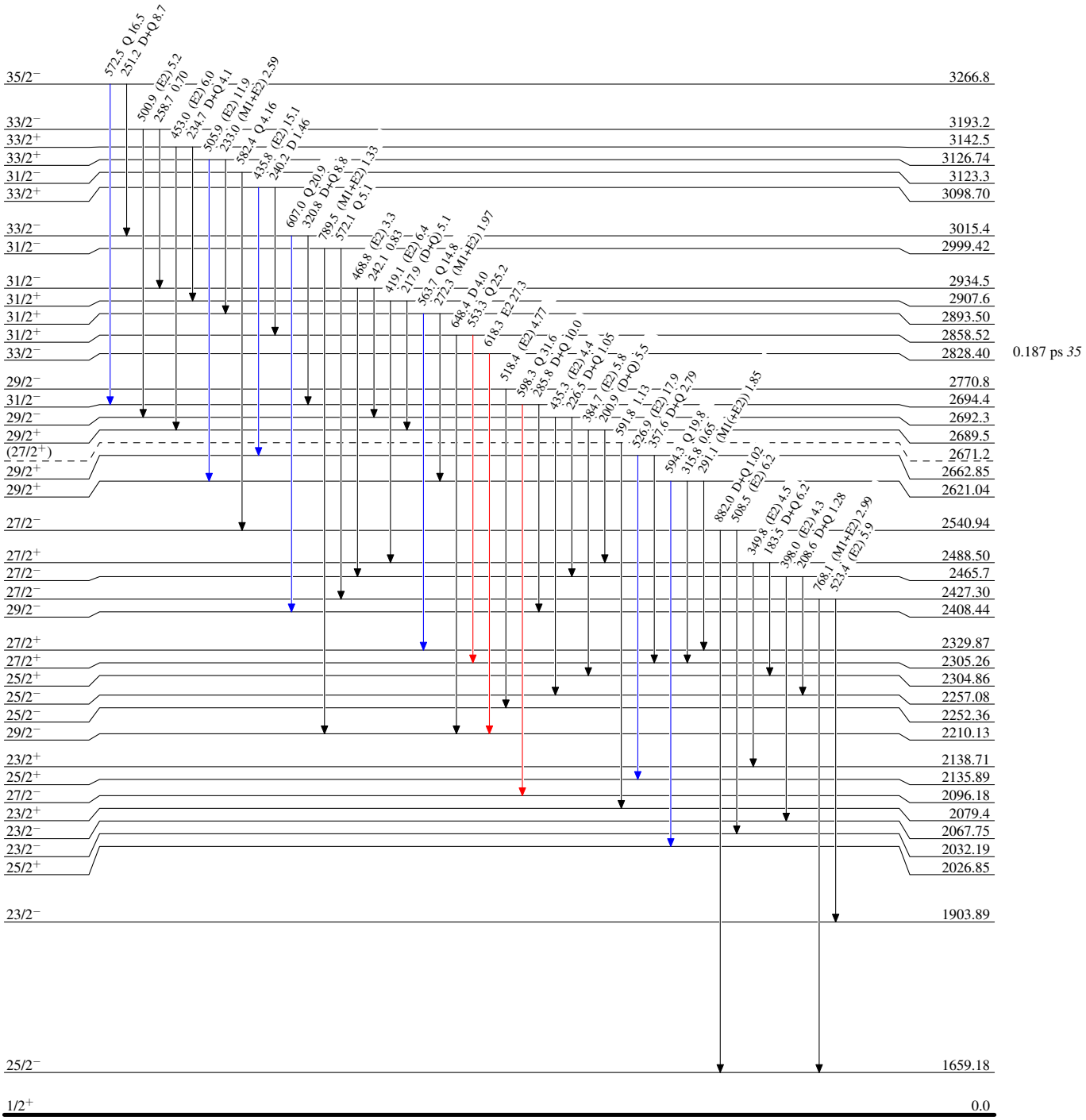
$^{165}_{69}Tm_{96}$

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09

Level Scheme (continued)

Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



$^{165}_{69}Tm_{96}$

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09

Level Scheme (continued)

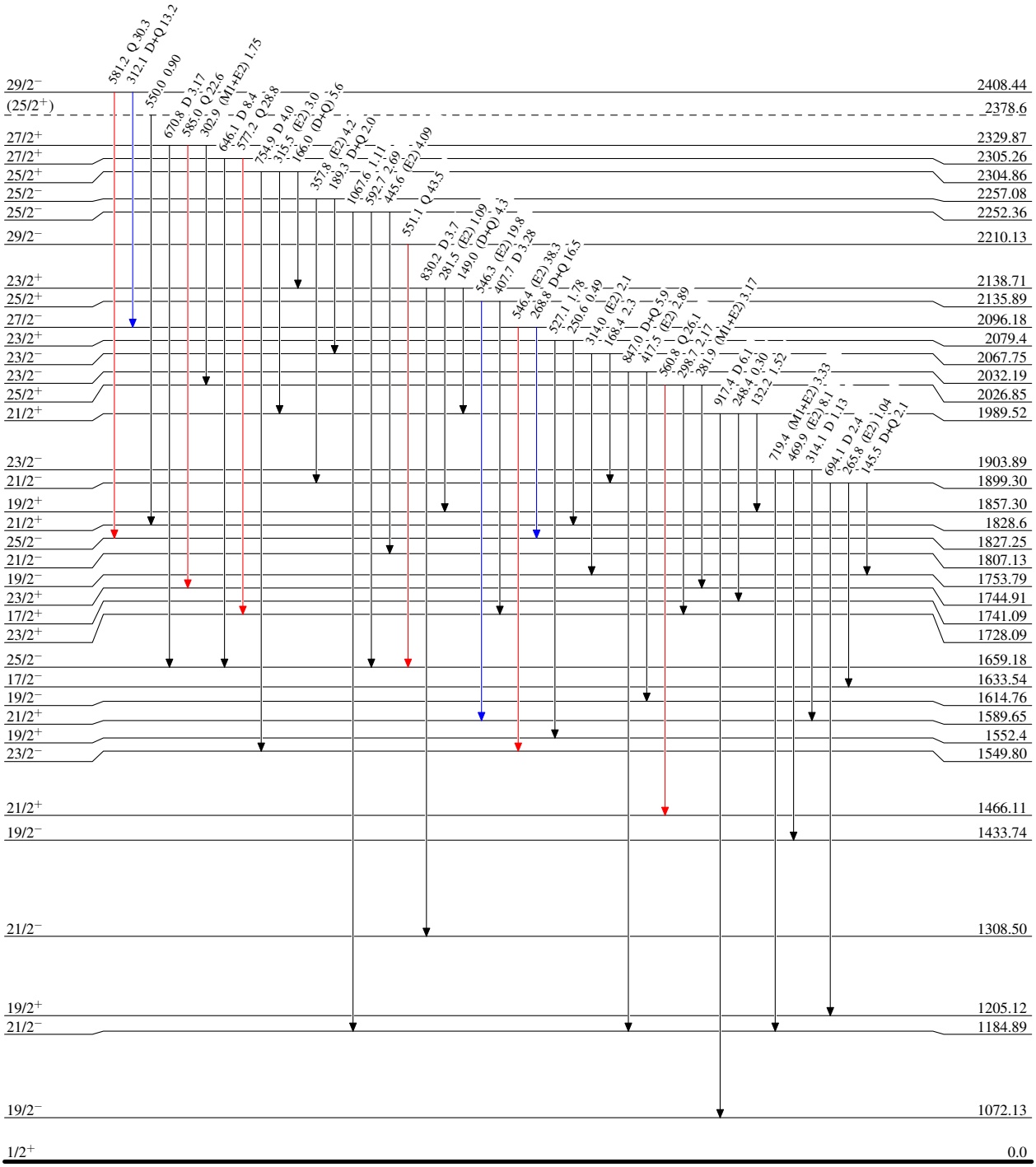
Intensities: Relative I_γ

Legend

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

