^{96}Zr(^{19}F,5nγ) 2001Ch71

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	G. Gürdal and F. G. Kondev	NDS 113, 1315 (2012)	1-Aug-2011

E_{beam}=85 MeV. Several experiments using thin and thick targets were performed. In the first experiment, ^{19}F beam was provided by the TASCC facility at Chalk River Laboratory and impinged onto a 500 μg/cm^2 self-supporting ^{96}Zr target to study the band structure. γ-rays were detected using the 8π array, which consisted of 20 Compton-suppressed HPGe detectors and a 71-element inner BGO ball. In a second experiment ^{19}F beam was provided by the Stony Brook accelerator facility. A 2 mg/cm^2 ^{96}Zr target backed with 15 mg/cm^2 of ^{208}Pb was used. γ-rays were detected using the Stony Brook array of 6 Compton-suppressed HPGe detectors combined with a 14-element BGO multiplicity filter. Two HPGe detectors were placed at 26° and 25°, two at 90° and two at 144° and 142° relative to beam direction in order to perform DSAM lifetime analysis. Measured Eγ, Iγ, γγ, γγ(θ)(DCO), $T_{1/2}$.

^{110}In Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]
0.0	7^+	
413.51 *7*	7^+	
714.54[d] *7*	8^+	
799.79 *7*	7^-	
807.90[@] *6*	8^-	
1017.78[@] *8*	9^-	
1396.29[d] *9*	(9^+)	
1561.45[@] *9*	10^-	
1617.37[b] *8*	8^-	
1886.08 *9*	(10^-)	
2110.09[d] *13*	(10^+)	
2128.99 *8*	(10^-)	
2174.77[@] *9*	11^-	
2201.86[b] *9*	10^-	
2220.52[c] *10*	$9^{(-)}$	
2275.43[e] *9*	(10^-)	
2492.45 *11*	(11^-)	
2596.80[&] *10*	12^-	
2607.31[e] *9*	(11^-)	
2687.0 *5*	(10^+)	
2764.71 *10*	12^-	
2798.29[c] *10*	$11^{(-)}$	
2837.80[&] *11*	13^-	
2854.29[d] *24*	(11^+)	
2901.73 *12*		
2908.34[e] *11*	(12^-)	
3079.87[b] *13*	12^-	
3191.97[&] *13*	14^-	0.868 ps *+24−25*
3196.84[e] *15*	(13^-)	
3244.98 *10*	$11^{(-)}$	
3326.86[a] *11*	11^+	
3344.60 *15*	(14^-)	
3371.17 *22*	(13^-)	
3438.24 *14*		
3512.34[a] *10*	12^+	
3628.90[c] *14*	$13^{(-)}$	

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$^{96}Zr(^{19}F,5n\gamma)$ 2001Ch71 (continued)

^{110}In Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	Comments
3697.54[g] *11*	$12^{(-)}$		J^{π}: π=(−) assigned based on theoretical arguments (i.e similarities of Routhian with other bands).
3713.07[&] *17*	15^{-}	0.50 ps *+4−3*	
3719.67[a] *11*	13^{+}		
3732.84[e] *18*	(14^{-})		
3821.00 *18*	(15^{-})		
3832.87 *17*	(14^{-})		
3914.78[f] *11*	$13^{(+)}$		
3943.23[a] *12*	14^{+}		
3995.47[g] *12*	$13^{(-)}$		
4081.53[f] *12*	$14^{(+)}$		
4156.37[b] *17*	14^{-}		
4228.81[a] *13*	15^{+}	0.435 ps *+17−16*	
4263.83[g] *13*	$14^{(-)}$		
4322.88 *24*	(15^{-})		
4370.44[f] *14*	$15^{(+)}$		
4528.14[&] *19*	16^{-}		
4561.61[g] *14*	$15^{(-)}$		
4597.86[a] *15*	16^{+}	0.297 ps *+6−11*	
4601.97 *20*	(16^{-})		
4605.90[c] *17*	$15^{(-)}$		
4802.71 *21*	(17^{-})		
4802.78[f] *15*	$16^{(+)}$		
4942.0 *4*	(16^{-})		
4995.41[g] *17*	$16^{(-)}$		
5045.44 *16*	(15^{+})		
5084.74[a] *15*	(17^{+})	0.159 ps *+24−18*	
5180.68[b] *20*	16^{-}		
5265.00[&] *20*	17^{-}		
5283.22[f] *15*	$17^{(+)}$		
5403.10 *22*	(17^{-})		
5545.71 *20*	(17^{-})		
5556.31[c] *20*	$17^{(-)}$	0.54 ps *+7−6*	
5561.51[g] *20*	(17^{-})		
5650.23[a] *15*	(18^{+})	0.136 ps *+15−13*	
5687.05 *21*	(18^{-})		
5824.94 *18*	(18^{+})		
5833.28[f] *16*	(18^{+})		
5839.11 *17*	(18^{+})		
6061.98[b] *22*	18^{-}		
6095.25 *23*	(19^{-})		
6223.17[a] *17*	(19^{+})	0.073 ps *+6−9*	
6296.83 *18*	(19^{+})		
6445.41[c] *22*	$19^{(-)}$	0.38 ps *+4−3*	
6707.07[a] *20*	(20^{+})		
6991.93 *21*	(20^{+})		
6999.09[b] *24*	(20^{-})		
7240.4 *4*	(19^{+})		
7272.47[a] *23*	(21^{+})		
7391.62[c] *25*	$21^{(-)}$	0.279 ps *+16−12*	

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$^{96}Zr(^{19}F,5n\gamma)$ 2001Ch71 (continued)

^{110}In Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	E(level)[†]	Jπ[‡]
7980.68[a] *25*	(22+)		9398.1[b] *4*	(24−)
8087.7[b] *3*	(22−)		9698.5[c] *3*	(25−)
8463.6[c] *3*	(23−)	0.142 ps *+13−10*	11117.6[c] *3*	(27−)
8747.6[a] *3*	(23+)		12744.5[c] *7*	(29−)

[†] From least-squares fit to Eγ′s. The least-squares adjustment procedure indicates that the Δ(Eγ)′s, as quoted by 2001Ch71 may be either statistical uncertainties only or underestimated, since about 15 γ rays are poorly fitted, the deviations being 0.3 to 0.6 keV, but in the case of 825.4γ the deviation is 1.2 keV.

[‡] From the deduced γ-ray transition multipolarities and band structure.

[#] Deduced using the Doppler shift attenuation method.

[@] Band(A): Magnetic-rotational band #1. Configuration=$\pi(g_{9/2}^{-1})\otimes\nu h_{11/2}$.

