^{163}Dy(γ,γ') 2003No02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich, Balraj Singh	NDS 111, 1211 (2010)	12-Apr-2010

Additional information 1.

2003No02: bremsstrahlung spectrum, end-point energy=4.05 MeV. 2530-mg target, 89.90% enriched, sandwiched between two Al discs. Scattered radiation detected using three high-resolution Ge detectors, one of which was surrounded by a BGO anti-Compton shield. Measured Eγ, $\gamma\gamma$, $\gamma(\theta)$ At 90, 127 and 150°. Report level energies, total scattering cross sections, ratios of reduced γ intensities, g$\Gamma_{\gamma 0}$. Deduce bmi↑. Discuss the magnetic-dipole scissors mode and its fragmentation.

For earlier studies, see, e.g., 1995Ma69, 1993Ba24.

^{163}Dy Levels

Several levels are shown As deexciting via only one γ, which May arise from either elastic scattering or inelastic scattering. The evaluators have shown these levels As questionable and have not included them In the Adopted Levels.

E(level)	J$^\pi$[&]	g$_J\Gamma_{\gamma 0}$[‡#]	Integrated scattering cross section.[@]	Comments
0.0	5/2$^-$[a]			
73.4[b]	7/2$^-$[a]			
167.3[b]	9/2$^-$[a]			
1465 *1*	5/2,7/2	10.3 *9*	14.5 *16*	B(M1)↑=0.28 *3*
1531 *1*	7/2	3.6 *3*	2.7 *3*	B(M1)↑=0.086 *8*
1542 *1*		1.00 *17*	1.6 *3*	B(M1)↑=0.024 *4*
1634 *1*	5/2,7/2	4.3 *4*	4.7 *5*	B(M1)↑=0.086 *7* J$^\pi$: L=3 In (d,t) establishes π=−.
1684 *1*		0.77 *17*	1.04 *22*	B(M1)↑=0.014 *3*
1705 *1*		0.99 *18*	1.31 *24*	B(M1)↑=0.017 *3* J$^\pi$: L=3 In (d,t) establishes J$^\pi$=5/2$^-$,7/2$^-$.
1730 *1*		1.24 *19*	1.59 *25*	B(M1)↑=0.021 *3* J$^\pi$: if this is the same level As the 1734 level In (d,p), then J$^\pi$=3/2$^+$,5/2$^+$ and the 1730 γ is E1, not M1 As assumed by 2003No02.
1775 *1*		2.6 *3*	3.2 *4*	B(M1)↑=0.041 *4*
1797 *1*		2.2 *3*	2.6 *3*	B(M1)↑=0.033 *4* J$^\pi$: if this is the same As the 1795 level In (d,p), J$^\pi$=3/2$^-$.
1831 *1*		0.88 *19*	1.00 *21*	B(M1)↑=0.012 *3*
1840 *1*		0.91 *19*	1.03 *21*	B(M1)↑=0.013 *3* J$^\pi$: if this is the same As the 1843 level In (d,t), J$^\pi$=(5/2$^-$,7/2$^-$).
1902 *1*		1.28 *21*	1.36 *22*	B(M1)↑=0.016 *3*
1942 *1*	5/2	13.5 *10*	9.9 *9*	B(M1)↑=0.160 *12* J$^\pi$: from (t,p), J$^\pi$=5/2$^+$. This implies that the deexciting γ's are E1, not M1 As assumed by 2003No02.
1981 *1*		1.05 *22*	1.03 *21*	B(M1)↑=0.012 *2*
1984 *1*		0.77 *21*	0.75 *20*	B(M1)↑=0.009 *2* J$^\pi$: if this is the same As the 1986 level In (d,t), then J$^\pi$=3/2$^+$,5/2$^+$ and the deexciting γ is E1, not M1 As assumed by 2003No02.
2009 *1*		1.36 *23*	1.29 *22*	B(M1)↑=0.014 *3*
2054 *1*		1.13 *21*	1.03 *19*	B(M1)↑=0.011 *2*
2080 *1*		1.32 *22*	1.17 *20*	B(M1)↑=0.013 *2*

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^{163}Dy(γ,γ') 2003No02 (continued)

^{163}Dy Levels (continued)