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

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



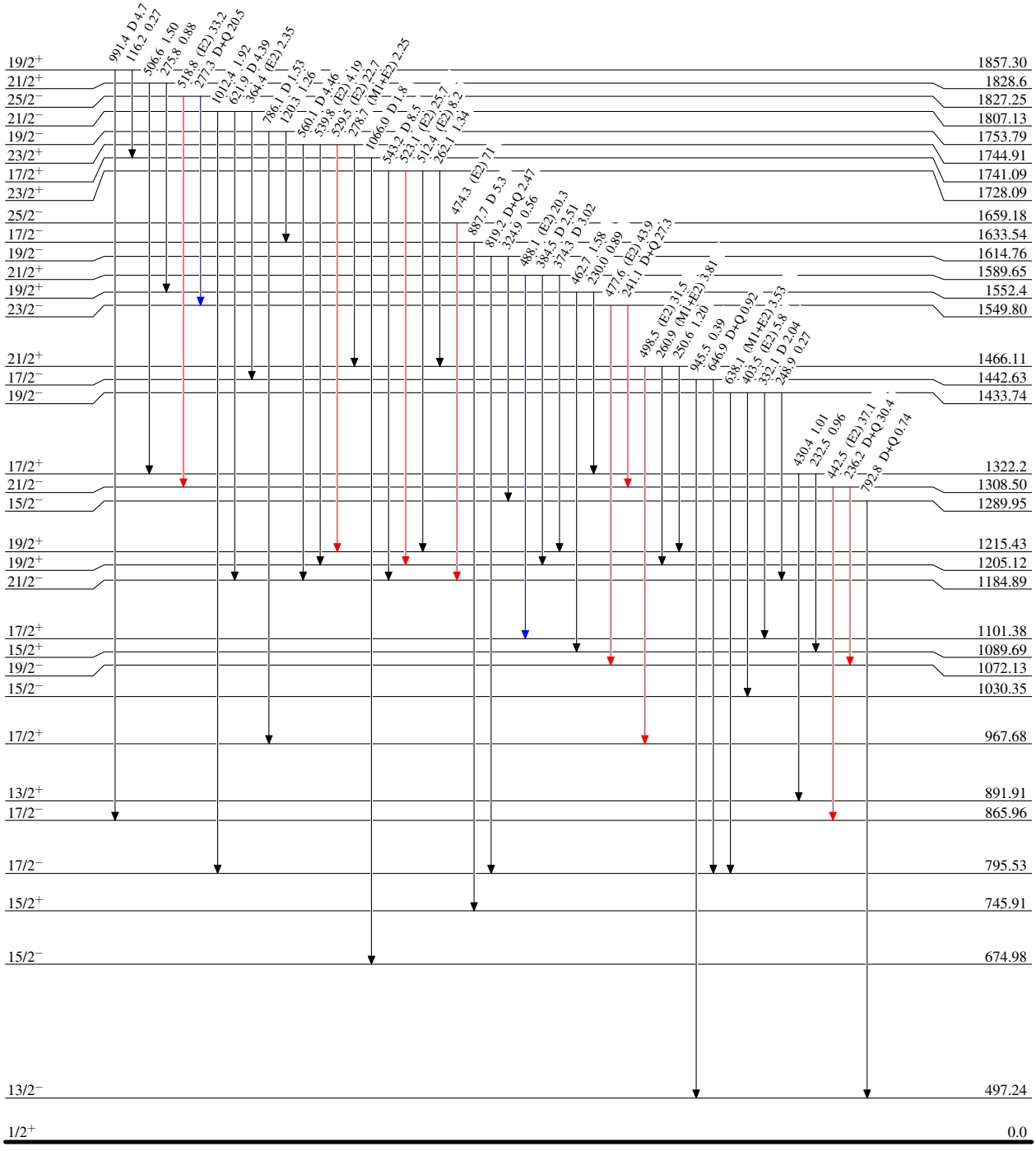
$^{165}_{69}Tm_{96}$

$^{154}Sm(^{15}N,4n\gamma),^{150}Nd(^{19}F,4n\gamma)$ **2001Je09**

Level Scheme (continued)