[&] Band(B): Magnetic-rotational band #2. Configuration=$\pi(g_{9/2}^{-1})\otimes\nu((g_{7/2}/d_{5/2})^2)(h_{11/2})$.

[a] Band(C): Magnetic-rotational band #3. Configuration=$\pi(g_{9/2}^{-1})\otimes\nu((g_{7/2}/d_{5/2})(h_{11/2})^2)$ below the alignment, and $\pi(g_{9/2}^{-1})\otimes\nu((g_{7/2}/d_{5/2})^3)\ (h_{11/2})^2$ above the alignment.

[b] Band(D): Anti-magnetic rotational band #1. Configuration=$\pi((g_{9/2}^{-2})(d_{5/2}))\otimes\nu h_{11/2}$ below the alignment, and $\pi((g_{9/2}^{-2})(d_{5/2})\otimes\nu(h_{11/2})^3$ above the alignment.

[c] Band(E): $\pi((g_{9/2}^{-2})(g_{7/2}))\otimes\nu h_{11/2}$ below the alignment and $\pi(g_{9/2}^{-2})(g_{7/2})\otimes\nu(h_{11/2})^3$ above the alignment.

[d] Band(F): $\pi(g_{9/2}^{-1})\otimes\nu g_{7/2}$ below the alignment and $\pi(g_{9/2}^{-1})\otimes\nu((g_{7/2}/d_{5/2})^3)$ above the alignment.

[e] Band(G): $\pi(g_{9/2}^{-1})\otimes\nu(((g_{7/2}/d_{5/2}))^2(h_{11/2}))$.

[f] Band(H): $\pi(g_{9/2}^{-1})\otimes\nu((g_{7/2}/d_{5/2})(h_{11/2})^2)$.

[g] Band(I): $\pi(g_{9/2}^{-1})\otimes\nu(h_{11/2})^3$.

$\gamma(^{110}In)$

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	Comments
413.51	7+	413.4 *1*	38.6 *4*	0.0	7+	M1+E2	DCO=1.75 *6*. Other Iγ=35.9 *5*.
714.54	8+	300.9 *1*	0.6 *1*	413.51	7+	M1+E2	Other Iγ=0.6 *1*.
		714.5 *1*	4.8 *10*	0.0	7+	M1+E2	Other Iγ=10.7 *13*.
799.79	7−	386.2 *1*	8.0 *3*	413.51	7+	E1	DCO=2.14 *16*. Other Iγ=8.6 *3*.
		799.7 *1*	27.0 *11*	0.0	7+	E1	DCO=2.04 *10*. DCO(ΔJ=2,Q gated)=1.3 *3*. Other Iγ=35.3 *14*.
807.90	8−	(8.0 *10*)	0.2 *1*	799.79	7−	M1+E2	Other Iγ=0.3 *1*.
		93.2 *1*	0.9 *1*	714.54	8+	E1	Other Iγ=1.6 *1*.
		394.5 *1*	27.1 *9*	413.51	7+	E1	DCO=0.94 *4*. Other Iγ=26.1 *8*.
		808.0 *1*	54.0 *17*	0.0	7+	E1	DCO=0.96 *3*. DCO(ΔJ=2,Q gated)=0.67 *15*. Other Iγ=58.2 *19*.
1017.78	9−	209.5 *1*	100 *3*	807.90	8−	M1+E2	E_γ: Least-squares fit gives 209.88 6. DCO=1.04 *2*. DCO(ΔJ=2,Q gated)=0.63 *13*. Other Iγ=100 *3*.
1396.29	(9+)	681.5 *10*	0.6 *1*	714.54	8+	M1+E2	Other Iγ=0.7 *1*.
		1396.4 *1*	2.5 *7*	0.0	7+	E2	Other Iγ=4.2 *9*.
1561.45	10−	543.7 *1*	87 *3*	1017.78	9−	M1+E2	DCO=1.04 *4*. Other Iγ=73.0 *22*.

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$^{96}Zr(^{19}F,5n\gamma)$ 2001Ch71 (continued)