E(level)	J$^{\pi}$[&]	$g_J\Gamma_{\gamma 0}$[‡#]	Integrated scattering cross section.[@]	Comments
2091 *1*		1.13 *21*	0.99 *19*	B(M1)↑=0.011 *2*
2099 *1*		0.96 *23*	0.84 *20*	B(M1)↑=0.009 *2*
2103 *1*	7/2	2.5 *4*	0.96 *23*	B(M1)↑=0.023 *4*
2112 *1*		0.81 *21*	0.70 *18*	B(M1)↑=0.008 *2*
2140?[†] *1*		5.5 *5*	4.6 *5*	B(M1)↑=0.048 *5*
2158 *1*		0.98 *21*	0.81 *17*	B(M1)↑=0.008 *2*
2165 *1*		1.45 *25*	1.19 *21*	B(M1)↑=0.012 *2*
2169 *1*		1.5 *3*	1.22 *21*	B(M1)↑=0.013 *2*
2180 *1*	7/2	27.0 *19*	15.2 *14*	B(M1)↑=0.225 *16*
2191 *1*	5/2,7/2	3.8 *4*	0.94 *18*	B(M1)↑=0.031 *3* J$^{\pi}$: from L=4 In (t,p), π=+, suggesting that the deexciting γ's are E1, not M1 As suggested by 2003No02.
2213?[†] *1*	5/2,7/2	22.8 *23*	13.0 *18*	B(M1)↑=0.182 *19*
2224 *1*		1.26 *23*	0.98 *18*	B(M1)↑=0.010 *2*
2237 *1*		1.2 *3*	0.93 *20*	B(M1)↑=0.009 *2*
2242 *1*	7/2	4.4 *4*	1.61 *21*	B(M1)↑=0.034 *3*
2255 *1*		1.4 *3*	1.07 *22*	B(M1)↑=0.011 *2*
2272 *1*		1.31 *24*	0.98 *18*	B(M1)↑=0.010 *2*
2278 *1*		2.1 *3*	1.54 *20*	B(M1)↑=0.015 *2*
2287 *1*		2.0 *3*	1.44 *20*	B(M1)↑=0.014 *2* $g_J\Gamma_{\gamma 0}$: value computed not taking into account the 2213 G. Including this γ, 2003No02 compute 20.8 meV *26*. B(M1)↑: value computed not taking into account the 2213 G. Including this γ, 2003No02 compute 0.151 *19*.
2329 *1*		1.7 *4*	1.2 *3*	B(M1)↑=0.011 *3*
2344 *1*		1.4 *3*	0.96 *19*	B(M1)↑=0.009 *2*
2353 *1*		1.0 *3*	0.72 *21*	B(M1)↑=0.007 *2*
2356 *1*		0.9 *3*	0.63 *21*	B(M1)↑=0.006 *2*
2367 *1*		1.3 *3*	0.90 *22*	B(M1)↑=0.009 *2*
2369 *1*		1.5 *4*	1.0 *3*	B(M1)↑=0.010 *3*
2380 *1*		3.0 *3*	2.00 *23*	B(M1)↑=0.019 *2* J$^{\pi}$: if this is the same As the 2378 level In (d,t), J$^{\pi}$=5/2$^-$,7/2$^-$.
2387 *1*		2.3 *3*	1.52 *20*	B(M1)↑=0.014 *2* J$^{\pi}$: if this is the same As the 2387 level In (d,t), J$^{\pi}$=3/2$^+$,5/2$^+$, which would imply that the deexciting γ's are E1, not M1 As assumed by 2003No02.
2427 *1*		9.4 *9*	6.1 *6*	B(M1)↑=0.057 *5*
2431 *1*		7.5 *7*	4.9 *5*	B(M1)↑=0.045 *4*
2442?[†] *1*		1.4 *3*	0.88 *17*	B(M1)↑=0.008 *2*
2449 *1*		1.5 *3*	0.95 *16*	B(M1)↑=0.009 *2*
2473 *1*		9.8 *9*	6.1 *6*	B(M1)↑=0.056 *5*
2483 *1*		1.8 *3*	1.10 *17*	B(M1)↑=0.010 *2*
2493 *1*	5/2	8.0 *7*	1.28 *18*	B(M1)↑=0.044 *4*
2503 *1*		2.1 *3*	1.29 *18*	B(M1)↑=0.012 *2*
2514?[†] *1*	7/2	7.7 *7*	3.8 *4*	B(M1)↑=0.042 *4*
2527 *1*		1.9 *3*	1.14 *18*	B(M1)↑=0.010 *2*
2542 *1*		14.7 *14*	8.7 *9*	B(M1)↑=0.077 *8*
2559 *1*		6.1 *6*	3.6 *4*	B(M1)↑=0.032 *3*
2567 *1*		9.3 *9*	5.4 *5*	B(M1)↑=0.047 *5*
2570 *1*		2.7 *4*	1.55 *23*	B(M1)↑=0.014 *2*
2583 *1*	5/2,7/2	6.0 *6*	0.85 *20*	B(M1)↑=0.030 *3*

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^{163}Dy(γ,γ′) 2003No02 (continued)

^{163}Dy Levels (continued)

E(level)	Jπ[&]	$g_J\Gamma_{\gamma 0}$[‡#]	Integrated scattering cross section.[@]	Comments
2587 *1*	7/2	32.4 *23*	14.6 *13*	B(M1)↑=0.162 *12* $g_J\Gamma_{\gamma 0}$: value computed using the listed γ-decay modes. Neglecting the 2514 γ, 2003No02 compute 25.4 meV *22*. B(M1)↑: neglecting the 2514 γ, 2003No02 compute B(M1)=0.127 *11*.
2627 *1*		6.6 *6*	3.7 *4*	B(M1)↑=0.032 *3*
2658 *1*		4.2 *4*	2.26 *24*	B(M1)↑=0.019 *2*
2666 *1*		5.9 *6*	3.2 *3*	B(M1)↑=0.027 *3*
2669 *1*		3.2 *5*	1.7 *3*	B(M1)↑=0.014 *2*
2677?[†] *1*		1.9 *3*	1.00 *16*	B(M1)↑=0.008 *1*
2698 *1*		1.3 *3*	0.71 *16*	B(M1)↑=0.006 *1*
2707 *1*	5/2,7/2	7.4 *6*	2.8 *3*	B(M1)↑=0.032 *3*
2715 *1*		2.5 *4*	1.29 *20*	B(M1)↑=0.011 *2*
2724 *1*		1.2 *4*	0.61 *20*	B(M1)↑=0.005 *2*
2752 *1*		1.9 *3*	0.94 *15*	B(M1)↑=0.008 *1*
2765 *1*		1.4 *3*	0.70 *14*	B(M1)↑=0.006 *1*
2774 *1*		2.2 *4*	1.12 *22*	B(M1)↑=0.009 *2*
2790 *1*		4.1 *5*	2.0 *3*	B(M1)↑=0.016 *2*
2794 *1*	7/2	12.3 *10*	0.73 *16*	B(M1)↑=0.049 *4*
2808 *1*		3.1 *4*	1.52 *20*	B(M1)↑=0.012 *2*
2812 *1*	7/2	15.3 *12*	1.94 *22*	B(M1)↑=0.059 *5*
2819 *1*	7/2	8.3 *6*	1.63 *19*	B(M1)↑=0.032 *2*
2830 *1*		1.3 *3*	0.64 *13*	B(M1)↑=0.005 *1*
2844?[†] *1*	7/2	4.3 *6*	0.86 *20*	B(M1)↑=0.016 *2*
2847 *1*		2.6 *5*	1.22 *24*	B(M1)↑=0.010 *2*
2853 *1*		2.2 *4*	1.04 *18*	B(M1)↑=0.008 *1*
2859 *1*		1.7 *5*	0.82 *12*	B(M1)↑=0.006 *2*
2873?[†] *1*		4.6 *4*	2.13 *20*	B(M1)↑=0.017 *2*
2894 *1*		4.7 *5*	2.13 *21*	B(M1)↑=0.017 *2*
2911 *1*		1.6 *3*	0.71 *14*	B(M1)↑=0.006 *1*
2918 *1*		9.2 *7*	4.2 *3*	B(M1)↑=0.032 *3* $g_J\Gamma_{\gamma 0}$: value computed not taking into account the 2844 G. Including this γ, 2003No02 compute 11.3 meV *9*. B(M1)↑: value computed not taking into account the 2844 G. Including this γ, 2003No02 compute 0.039 *3*.
2928 *1*		5.5 *6*	2.5 *3*	B(M1)↑=0.019 *2*
2931 *1*		3.0 *5*	1.35 *21*	B(M1)↑=0.010 *2*
2942 *1*		2.4 *4*	1.07 *17*	B(M1)↑=0.008 *1*
2946?[†] *1*	5/2,7/2	6.6 *6*	0.65 *16*	B(M1)↑=0.022 *2*
2954 *1*	7/2	16.2 *12*	3.0 *3*	B(M1)↑=0.054 *4*
2958 *1*	7/2	64 *4*	22.0 *16*	B(M1)↑=0.212 *13*
2963 *1*		16.0 *12*	7.0 *5*	B(M1)↑=0.053 *4*
2968 *1*		9.5 *8*	4.2 *3*	B(M1)↑=0.032 *3*
2976 *1*		10.0 *9*	4.7 *4*	B(M1)↑=0.036 *3*
2988 *1*		2.0 *3*	0.86 *14*	B(M1)↑=0.007 *1*
2997 *1*		3.5 *4*	1.50 *17*	B(M1)↑=0.011 *1*
3020 *1*	5/2,7/2	7.8 *7*	2.61 *23*	B(M1)↑=0.025 *2* $g_J\Gamma_{\gamma 0}$: value computed not taking into account the 2946 G. Including this γ, 2003No02 compute 6.2 meV *5*. B(M1)↑: value computed not taking into account the 2946 G. Including this γ, 2003No02 compute 0.020 *2*.