Intensities: Relative I_γ

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$

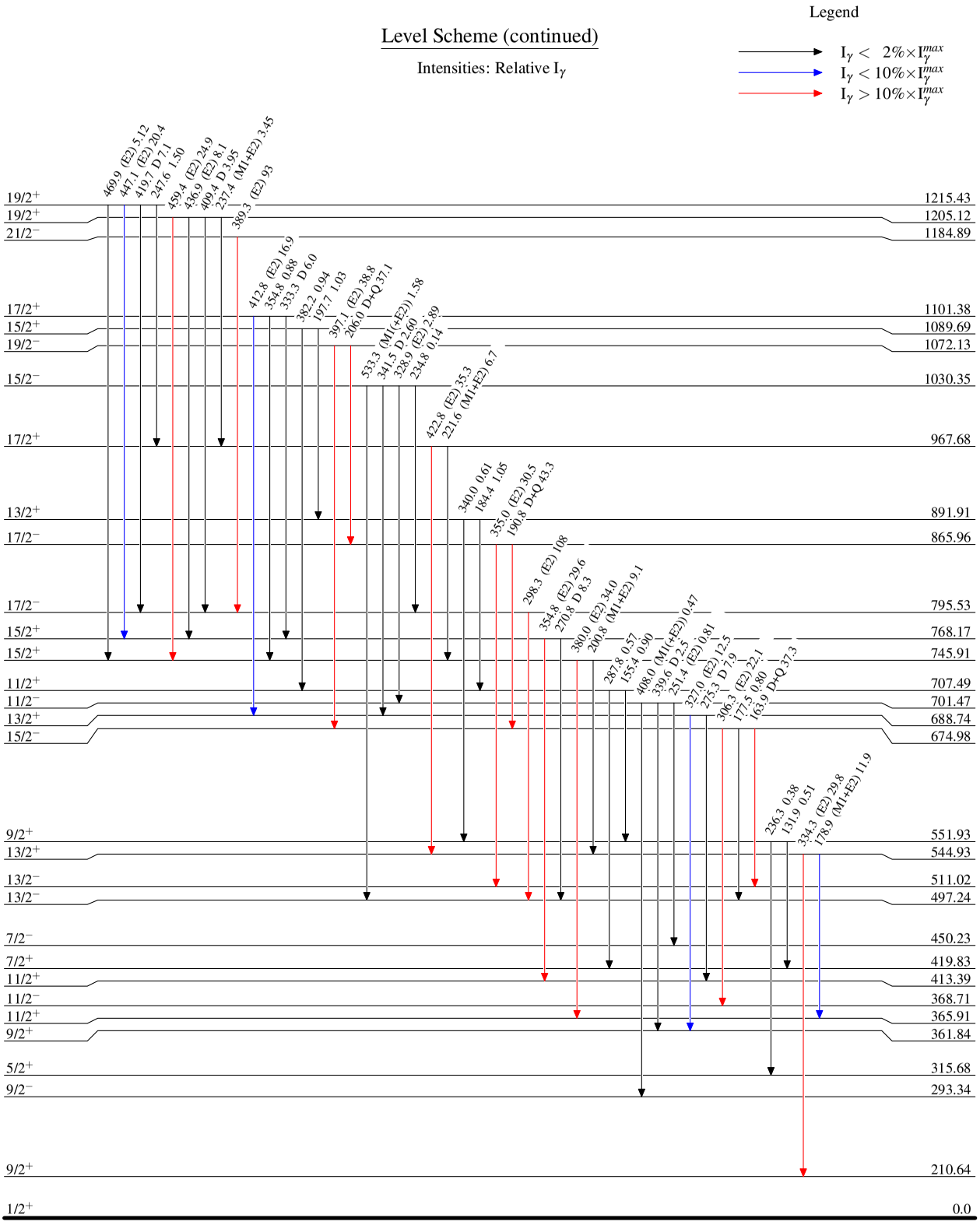


$^{165}_{69}Tm_{96}$

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09

Level Scheme (continued)