$\gamma(^{110}In)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	Comments
1561.45	10⁻	753.6 *7*	0.4 *1*	807.90	8⁻	E2	Other Iγ=0.2 *2*.
1617.37	8⁻	599.3 *1*	10.2 *4*	1017.78	9⁻	M1+E2	DCO=1.22 *24*. DCO(ΔJ=2,Q gated)=0.77 *15*. Other Iγ=7.7 *3*.
		809.9 *1*	3.3 *2*	807.90	8⁻	M1+E2	E_γ: Least-squares fit gives 809.47 6. Other Iγ=3.0 *2*.
		817.4 *1*	4.9 *2*	799.79	7⁻	M1+E2	DCO(ΔJ=2,Q gated)=1.03 *23*. Other Iγ=4.9 *2*.
		1617.0 *4*	0.6 *1*	0.0	7⁺	E1	Other Iγ=2.4 *1*.
1886.08	(10⁻)	1078.1 *1*	3.3 *4*	807.90	8⁻	E2	DCO(ΔJ=2,Q gated)=1.01 *12* for doublet. Other Iγ=2.6 *3*.
2110.09	(10⁺)	713.8 *1*	2.8 *2*	1396.29	(9⁺)	M1+E2	Other Iγ=2.9 *2*.
2128.99	(10⁻)	243.0 *1*	1.0 *1*	1886.08	(10⁻)	M1+E2	Other Iγ=1.0 *1*.
		567.2 *1*	3.1 *2*	1561.45	10⁻	M1+E2	E_γ: Least-squares fit gives 567.54 6. Other Iγ=3.6 *2*.
		732.3 *2*	0.8 *1*	1396.29	(9⁺)	E1	Other Iγ=0.8 *1*.
		1111.2 *2*	1.5 *1*	1017.78	9⁻	M1+E2	Other Iγ=0.8 *1*.
		1321.2 *1*	2.7 *2*	807.90	8⁻	E2	Other Iγ=3.2 *2*.
2174.77	11⁻	613.0 *1*	72.7 *22*	1561.45	10⁻	M1+E2	E_γ: Least-squares fit gives 613.31 5. DCO=0.94 *3*. Other Iγ=56.3 *17*.
		1157.0 *1*	8.3 *3*	1017.78	9⁻	E2	Other Iγ=8.1 *3*.
2201.86	10⁻	315.6 *1*	1.7 *1*	1886.08	(10⁻)	M1+E2	DCO(ΔJ=2,Q gated)=0.98 *19*. Other Iγ=1.4 *1*.
		584.4 *1*	7.4 *3*	1617.37	8⁻	E2	DCO(ΔJ=2,Q gated)=0.89 *10*. Other Iγ=6.1 *2*.
		640.6 *1*	2.8 *1*	1561.45	10⁻	M1+E2	Other Iγ=0.9 *1*.
		805.3 *2*	1.8 *1*	1396.29	(9⁺)	E1	Other Iγ=1.8 *1*.
		1183.2 *3*	0.7 *1*	1017.78	9⁻	M1+E2	Other Iγ=0.7 *1*.
2220.52	9⁽⁻⁾	603.2 *1*	9.8 *4*	1617.37	8⁻	M1+E2	DCO=0.84 *19*. DCO(ΔJ=2,Q gated)=0.42 *6*. Other Iγ=7.6 *3*.
		825.4 *2*	1.1 *1*	1396.29	(9⁺)	E1	E_γ: Least-squares fit gives 824.23 11. Other Iγ=0.8 *1*.
		1202.3 *2*	1.3 *1*	1017.78	9⁻	M1+E2	Other Iγ=1.0 *1*.
2275.43	(10⁻)	1257.3 *1*	1.9 *2*	1017.78	9⁻	M1+E2	E_γ: Least-squares fit gives 1257.64 7. Other Iγ=1.2 *1*.
		1467.5 *1*	2.2 *2*	807.90	8⁻	E2	Other Iγ=1.5 *2*.
2492.45	(11⁻)	363.3 *1*	5.3 *2*	2128.99	(10⁻)	M1+E2	DCO=0.96 *25*. Other Iγ=3.7 *2*.
2596.80	12⁻	104.2 *1*	1.9 *1*	2492.45	(11⁻)	M1+E2	Other Iγ=2.2 *1*.
		421.9 *1*	40.6 *12*	2174.77	11⁻	M1+E2	DCO=0.87 *2*. Other Iγ=33.8 *10*.
		1035.6 *1*	5.5 *2*	1561.45	10⁻	E2	DCO=1.7 *4*. Other Iγ=4.5 *2*.
2607.31	(11⁻)	331.5 *1*	2.9 *1*	2275.43	(10⁻)	M1+E2	E_γ: Least-squares fit gives 331.87 7. DCO=0.88 *16*. Other Iγ=1.7 *1*.
		1046.1 *1*	2.7 *2*	1561.45	10⁻	M1+E2	Other Iγ=1.3 *1*.
		1589.9 *1*	3.0 *2*	1017.78	9⁻	E2	E_γ: Least-squares fit gives 1589.51 7. Other Iγ=1.9 *1*.
2687.0	(10⁺)	1290.7 *5*	1.1 *2*	1396.29	(9⁺)	M1+E2	Other Iγ=1.3 *2*.
2764.71	12⁻	590.1 *1*	20.0 *6*	2174.77	11⁻	M1+E2	DCO=0.99 *8*. Other Iγ=11.8 *4*.
		1203.2 *1*	2.0 *1*	1561.45	10⁻	E2	Other Iγ=1.7 *1*.

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$^{96}Zr(^{19}F,5n\gamma)$ 2001Ch71 (continued)

$\gamma(^{110}In)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	Comments
2798.29	$11^{(-)}$	578.0 *1*	8.3 *3*	2220.52	$9^{(-)}$	E2	DCO(ΔJ=2,Q gated)=1.08 *14*. Other Iγ=7.0 *3*.
		596.2 *1*	5.1 *2*	2201.86	10^-	M1+E2	DCO(ΔJ=2,Q gated)=0.43 *8*. Other Iγ=3.9 *2*.
		669.3 *1*	1.1 *1*	2128.99	(10^-)	M1+E2	Other Iγ=0.6 *1*.
2837.80	13^-	241.1 *1*	34.6 *10*	2596.80	12^-	M1+E2	DCO=0.89 *2*. Other Iγ=30.4 *9*.
2854.29	(11^+)	744.2 *2*	0.8 *1*	2110.09	(10^+)	M1+E2	Other Iγ=0.8 *1*.
2901.73		63.9 *1*	0.5 *1*	2837.80	13^-		Other Iγ=4.7 *3*.
2908.34	(12^-)	301.3 *1*	3.6 *1*	2607.31	(11^-)	M1+E2	DCO=0.89 *19*. Other Iγ=2.6 *1*.
		733.4 *1*	1.1 *1*	2174.77	11^-	M1+E2	DCO=1.2 *4*. Other Iγ=0.9 *1*.
		1346.5 *2*	1.5 *1*	1561.45	10^-	E2	Other Iγ=1.6 *1*.
3079.87	12^-	878.0 *1*	8.3 *3*	2201.86	10^-	E2	DCO=1.7 *4*. DCO(ΔJ=2,Q gated)=0.93 *17*. Other Iγ=8.4 *3*.
3191.97	14^-	354.6 *1*	22.2 *7*	2837.80	13^-	M1+E2	E_γ: Least-squares fit gives 354.16 9. DCO=0.77 *4*. Other Iγ=16.6 *5*.
3196.84	(13^-)	288.5 *1*	4.3 *2*	2908.34	(12^-)	M1+E2	DCO=0.92 *5*. Other Iγ=4.0 *2*.
3244.98	$11^{(-)}$	1070.1 *1*	1.1 *1*	2174.77	11^-	M1+E2	Other Iγ=0.5 *1*.
		1115.9 *1*	1.1 *1*	2128.99	(10^-)	M1+E2	Other Iγ=0.7 *1*.
		1684.1 *5*	0.2 *1*	1561.45	10^-	M1+E2	Other Iγ=0.1 *1*.
3326.86	11^+	1765.5 *1*	0.8 *1*	1561.45	10^-	E1	Other Iγ=0.5 *1*.
3344.60	(14^-)	506.8 *1*	1.9 *1*	2837.80	13^-	M1+E2	
3371.17	(13^-)	1196.4 *2*	1.9 *2*	2174.77	11^-	E2	
3438.24		536.0 *2*	0.9 *1*	2901.73			Other Iγ=0.3 *1*.
3512.34	12^+	185.6 *1*	1.0 *1*	3326.86	11^+	M1+E2	DCO=1.29 *24*. Other Iγ=0.7 *1*.
		267.2 *1*	2.1 *1*	3244.98	$11^{(-)}$	E1	DCO=0.85 *9*. Other Iγ=1.3 *1*.
		610.7[@] *1*	1.0 *1*	2901.73			
		1337.7 *1*	15.8 *5*	2174.77	11^-	E1	DCO=1.22 *20*. Other Iγ=9.9 *3*.
		2116[@]		1396.29	(9^+)		E_γ: A dotted transition (involving ΔJ=3) to 1396.3 keV, (9^+) level that is shown in figure 3 of 2001Ch71.
3628.90	$13^{(-)}$	830.6 *1*	11.6 *4*	2798.29	$11^{(-)}$	E2	DCO(ΔJ=2,Q gated)=1.12 *12*. Other Iγ=8.9 *3*.
3697.54	$12^{(-)}$	1522.6 *1*	1.3 *1*	2174.77	11^-	M1+E2	Other Iγ=0.5 *1*.
		1587.4[@]		2110.09	(10^+)	[M2]	E_γ: From level-energy difference, transition shown in figure 3 of 2001Ch71.
3713.07	15^-	521.1 *1*	13.6 *4*	3191.97	14^-	M1+E2	DCO=0.62 *7*. Other Iγ=7.6 *2*.
3719.67	13^+	207.5 *1*	16.9 *5*	3512.34	12^+	M1+E2	DCO=1.02 *5*. Other Iγ=14.6 *5*.
		281.3 *1*	0.6 *1*	3438.24			Other Iγ=0.9 *1*.
		955.3 *1*	6.4 *2*	2764.71	12^-	E1	E_γ: Least-squares fit gives 954.95 7. DCO=0.88 *21*. Other Iγ=4.7 *2*.
		1122.7 *1*	1.4 *1*	2596.80	12^-	E1	DCO=1.0 *3*. Other Iγ=1.0 *1*.
		2323[@]		1396.29	(9^+)		E_γ: A dotted transition (involving ΔJ=4) to 1396.3 keV, (9^+) level that is shown in figure 3 of 2001Ch71.