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^{163}Dy(γ,γ') 2003No02 (continued)

^{163}Dy Levels (continued)

E(level)	J$^{\pi}$[&]	$g_J\Gamma_{\gamma 0}$[‡#]	Integrated scattering cross section.[@]	Comments
3026 *1*		17.0 *15*	7.1 *7*	B(M1)↑=0.053 *5*
3034 *1*		17.6 *17*	7.3 *7*	B(M1)↑=0.054 *5*
3037 *1*		19.4 *19*	8.1 *8*	B(M1)↑=0.060 *6*
3045?[†] *1*		29.1 *21*	12.1 *9*	B(M1)↑=0.089 *6*
3052 *1*		4.6 *4*	1.89 *18*	B(M1)↑=0.014 *1*
3057 *1*		12.9 *10*	5.3 *4*	B(M1)↑=0.039 *3*
3067 *1*		7.3 *6*	2.97 *24*	B(M1)↑=0.022 *2*
3075 *1*	5/2,7/2	5.4 *7*	0.76 *12*	B(M1)↑=0.016 *2*
3087 *1*		3.1 *5*	1.25 *19*	B(M1)↑=0.009 *1*
3099 *1*		17.1 *13*	6.8 *5*	B(M1)↑=0.050 *4*
3107 *1*		11.6 *9*	4.6 *4*	B(M1)↑=0.034 *3*
3125 *1*		1.3 *3*	0.50 *11*	B(M1)↑=0.004 *1*
3137 *1*		1.7 *4*	0.67 *15*	B(M1)↑=0.005 *1*
3142 *1*		5.3 *5*	2.07 *19*	B(M1)↑=0.015 *1*
3173 *1*		5.0 *5*	1.92 *21*	B(M1)↑=0.014 *2*
3182 *1*	7/2	35.8 *25*	0.66 *16*	B(M1)↑=0.096 *7*
3186 *1*		9.7 *9*	3.7 *3*	B(M1)↑=0.026 *2*
3206 *1*		1.4 *3*	0.53 *12*	B(M1)↑=0.004 *1*
3212?[†] *1*	7/2	40 *3*	0.85 *12*	B(M1)↑=0.105 *7*
3264 *1*		1.4 *3*	0.49 *11*	B(M1)↑=0.003 *1*
3282 *1*		1.9 *5*	0.69 *16*	B(M1)↑=0.005 *1*
3286 *1*	5/2,7/2	4.2 *7*	0.56 *20*	B(M1)↑=0.010 *2* $g_J\Gamma_{\gamma 0}$: value computed not taking into account the 3212 G. Including this γ, 2003No02 compute 1.6 meV *6*. B(M1)↑: value computed not taking into account the 3212 G. Including this γ, 2003No02 compute 0.004 *1*.
3301 *1*		1.2 *3*	0.41 *11*	B(M1)↑=0.003 *1*
3351 *1*	5/2,7/2	4.7 *5*	1.09 *15*	B(M1)↑=0.011 *1*
3362 *1*	5/2	11.5 *9*	2.55 *25*	B(M1)↑=0.026 *2*
3390 *1*		1.7 *3*	0.58 *11*	B(M1)↑=0.004 *1*
3404 *1*		1.4 *3*	0.46 *11*	B(M1)↑=0.003 *1*
3416 *1*		3.9 *5*	1.30 *15*	B(M1)↑=0.009 *1*
3423 *1*		1.7 *4*	0.54 *11*	B(M1)↑=0.004 *1*
3434 *1*		2.0 *5*	0.64 *15*	B(M1)↑=0.004 *1*
3449?[†] *1*		3.8 *5*	1.22 *15*	B(M1)↑=0.008 *1*
3459 *1*		2.5 *4*	0.79 *14*	B(M1)↑=0.005 *1*
3471 *1*	7/2	3.7 *5*	0.55 *11*	B(M1)↑=0.008 *1*
3484 *1*	7/2	5.4 *7*	0.55 *12*	B(M1)↑=0.011 *1*
3495 *1*		2.6 *5*	0.82 *15*	B(M1)↑=0.005 *1*
3500 *1*		2.1 *5*	0.66 *14*	B(M1)↑=0.004 *1*
3508 *1*		3.1 *10*	1.0 *3*	B(M1)↑=0.006 *2*
3520 *1*		2.0 *4*	0.62 *12*	B(M1)↑=0.004 *1*
3530?[†] *1*		1.8 *5*	0.56 *14*	B(M1)↑=0.004 *1*
3537 *1*		2.2 *5*	0.67 *14*	B(M1)↑=0.004 *1*
3565 *1*	7/2	4.2 *6*	0.55 *13*	B(M1)↑=0.008 *1*
3579 *1*	7/2	4.9 *14*	0.72 *23*	B(M1)↑=0.009 *3* $g_J\Gamma_{\gamma 0}$: value computed using the listed γ-decay modes. Neglecting the 3506 γ, 2003No02 compute 2.4 meV *8*. B(M1)↑: neglecting the 3506 γ, 2003No02 compute B(M1)=0.005 .
3596 *1*		1.8 *5*	0.55 *14*	B(M1)↑=0.003 *1*
3604?[†] *1*	5/2,7/2	6.8 *9*	1.38 *20*	B(M1)↑=0.013 *2*