Intensities: Relative I_γ

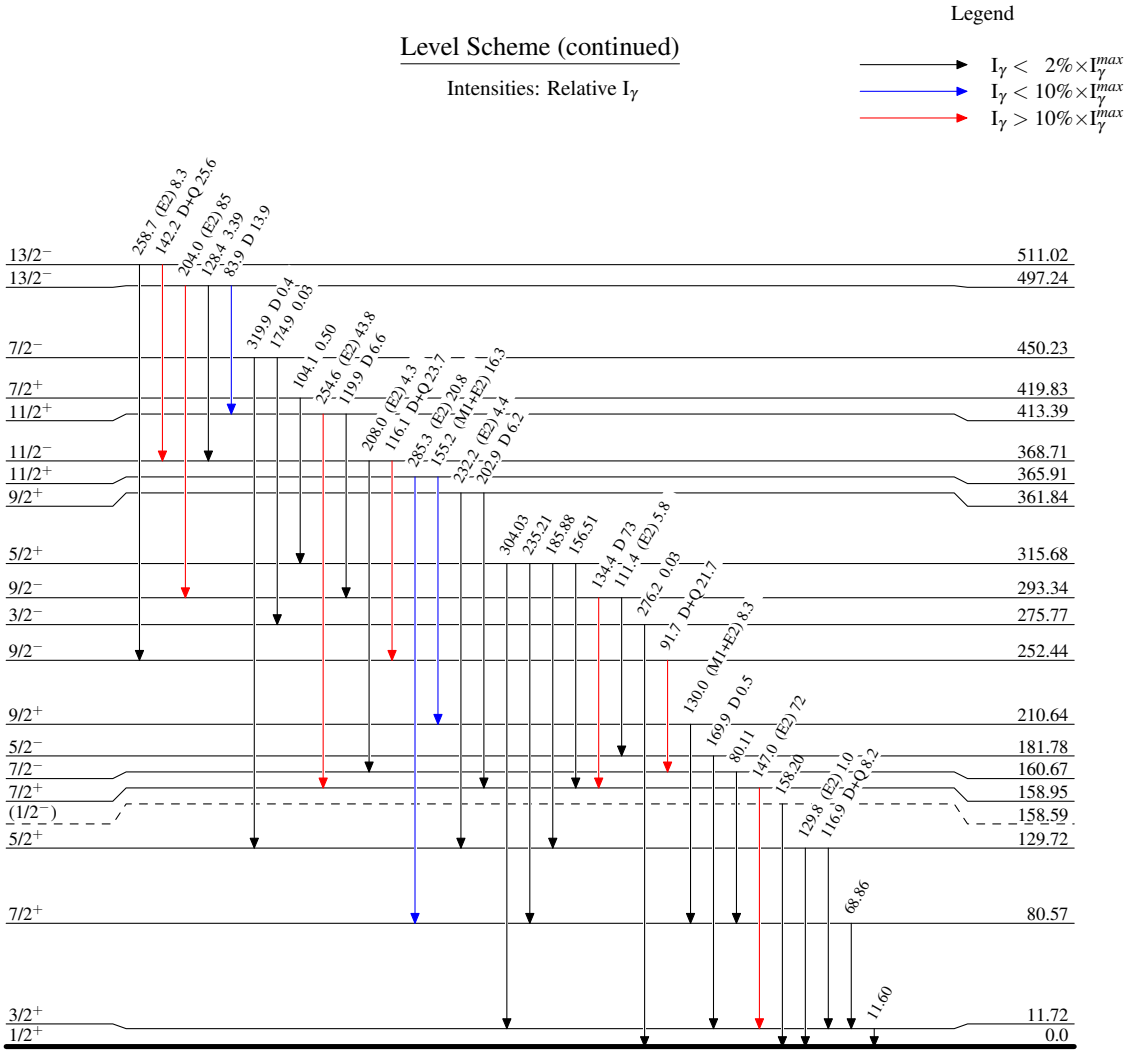


$^{165}_{69}Tm_{96}$