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^{96}Zr(^{19}F,5nγ) 2001Ch71 (continued)

γ(^{110}In) (continued)

E_i(level)	J^π_i	E_γ†	I_γ‡	E_f	J^π_f	Mult.#	Comments
3732.84	(14^-)	536.0 *1*	1.6 *1*	3196.84	(13^-)	M1+E2	Other Iγ=0.6 *1*.
3821.00	(15^-)	476.4 *1*	2.1 *1*	3344.60	(14^-)	M1+E2	
3832.87	(14^-)	753.0 *1*	2.6 *2*	3079.87	12^-	E2	Other Iγ=2.2 *1*.
3914.78	$13^{(+)}$	217.2 *1*	1.1 *1*	3697.54	$12^{(-)}$	E1	DCO=0.97 *11*. Other Iγ=0.6 *1*.
		1077.6 *2*	0.8 *1*	2837.80	13^-	E1	E$_\gamma$: Least-squares fit gives 1076.95 8.
		1318.0 *1*	5.0 *2*	2596.80	12^-	E1	DCO=0.93 *19*. Other Iγ=2.6 *1*.
3943.23	14^+	223.8 *1*	26.6 *8*	3719.67	13^+	M1+E2	DCO=0.90 *3*. Other Iγ=19.8 *6*.
		1105.0 *1*	2.0 *1*	2837.80	13^-	E1	E$_\gamma$: Least-squares fit gives 1105.41 8. Other Iγ=0.9 *1*.
3995.47	$13^{(-)}$	297.8 *1*	1.1 *1*	3697.54	$12^{(-)}$	M1+E2	DCO=0.63 *10*. Other Iγ=0.8 *1*.
		1230.5 *1*	4.2 *2*	2764.71	12^-	M1+E2	Other Iγ=2.3 *1*.
4081.53	$14^{(+)}$	166.9 *1*	4.3 *1*	3914.78	$13^{(+)}$	M1+E2	DCO=0.68 *8*. Other Iγ=3.3 *1*.
		1243.8 *1*	5.3 *2*	2837.80	13^-	E1	DCO=0.87 *15*. Other Iγ=3.8 *1*.
4156.37	14^-	1076.5 *1*	8.1 *3*	3079.87	12^-	E2	DCO(ΔJ=2,Q gated)=1.01 *12* for doublet. Other Iγ=6.3 *2*.
4228.81	15^+	147.4 *1*	0.5 *1*	4081.53	$14^{(+)}$	M1+E2	Other Iγ=0.4 *1*.
		285.4 *1*	26.5 *8*	3943.23	14^+	M1+E2	DCO=0.85 *3*. Other Iγ=18.5 *6*.
4263.83	$14^{(-)}$	268.0 *1*	3.9 *1*	3995.47	$13^{(-)}$	M1+E2	E$_\gamma$: Least-squares fit gives 268.38 9. DCO=0.68 *11*. Other Iγ=2.8 *1*.
		1425.6 *2*	1.0 *1*	2837.80	13^-	M1+E2	Other Iγ=0.4 *1*.
4322.88	(15^-)	1130.9 *2*	1.0 *1*	3191.97	14^-	M1+E2	
4370.44	$15^{(+)}$	289.0 *1*	9.3 *3*	4081.53	$14^{(+)}$	M1+E2	DCO=0.92 *5*. Other Iγ=6.5 *2*.
		1178.3 *2*	0.8 *1*	3191.97	14^-	E1	Other Iγ=0.3 *1*.
4528.14	16^-	815.0 *1*	7.0 *2*	3713.07	15^-	M1+E2	DCO=1.3 *3*. Other Iγ=2.8 *1*.
4561.61	$15^{(-)}$	297.3 *1*	4.8 *2*	4263.83	$14^{(-)}$	M1+E2	E$_\gamma$: Least-squares fit gives 295.30 10. DCO=0.63 *10*. Other Iγ=2.8 *1*.
		1370.1 *1*	1.4 *1*	3191.97	14^-	M1+E2	E$_\gamma$: Least-squares fit gives 1369.62 9. Other Iγ=0.4 *1*.
4597.86	16^+	369.0 *1*	24.4 *7*	4228.81	15^+	M1+E2	DCO=0.69 *5*. Other Iγ=13.6 *4*.
4601.97	(16^-)	769.1 *1*	1.5 *1*	3832.87	(14^-)	E2	Other Iγ=1.1 *1*.
4605.90	$15^{(-)}$	977.0 *1*	10.4 *4*	3628.90	$13^{(-)}$	E2	Other Iγ=8.1 *3*.
4802.71	(17^-)	981.7 *1*	1.2 *1*	3821.00	(15^-)	E2	
4802.78	$16^{(+)}$	432.4 *1*	9.7 *3*	4370.44	$15^{(+)}$	M1+E2	DCO=0.75 *21*. Other Iγ=5.7 *2*.
4942.0	(16^-)	1750.0 *3*	0.8 *1*	3191.97	14^-	E2	
4995.41	$16^{(-)}$	433.8 *1*	5.7 *2*	4561.61	$15^{(-)}$	M1+E2	DCO=0.53 *11*. Other Iγ=2.7 *1*.
5045.44	(15^+)	1102.2 *1*	2.4 *1*	3943.23	14^+	M1+E2	
5084.74	(17^+)	486.9 *1*	19.7 *6*	4597.86	16^+	M1+E2	Other Iγ=8.4 *3*.
		855.9 *1*	1.6 *1*	4228.81	15^+	E2	
5180.68	16^-	1024.3 *1*	6.0 *2*	4156.37	14^-	E2	DCO(ΔJ=2,Q gated)=0.96 *12*. Other Iγ=4.6 *2*.
5265.00	17^-	736.8 *1*	2.6 *1*	4528.14	16^-	M1+E2	DCO=0.84 *13*. Other Iγ=1.1 *1*.