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^{163}Dy(γ,γ′) 2003No02 (continued)

^{163}Dy Levels (continued)

E(level)	Jπ[&]	$g_J\Gamma_{\gamma 0}$[‡#]	Integrated scattering cross section.[@]	Comments
3610?[†] *1*		2.8 *6*	0.82 *16*	B(M1)↑=0.005 *1*
3614 *1*	5/2,7/2	4.6 *10*	0.56 *22*	B(M1)↑=0.008 *2*
3617?[†] *1*	7/2	8.5 *10*	0.91 *22*	B(M1)↑=0.015 *2*
3638 *1*	7/2	4.1 *7*	0.47 *12*	B(M1)↑=0.007 *1* $g_J\Gamma_{\gamma 0}$: value computed not taking into account the 3565 G. Including this γ, 2003No02 compute 6.0 meV *8*. If this level decays through the 3471 γ and 3638 γ only, 3.8 meV *7* is computed. If IT decays through the 3638 γ only, 1.6 meV *4* is computed. B(M1)↑: value computed not taking into account the 3565 G. Including this γ, 2003No02 compute B(M1)=0.011 *2*. If this level decays through the 3471 γ and 3638 γ only, 0.007 *1* is computed. If IT decays by the 3638 γ only, 0.003 *1* is computed.
3649 *1*	5/2,7/2	8.7 *11*	0.62 *13*	B(M1)↑=0.016 *2*
3673 *1*		2.8 *6*	0.80 *17*	B(M1)↑=0.005 *1* $g_J\Gamma_{\gamma 0}$: value computed not taking into account the 3506 G. Including this γ, 2003No02 compute 5.9 meV *16*. B(M1)↑: value computed not taking into account the 3506 G. Including this γ, 2003No02 compute 0.010 *3*.
3678 *1*		6.9 *9*	1.96 *25*	B(M1)↑=0.012 *2*
3682 *1*		4.6 *9*	1.29 *24*	B(M1)↑=0.008 *2*
3685 *1*		2.5 *8*	0.71 *23*	B(M1)↑=0.004 *1*
3690 *1*	5/2,7/2	14.2 *14*	3.0 *3*	B(M1)↑=0.024 *2* $g_J\Gamma_{\gamma 0}$: value computed using the listed γ-decay modes. Neglecting the 3617 γ, 2003No02 compute 10.5 meV *11*. B(M1)↑: neglecting the 3617 γ, 2003No02 compute B(M1)=0.018 *2*.
3732 *1*		2.7 *5*	0.75 *14*	B(M1)↑=0.005 *1* $g_J\Gamma_{\gamma 0}$: value computed not taking into account the 3565 G. Including this γ, 2003No02 compute 5.5 meV *8*. B(M1)↑: value computed not taking into account the 3565 G. Including this γ, 2003No02 compute 0.009 *1*.
3748 *1*		2.8 *6*	0.77 *17*	B(M1)↑=0.005 *1*
3753 *1*		7.1 *10*	1.9 *3*	B(M1)↑=0.012 *2*
3771 *1*	7/2	11.6 *13*	1.16 *20*	B(M1)↑=0.019 *2* $g_J\Gamma_{\gamma 0}$: value computed using the listed γ-decay modes. Neglecting the 3604 γ, 2003No02 compute 4.3 meV *7*. B(M1)↑: neglecting the 3604 γ, 2003No02 compute B(M1)=0.007 *1*.
3776?[†] *1*	7/2	7.4 *11*	0.84 *18*	B(M1)↑=0.012 *2*
3791 *1*	7/2	9.9 *11*	0.83 *18*	B(M1)↑=0.016 *2*
3846 *1*		3.5 *7*	0.90 *18*	B(M1)↑=0.005 *1*
3861 *1*		3.4 *11*	0.9 *3*	B(M1)↑=0.005 *2*
3866 *1*		4.2 *10*	1.1 *3*	B(M1)↑=0.006 *2*
3881 *1*	5/2,7/2	8.2 *14*	0.73 *24*	B(M1)↑=0.012 *2*

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^{163}Dy(γ,γ′) 2003No02 (continued)

^{163}Dy Levels (continued)

E(level)	J$^{\pi}$[&]	$g_J\Gamma_{\gamma 0}$[‡#]	Integrated scattering cross section.[@]	Comments
3895 *1*		3.6 *7*	0.90 *19*	B(M1)↑=0.005 *1*
3924 *1*	7/2	9.2 *17*	0.86 *22*	B(M1)↑=0.013 *2*
3929 *1*		6.2 *10*	1.5 *3*	B(M1)↑=0.009 *2*
3936 *1*		3.5 *9*	0.86 *22*	B(M1)↑=0.005 *1*
3943 *1*		4.2 *9*	1.04 *23*	B(M1)↑=0.006 *1* $g_J\Gamma_{\gamma 0}$: value computed not taking into account the 3776 G. Including this γ, 2003No02 compute 10.6 meV *17*. B(M1)↑: value computed not taking into account the 3776 G. Including this γ, 2003No02 compute 0.015 *2*.
3950 *1*		4.3 *12*	1.1 *3*	B(M1)↑=0.006 *2*
3962 *1*	7/2	14.3 *21*	1.1 *3*	B(M1)↑=0.020 *3*
3991 *1*	7/2	14.6 *24*	1.4 *4*	B(M1)↑=0.020 *3*

† Level established only from the placement of multiply placed γ′s. Level shown As questionable here and is not included In the Adopted Levels.
‡ Values In milli-eV.
# Statistical factor, g_J, is defined As (2J+1)/(2J_0+1), where J is the spin of the excited state and J_0 is the spin of the initial (ground) state, which is 5/2$^-$.
@ Values In eV b.
& From 2003No02 unless noted otherwise. Other than dipole excitation from the 5/2$^-$ g.s., the basis for these assignments is not explicitly given.
[a] From the adopted values.
[b] Nominal value from the Adopted Levels.