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09

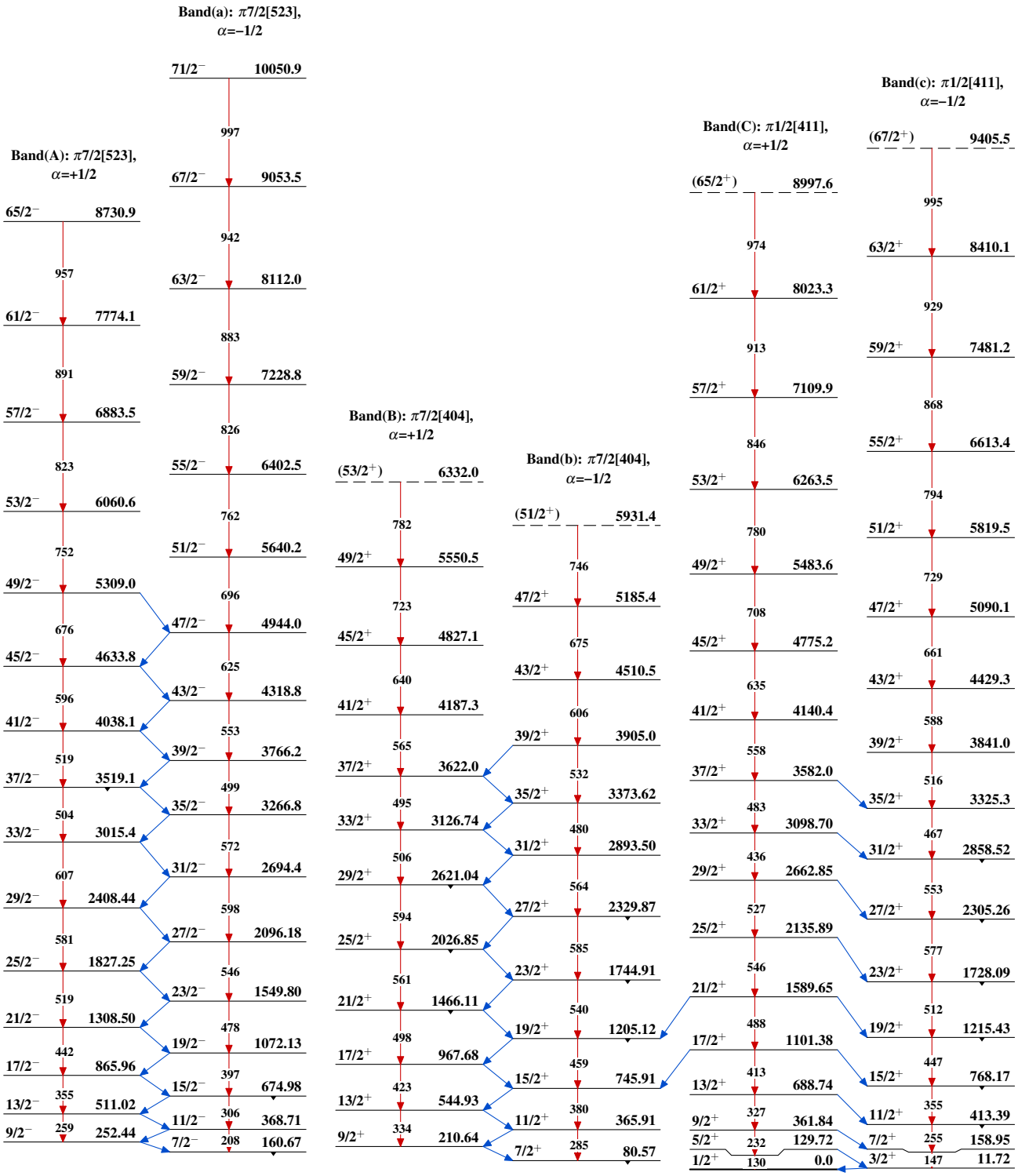
Level Scheme (continued)