Continued on next page (footnotes at end of table)

$^{96}Zr(^{19}F,5n\gamma)$ 2001Ch71 (continued)

$\gamma(^{110}In)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ ‡	E_f	J_f^π	Mult.#	Comments
5265.00	17^-	1552.0 *2*	0.9 *1*	3713.07	15^-	E2	Other Iγ=0.2 *1*.
5283.22	$17^{(+)}$	480.5 *1*	7.0 *2*	4802.78	$16^{(+)}$	M1+E2	Other Iγ=3.2 *1*.
5403.10	(17^-)	1690.2 *2*	0.8 *1*	3713.07	15^-	E2	Other Iγ=0.4 *1*.
5545.71	(17^-)	550.3 *1*	2.2 *1*	4995.41	$16^{(-)}$	M1+E2	Other Iγ=0.9 *1*.
5556.31	$17^{(-)}$	950.4 *1*	9.1 *3*	4605.90	$15^{(-)}$	E2	DCO(ΔJ=2,Q gated)=0.92 *12* for doublet. Other Iγ=7.5 *2*.
5561.51	(17^-)	566.1 *1*	2.3 *1*	4995.41	$16^{(-)}$	M1+E2	Other Iγ=0.7 *1*.
5650.23	(18^+)	366.9 *1*	0.8 *1*	5283.22	$17^{(+)}$	M1+E2	Other Iγ=0.7 *1*.
		565.6 *1*	13.0 *4*	5084.74	(17^+)	M1+E2	Other Iγ=4.0 *1*.
		1052.3 *1*	1.5 *1*	4597.86	16^+	E2	
5687.05	(18^-)	284.0 *1*	1.2 *1*	5403.10	(17^-)	M1+E2	Other Iγ=0.8 *1*.
		422.0 *1*	2.3 *1*	5265.00	17^-	M1+E2	Other Iγ=1.1 *1*.
5824.94	(18^+)	740.2 *1*	1.5 *1*	5084.74	(17^+)	M1+E2	
5833.28	(18^+)	550.2 *1*	2.6 *1*	5283.22	$17^{(+)}$	M1+E2	Other Iγ=0.9 *1*.
		748.4 *1*	1.0 *1*	5084.74	(17^+)	M1+E2	Other Iγ=0.2 *1*.
5839.11	(18^+)	555.9 *1*	2.1 *1*	5283.22	$17^{(+)}$	M1+E2	Other Iγ=0.4 *1*.
		754.3 *2*	0.6 *1*	5084.74	(17^+)	M1+E2	Other Iγ=0.3 *1*.
6061.98	18^-	881.3 *1*	5.3 *2*	5180.68	16^-	E2	DCO=1.6 *4*. DCO(ΔJ=2,Q gated)=0.79 *15*. Other Iγ=3.9 *1*.
6095.25	(19^-)	408.2 *1*	2.1 *1*	5687.05	(18^-)	M1+E2	Other Iγ=0.7 *1*.
6223.17	(19^+)	572.9 *1*	6.2 *2*	5650.23	(18^+)	M1+E2	Other Iγ=2.1 *1*.
		1138.6 *2*	0.9 *1*	5084.74	(17^+)	E2	
6296.83	(19^+)	646.6 *1*	1.9 *1*	5650.23	(18^+)	M1+E2	
6445.41	$19^{(-)}$	889.1 *1*	7.8 *3*	5556.31	$17^{(-)}$	E2	Other Iγ=5.0 *2*.
6707.07	(20^+)	483.9 *1*	3.9 *1*	6223.17	(19^+)	M1+E2	Other Iγ=2.7 *1*.
6991.93	(20^+)	695.1 *1*	1.1 *1*	6296.83	(19^+)	M1+E2	
6999.09	(20^-)	937.1 *1*	4.2 *2*	6061.98	18^-	E2	Other Iγ=2.6 *1*.
7240.4	(19^+)	1590.2 *3*	0.5 *1*	5650.23	(18^+)	M1+E2	
7272.47	(21^+)	565.4 *1*	2.8 *2*	6707.07	(20^+)	M1+E2	Other Iγ=0.6 *1*.
7391.62	$21^{(-)}$	946.2 *1*	6.4 *2*	6445.41	$19^{(-)}$	E2	DCO(ΔJ=2,Q gated)=0.92 *12* for doublet. Other Iγ=3.1 *1*.
7980.68	(22^+)	708.2 *1*	2.1 *1*	7272.47	(21^+)	M1+E2	
8087.7	(22^-)	1088.6 *1*	2.0 *1*	6999.09	(20^-)	E2	Other Iγ=0.7 *1*.
8463.6	(23^-)	1072.0 *1*	4.2 *2*	7391.62	$21^{(-)}$	E2	Other Iγ=1.0 *1*.
8747.6	(23^+)	766.9 *1*	1.0 *1*	7980.68	(22^+)	M1+E2	
9398.1	(24^-)	1310.4 *2*	1.0 *1*	8087.7	(22^-)	E2	
9698.5	(25^-)	1234.9 *1*	2.5 *1*	8463.6	(23^-)	E2	Other Iγ=0.3 *1*.
11117.6	(27^-)	1419.1 *1*	1.2 *1*	9698.5	(25^-)	E2	
12744.5	(29^-)	1626.8 *6*	0.2 *1*	11117.6	(27^-)	E2	

† From 2001Ch71, unless otherwise stated.

‡ From the thin target experiment. Iγ′s measured in the thick target experiment are quoted as "Other Iγ" in the comment line.

From DCO ratios measured in thick target experiment in 2001Ch01, unless otherwise stated. DCO ratios correspond to gates on ΔI=1 dipole transitions, unless otherwise stated. The authors provided expected DCO ratios for their set-up (see Table II for the expected DCO ratios).