γ(^{163}Dy)

Because ^{163}Dy is an odd-mass nuclide with a relatively large spin, γ(θ) and polarization studies do not provide unambiguous spin and parity assignments. 2003No02 assume that the multipolarities of the γ transitions are M1, but this is an assumption only.

E_i(level)	J_i^{π}	E_γ[†‡]	I_γ[@]	E_f	J_f^{π}	E_i(level)	J_i^{π}	E_γ[†‡]	I_γ[@]	E_f	J_f^{π}
1465	5/2,7/2	1392 *1*	27 *4*	73.4	7/2$^-$	1981		1981 *1*	100	0.0	5/2$^-$
		1465 *1*	100	0.0	5/2$^-$	1984		1984 *1*	100	0.0	5/2$^-$
1531	7/2	1364 *1*	117 *21*	167.3	9/2$^-$	2009		2009 *1*	100	0.0	5/2$^-$
		1531 *1*	100	0.0	5/2$^-$	2054		2054 *1*	100	0.0	5/2$^-$
1542		1542 *1*	100	0.0	5/2$^-$	2080		2080 *1*	100	0.0	5/2$^-$
1634	5/2,7/2	1561 *1*	33 *7*	73.4	7/2$^-$	2091		2091 *1*	100	0.0	5/2$^-$
		1634 *1*	100	0.0	5/2$^-$	2099		2099 *1*	100	0.0	5/2$^-$
1684		1684 *1*	100	0.0	5/2$^-$	2103	7/2	1936 *1*	1.3×10^2 *4*	167.3	9/2$^-$
1705		1705 *1*	100	0.0	5/2$^-$			2103 *1*	100	0.0	5/2$^-$
1730		1730 *1*	100	0.0	5/2$^-$	2112		2112 *1*	100	0.0	5/2$^-$
1775		1775 *1*	100	0.0	5/2$^-$	2140?		2140[c#] *1*	100	0.0	5/2$^-$
1797		1797 *1*	100	0.0	5/2$^-$	2158		2158 *1*	100	0.0	5/2$^-$
1831		1831 *1*	100	0.0	5/2$^-$	2165		2165 *1*	100	0.0	5/2$^-$
1840		1840 *1*	100	0.0	5/2$^-$	2169		2169 *1*	100	0.0	5/2$^-$
1902		1902 *1*	100	0.0	5/2$^-$	2180	7/2	2013 *1*	6.3 *16*	167.3	9/2$^-$
1942	5/2	1869 *1*	39 *5*	73.4	7/2$^-$			2107 *1*	37 *6*	73.4	7/2$^-$
		1942 *1*	100	0.0	5/2$^-$			2180 *1*	100	0.0	5/2$^-$

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^{163}Dy(γ,γ′) 2003No02 (continued)