Intensities: Relative I_γ



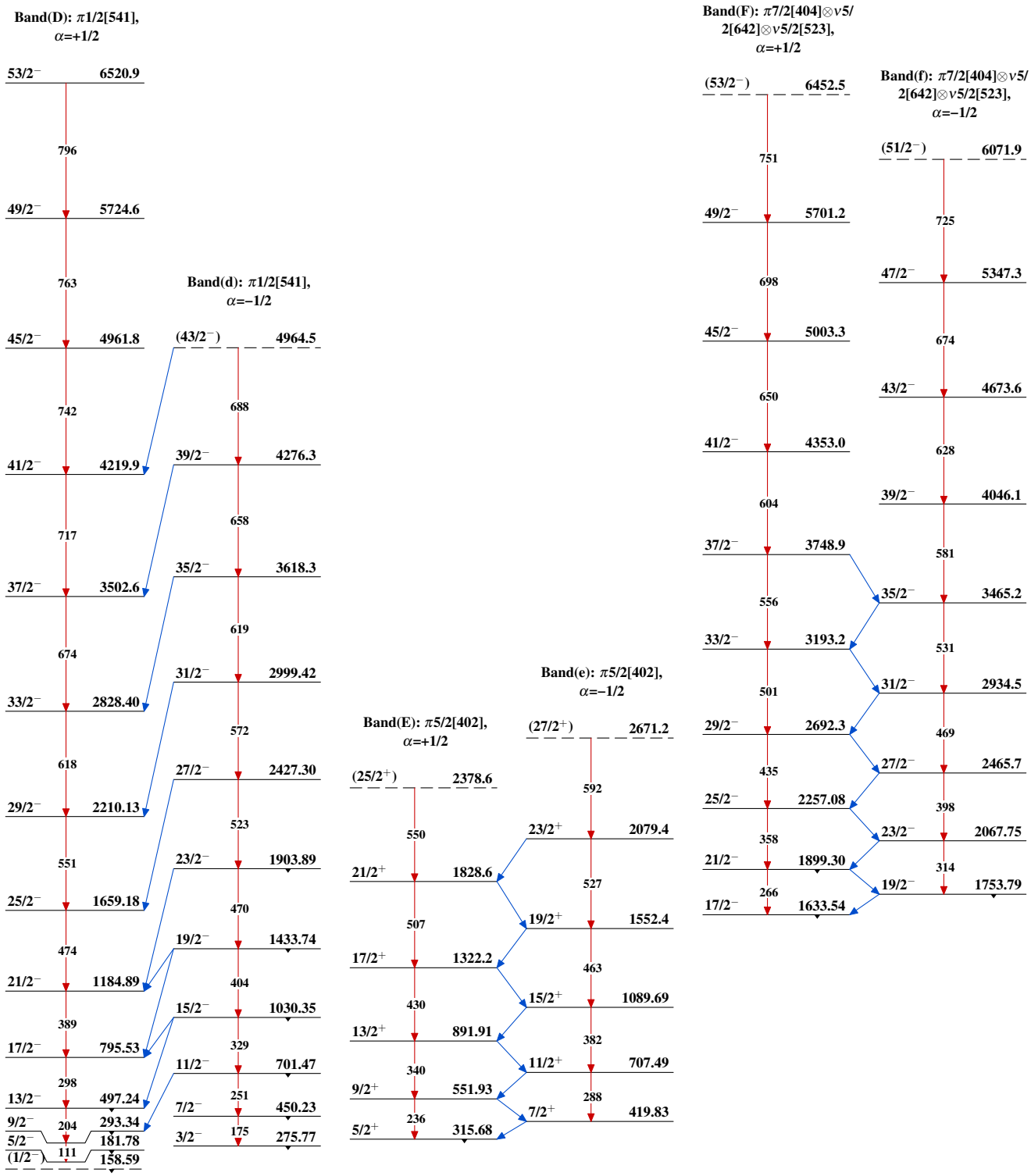
$^{165}_{69}Tm_{96}$

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09



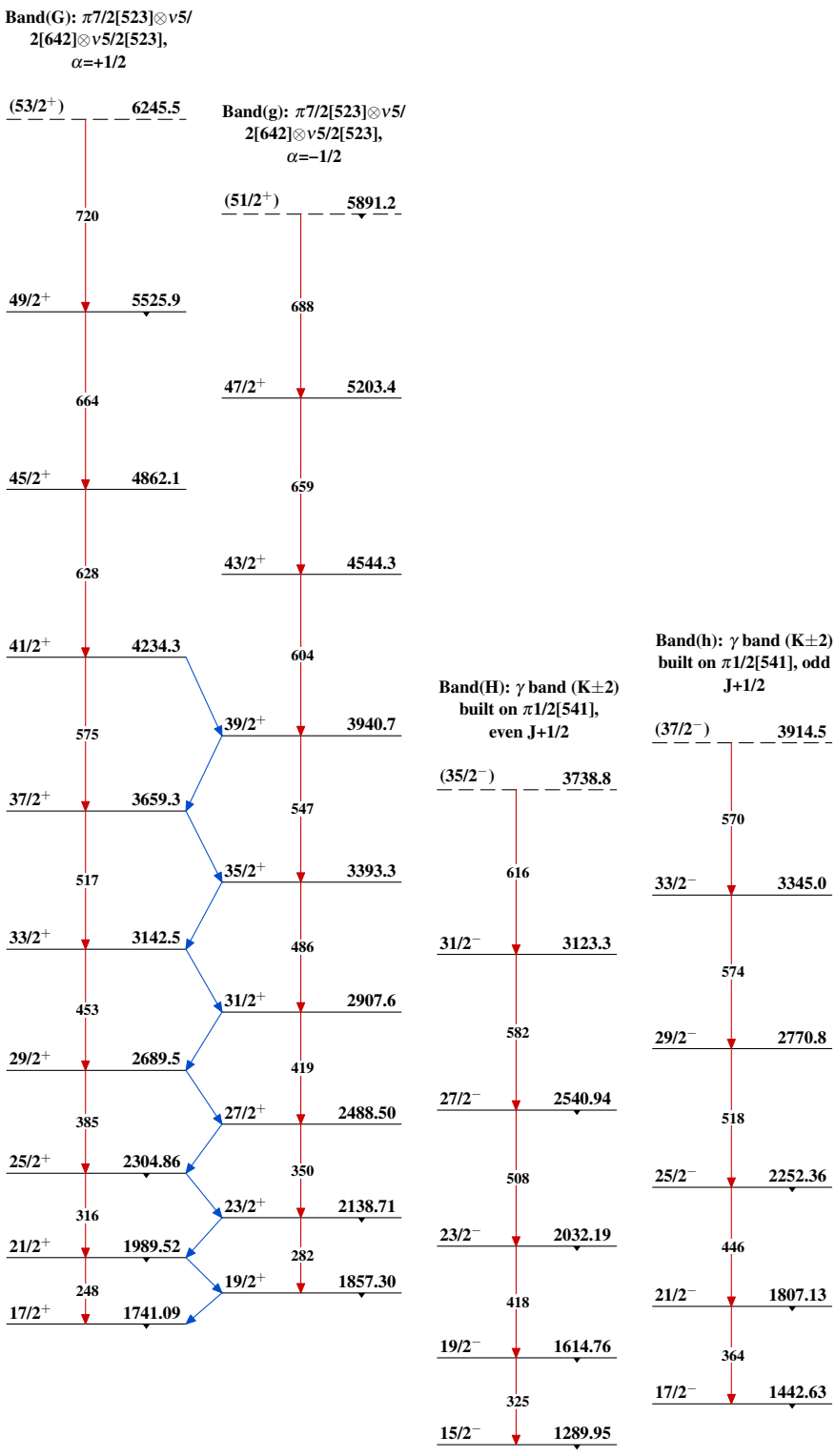
$^{165}_{69}Tm_{96}$

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)



$^{165}_{69}Tm_{96}$

^{154}Sm(^{15}N,4nγ),^{150}Nd(^{19}F,4nγ) 2001Je09 (continued)



$^{165}_{69}Tm_{96}$