@ Placement of transition in the level scheme is uncertain.

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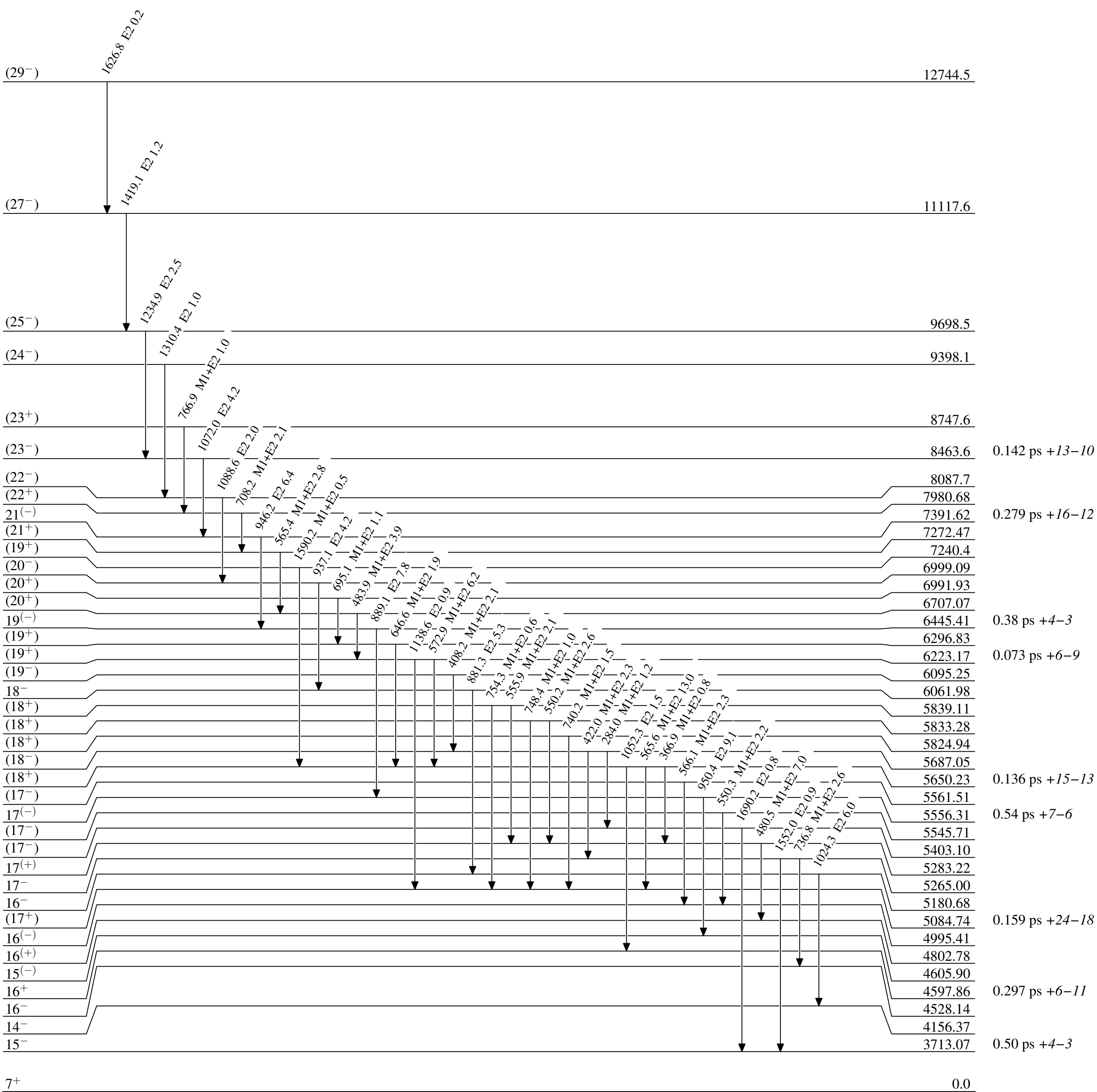
Level Scheme

Intensities: Relative photon branching from each level



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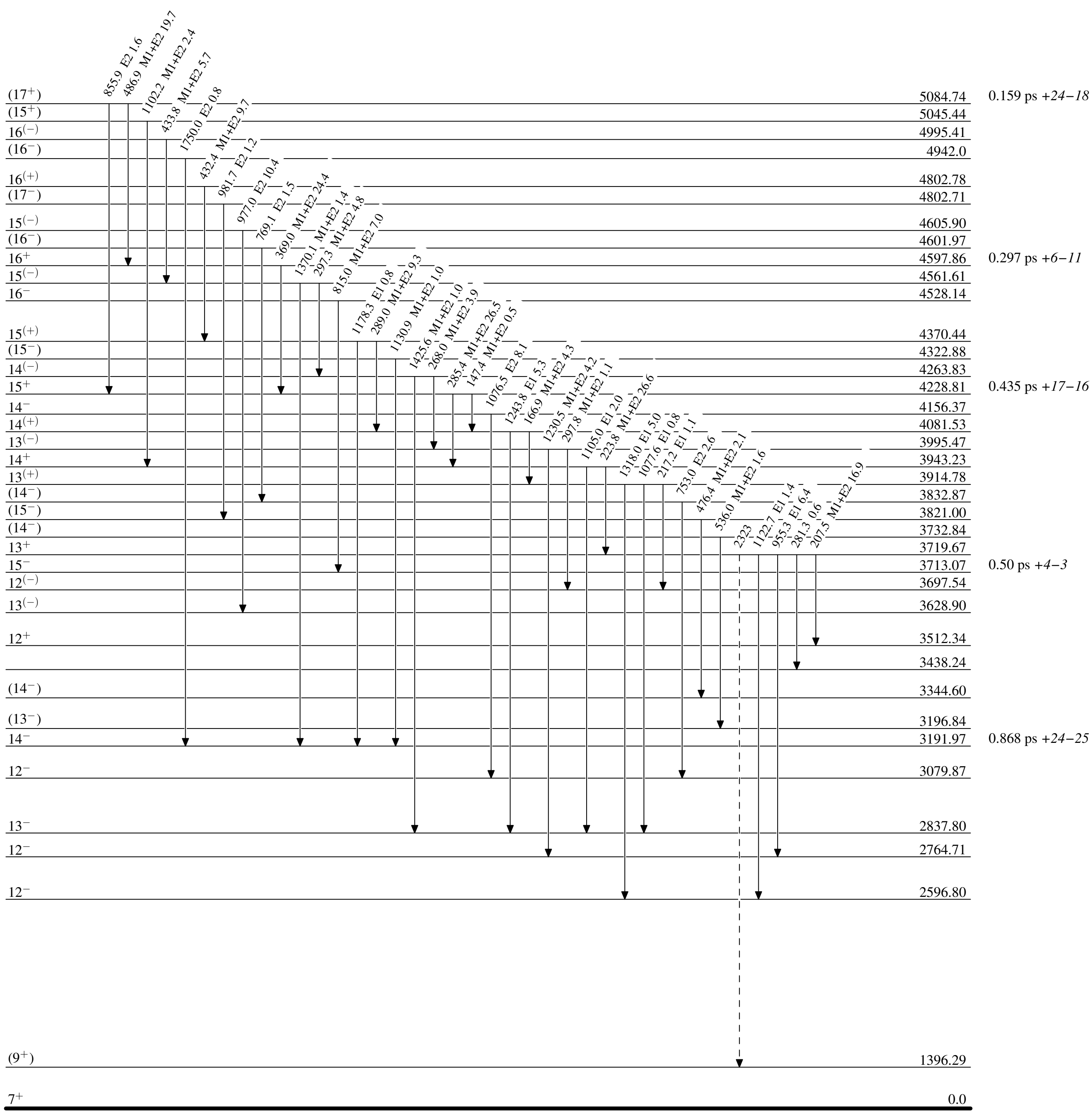
Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{110}_{49}In_{61}$