γ(^{163}Dy) (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[@]	E_f	J_f^π
2191	5/2,7/2	2118 *1*	2.3×10^2 *5*	73.4	7/2$^-$
		2191 *1*	100	0.0	5/2$^-$
2213?	5/2,7/2	2140[c] *1*	38 *6*	73.4	7/2$^-$
		2213[c] *1*	100	0.0	5/2$^-$
2224		2224 *1*	100	0.0	5/2$^-$
2237		2237 *1*	100	0.0	5/2$^-$
2242	7/2	2075 *1*	110 *21*	167.3	9/2$^-$
		2242 *1*	100	0.0	5/2$^-$
2255		2255 *1*	100	0.0	5/2$^-$
2272		2272 *1*	100	0.0	5/2$^-$
2278		2278 *1*	100	0.0	5/2$^-$
2287		2213[c] *1*	9.6×10^2 *12*	73.4	7/2$^-$
		2287 *1*	100	0.0	5/2$^-$
2329		2329 *1*	100	0.0	5/2$^-$
2344		2344 *1*	100	0.0	5/2$^-$
2353		2353 *1*	100	0.0	5/2$^-$
2356		2356 *1*	100	0.0	5/2$^-$
2367		2367 *1*	100	0.0	5/2$^-$
2369		2369 *1*	100	0.0	5/2$^-$
2380		2380 *1*	100	0.0	5/2$^-$
2387		2387 *1*	100	0.0	5/2$^-$
2427		2427 *1*	100	0.0	5/2$^-$
2431		2431 *1*	100	0.0	5/2$^-$
2442?		2442[c#] *1*	100	0.0	5/2$^-$
2449		2449 *1*	100	0.0	5/2$^-$
2473		2473 *1*	100	0.0	5/2$^-$
2483		2483 *1*	100	0.0	5/2$^-$
2493	5/2	2420 *1*	2.9×10^2 *5*	73.4	7/2$^-$
		2493 *1*	100	0.0	5/2$^-$
2503		2503 *1*	100	0.0	5/2$^-$
2514?	7/2	2442[c] *1*	25 *5*	73.4	7/2$^-$
		2514[c] *1*	100	0.0	5/2$^-$
2527		2527 *1*	100	0.0	5/2$^-$
2542		2542 *1*	100	0.0	5/2$^-$
2559		2559 *1*	100	0.0	5/2$^-$
2567		2567 *1*	100	0.0	5/2$^-$
2570		2570 *1*	100	0.0	5/2$^-$
2583	5/2,7/2	2510 *1*	3.1×10^2 *8*	73.4	7/2$^-$
		2583 *1*	100	0.0	5/2$^-$
2587	7/2	2514[c] *1*	28 *4*	73.4	7/2$^-$
		2587 *1*	100	0.0	5/2$^-$
2627		2627 *1*	100	0.0	5/2$^-$
2658		2658 *1*	100	0.0	5/2$^-$
2666		2666 *1*	100	0.0	5/2$^-$
2669		2669 *1*	100	0.0	5/2$^-$
2677?		2677[c] *1*	100	0.0	5/2$^-$
2698		2698 *1*	100	0.0	5/2$^-$
2707	5/2,7/2	2634 *1*	41 *7*	73.4	7/2$^-$
		2707 *1*	100	0.0	5/2$^-$
2715		2715 *1*	100	0.0	5/2$^-$
2724		2724 *1*	100	0.0	5/2$^-$
2752		2752 *1*	100	0.0	5/2$^-$
2765		2765 *1*	100	0.0	5/2$^-$
2774		2774 *1*	100	0.0	5/2$^-$
2790		2790 *1*	100	0.0	5/2$^-$
2794	7/2	2721 *1*	7.3×10^2 *17*	73.4	7/2$^-$
		2794 *1*	100	0.0	5/2$^-$
2808		2808 *1*	100	0.0	5/2$^-$
2812	7/2	2645 *1*	107[&] *17*	167.3	9/2$^-$
		2739 *1*	1.8×10^2 *3*	73.4	7/2$^-$
		2812 *1*	100	0.0	5/2$^-$
2819	7/2	2746 *1*	147 *22*	73.4	7/2$^-$
		2819 *1*	100	0.0	5/2$^-$
2830		2830 *1*	100	0.0	5/2$^-$
2844?	7/2	2677[c] *1*	1.4×10^2 *4*	167.3	9/2$^-$
		2844[c] *1*	100	0.0	5/2$^-$
2847		2847 *1*	100	0.0	5/2$^-$
2853		2853 *1*	100	0.0	5/2$^-$
2859		2859 *1*	100	0.0	5/2$^-$
2873?		2873[c#] *1*	100	0.0	5/2$^-$
2894		2894 *1*	100	0.0	5/2$^-$
2911		2911 *1*	100	0.0	5/2$^-$
2918		2844[c] *1*	22 *6*	73.4	7/2$^-$
		2918 *1*	100	0.0	5/2$^-$
2928		2928 *1*	100	0.0	5/2$^-$
2931		2931 *1*	100	0.0	5/2$^-$
2942		2942 *1*	100	0.0	5/2$^-$
2946?	5/2,7/2	2873[c] *1*	35 *9*	73.4	7/2$^-$
		2946[c] *1*	100	0.0	5/2$^-$
2954	7/2	2787 *1*	140 *20*	167.3	9/2$^-$
		2954 *1*	100	0.0	5/2$^-$
2958	7/2	2885 *1*	27 *3*	73.4	7/2$^-$
		2958 *1*	100	0.0	5/2$^-$
2963		2963 *1*	100	0.0	5/2$^-$
2968		2968 *1*	100	0.0	5/2$^-$
2976		2976 *1*	100	0.0	5/2$^-$
2988		2988 *1*	100	0.0	5/2$^-$
2997		2997 *1*	100	0.0	5/2$^-$
3020	5/2,7/2	2946[c] *1*	26 *7*	73.4	7/2$^-$
		3020 *1*	100	0.0	5/2$^-$
3026		3026 *1*	100	0.0	5/2$^-$
3034		3034 *1*	100	0.0	5/2$^-$
3037		3037 *1*	100	0.0	5/2$^-$
3045?		3045[c#] *1*	100	0.0	5/2$^-$
3052		3052 *1*	100	0.0	5/2$^-$
3057		3057 *1*	100	0.0	5/2$^-$
3067		3067 *1*	100	0.0	5/2$^-$
3075	5/2,7/2	3002 *1*	1.9×10^2 *4*	73.4	7/2$^-$
		3075 *1*	100	0.0	5/2$^-$
3087		3087 *1*	100	0.0	5/2$^-$
3099		3099 *1*	100	0.0	5/2$^-$
3107		3107 *1*	100	0.0	5/2$^-$
3125		3125 *1*	100	0.0	5/2$^-$
3137		3137 *1*	100	0.0	5/2$^-$
3142		3142 *1*	100	0.0	5/2$^-$
3173		3173 *1*	100	0.0	5/2$^-$
3182	7/2	3015 *1*	1.9×10^3 *6*	167.3	9/2$^-$
		3182 *1*	100	0.0	5/2$^-$

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^{163}Dy(γ,γ′) 2003No02 (continued)

γ(^{163}Dy) (continued)

E_i(level)	J_i^π	E_γ †‡	I_γ @	E_f	J_f^π
3186		3186 *1*	100	0.0	5/2⁻
3206		3206 *1*	100	0.0	5/2⁻
3212?	7/2	3045[c] *1*	1.7×10³ *3*	167.3	9/2⁻
		3212[c] *1*	100	0.0	5/2⁻
3264		3264 *1*	100	0.0	5/2⁻
3282		3282 *1*	100	0.0	5/2⁻
3286	5/2,7/2	3212[c] *1*	1.6×10² *6*	73.4	7/2⁻
		3286 *1*	100	0.0	5/2⁻
3301		3301 *1*	100	0.0	5/2⁻
3351	5/2,7/2	3278 *1*	49 *12*	73.4	7/2⁻
		3351 *1*	100	0.0	5/2⁻
3362	5/2	3289 *1*	53 *9*	73.4	7/2⁻
		3362 *1*	100	0.0	5/2⁻
3390		3390 *1*	100	0.0	5/2⁻
3404		3404 *1*	100	0.0	5/2⁻
3416		3416 *1*	100	0.0	5/2⁻
3423		3423 *1*	100	0.0	5/2⁻
3434		3434 *1*	100	0.0	5/2⁻
3449?		3449[c#] *1*	100	0.0	5/2⁻
3459		3459 *1*	100	0.0	5/2⁻
3471	7/2	3398 *1*	1.1×10² *3*	73.4	7/2⁻
		3471[c] *1*	100	0.0	5/2⁻
3484	7/2	3317 *1*	1.0×10² *3*	167.3	9/2⁻
		3411 *1*	1.1×10² *3*	73.4	7/2⁻
		3484 *1*	100	0.0	5/2⁻
3495		3495 *1*	100	0.0	5/2⁻
3500		3500 *1*	100	0.0	5/2⁻
3508		3508 *1*	100	0.0	5/2⁻
3520		3520 *1*	100	0.0	5/2⁻
3530?		3530[c#] *1*	100	0.0	5/2⁻
3537		3537 *1*	100	0.0	5/2⁻
3565	7/2	3398 *1*	1.30×10² *4*	167.3	9/2⁻
		3565[d] *1*	100[d]	0.0	5/2⁻
3579	7/2	3506[c] *1*	1.1×10² *6*	73.4	7/2⁻
		3579 *1*	100	0.0	5/2⁻
3596		3596 *1*	100	0.0	5/2⁻
3604?	5/2,7/2	3530[c] *1*	46 *13*	73.4	7/2⁻
		3604[c] *1*	100	0.0	5/2⁻
3610?		3610[c] *1*	100	0.0	5/2⁻
3614	5/2,7/2	3541 *1*	1.4×10² *6*	73.4	7/2⁻
		3614 *1*	100	0.0	5/2⁻
3617?	7/2	3449[c] *1*	1.7×10² *5*	167.3	9/2⁻
		3617[c] *1*	100	0.0	5/2⁻
3638	7/2	3471[c] *1*	1.5×10²[a] *5*	167.3	9/2⁻
		3565[d] *1*	1.3×10²[db] *5*	73.4	7/2⁻
		3638 *1*	100	0.0	5/2⁻
3649	5/2,7/2	3576 *1*	3.1×10² *8*	73.4	7/2⁻
		3649 *1*	100	0.0	5/2⁻
3673		3506[c] *1*	1.1×10² *6*	167.3	9/2⁻
		3673 *1*	100	0.0	5/2⁻
3678		3678	100	0.0	5/2⁻
3682		3682 *1*	100	0.0	5/2⁻
3685		3685 *1*	100	0.0	5/2⁻

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^{163}Dy(γ,γ′) 2003No02 (continued)

γ(^{163}Dy) (continued)

E_i(level)	J_i^π	E_γ[†‡]	I_γ[@]	E_f	J_f^π	E_i(level)	J_i^π	E_γ[†‡]	I_γ[@]	E_f	J_f^π
3690	5/2,7/2	3617[c] *1*	35 *9*	73.4	7/2⁻	3881	5/2,7/2	3808 *1*	1.9×10^2 *7*	73.4	7/2⁻
		3690 *1*	100	0.0	5/2⁻			3881 *1*	100	0.0	5/2⁻
3732		3565[d] *1*	1.0×10^2[d] *3*	167.3	9/2⁻	3895		3895 *1*	100	0.0	5/2⁻
		3732 *1*	100	0.0	5/2⁻	3924	7/2	3757 *1*	1.7×10^2 *6*	167.3	9/2⁻
3748		3748 *1*	100	0.0	5/2⁻			3924 *1*	100	0.0	5/2⁻
3753		3753 *1*	100	0.0	5/2⁻	3929		3929 *1*	100	0.0	5/2⁻
3771	7/2	3604[c] *1*	1.6×10^2 *4*	167.3	9/2⁻	3936		3936 *1*	100	0.0	5/2⁻
		3771 *1*	100	0.0	5/2⁻	3943		3776[c] *1*	1.5×10^2 *5*	167.3	9/2⁻
3776?	7/2	3610[c] *1*	1.4×10^2 *4*	167.3	9/2⁻			3943 *1*	100	0.0	5/2⁻
		3776[c] *1*	100	0.0	5/2⁻	3950		3950 *1*	100	0.0	5/2⁻
3791	7/2	3624 *1*	2.2×10^2 *5*	167.3	9/2⁻	3962	7/2	3795 *1*	2.3×10^2 *7*	167.3	9/2⁻
		3791 *1*	100	0.0	5/2⁻			3962 *1*	100	0.0	5/2⁻
3846		3846 *1*	100	0.0	5/2⁻	3991	7/2	3824	1.5×10^2 *5*	167.3	9/2⁻
3861		3861 *1*	100	0.0	5/2⁻			3991 *1*	100	0.0	5/2⁻
3866		3866 *1*	100	0.0	5/2⁻						

[†] From the difference In the reported level energies. No correction has been made for the effect of nuclear recoil on these values. 2003No02 do not report Eγ values.

[‡] Uncertainty shown As 1 keV, based on a general comment by 2003No02.

[#] 2003No02 indicate that this γ May Be from elastic scattering (a g.s. transition) or from inelastic scattering (a transition to an excited state). Since this is the only γ reported from this level, the evaluators have shown this level As questionable.

[@] Relative γ branching from each level. Computed from the R values (ratios of the reduced transition probabilities) reported by 2003No02. 2003No02 do not report Iγ values for individual γ′s.

[&] Deduced by the evaluators from R=1.28 *20*. 2003No02 report R=1.28 *2*, which uncertainty seems to Be too small.

[a] Value reported by 2003No02 neglecting the contribution from the 3565 G. Including this γ, $I\gamma=1.4\times10^2$ *5* is computed.

[b] Value computed assuming the listed γ branching. If the 3471 γ is not included, the same value is obtained (2003No02).