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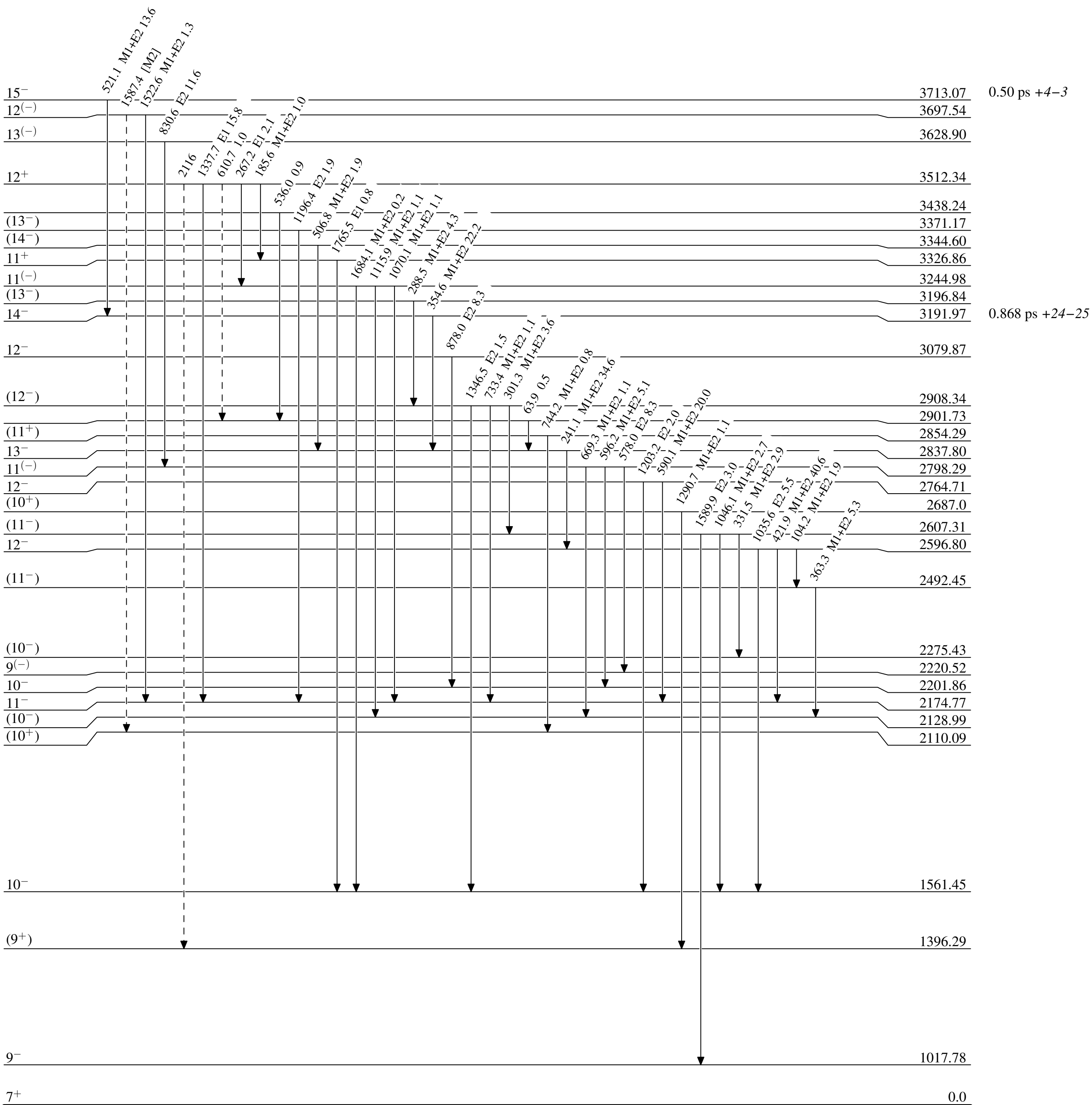
Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{110}_{49}In_{61}$

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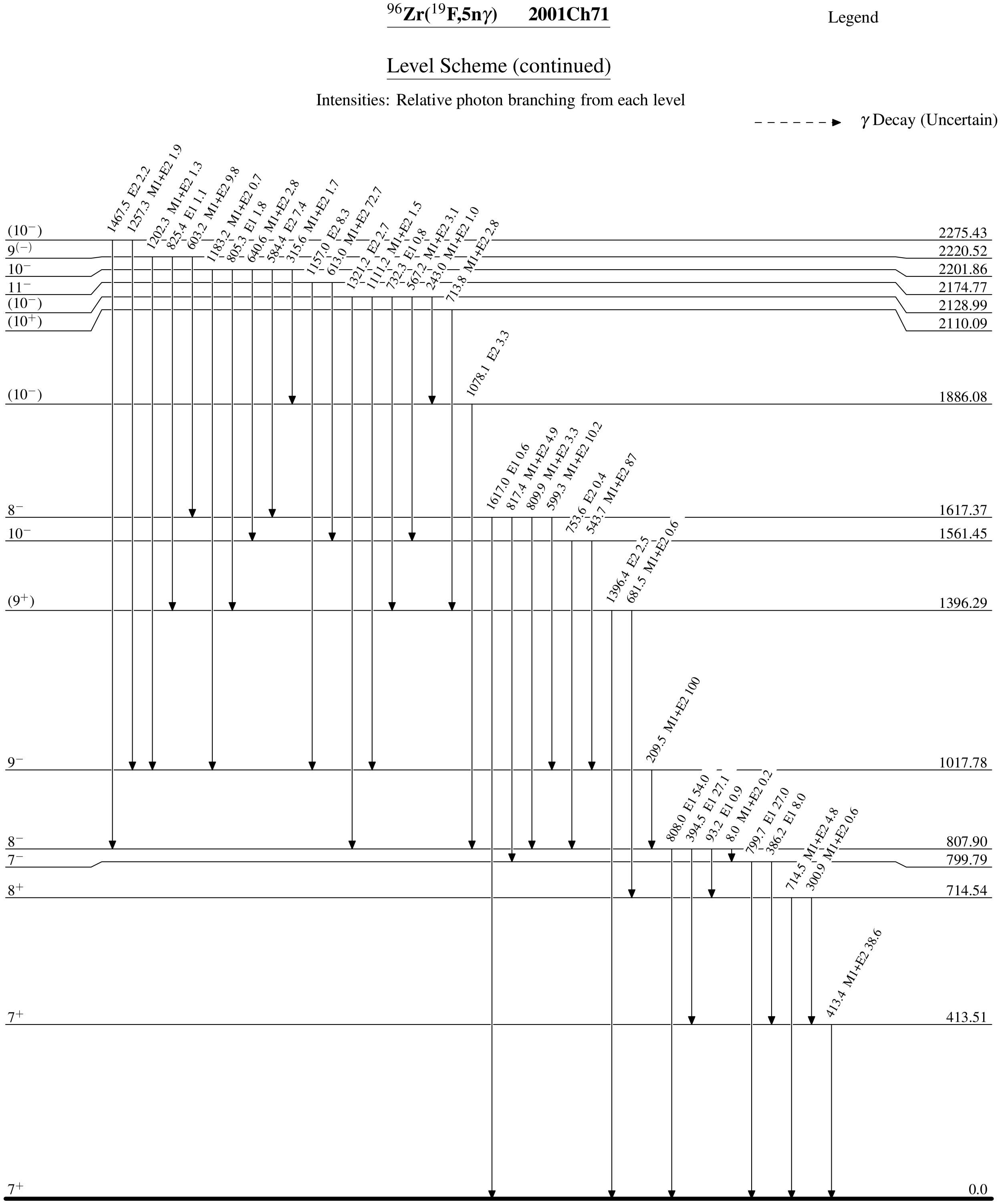
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{110}_{49}In_{61}$

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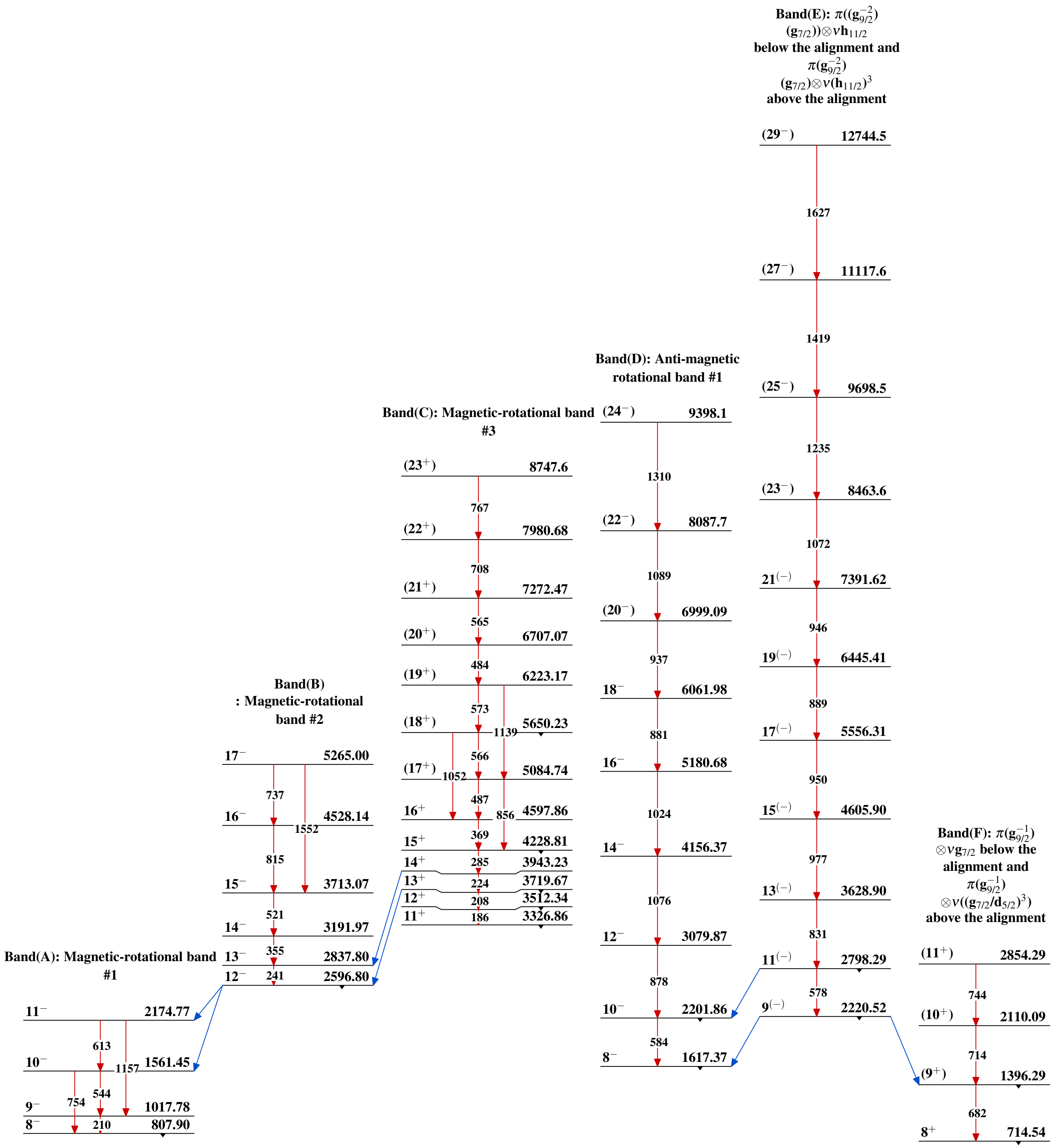

$^{110}_{49}In_{61}$

$^{96}Zr(^{19}F,5n\gamma)$ 2001Ch71 (continued)