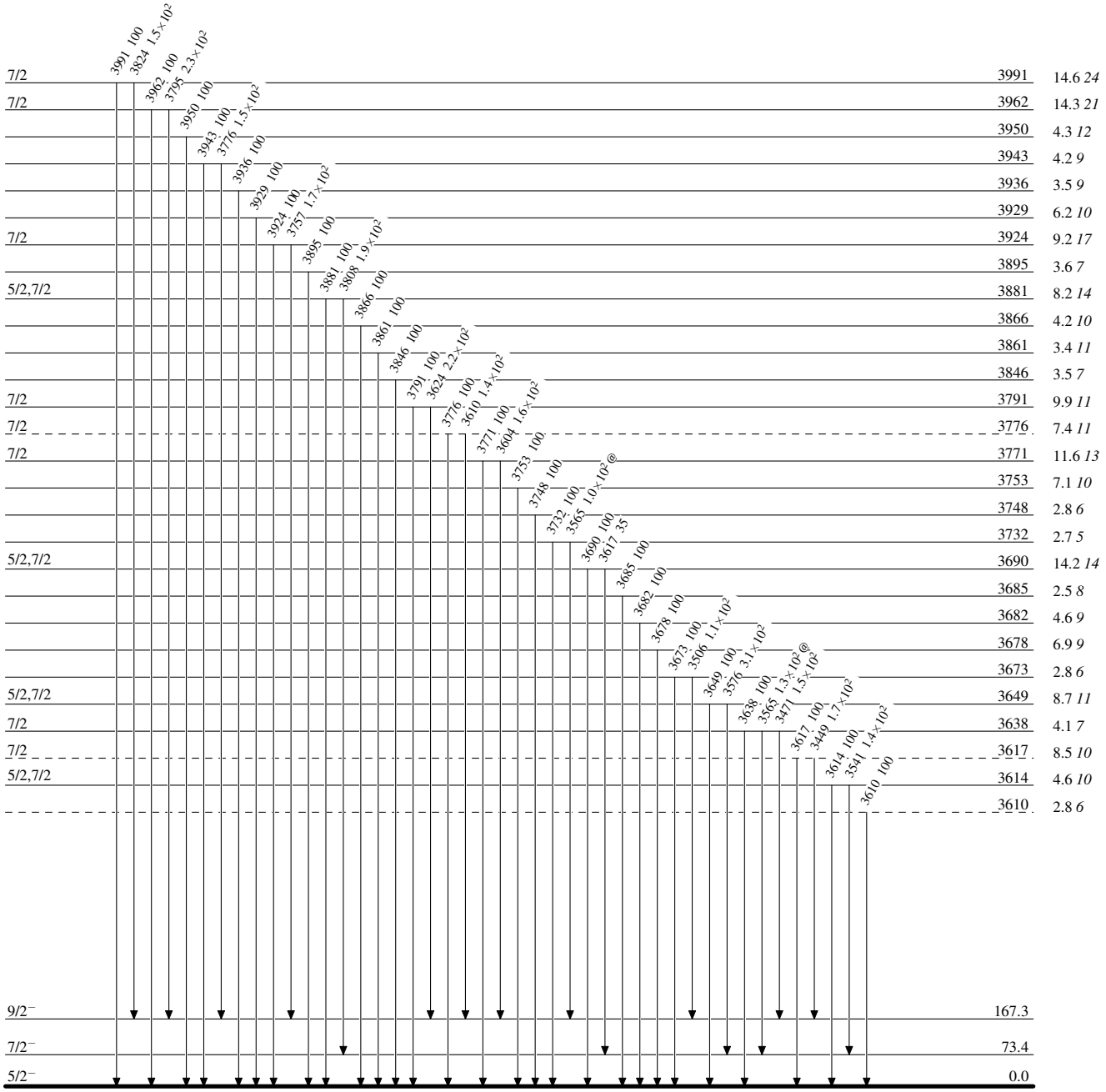
[c] Multiply placed.

[d] Multiply placed with intensity suitably divided.

^{163}Dy(γ,γ′) 2003No02

Level Scheme

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

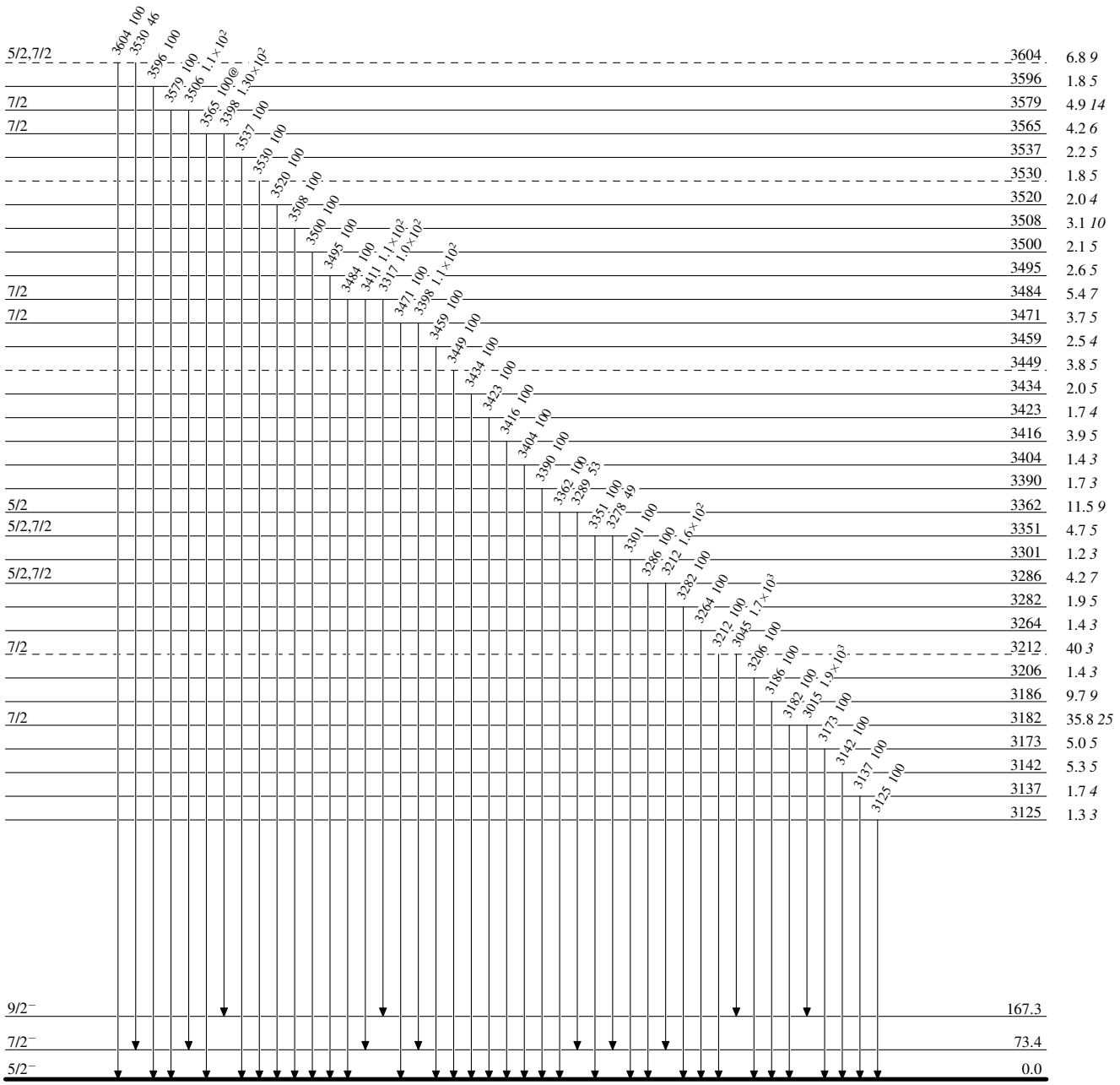


$^{163}_{66}Dy_{97}$

^{163}Dy(γ,γ′) 2003No02

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

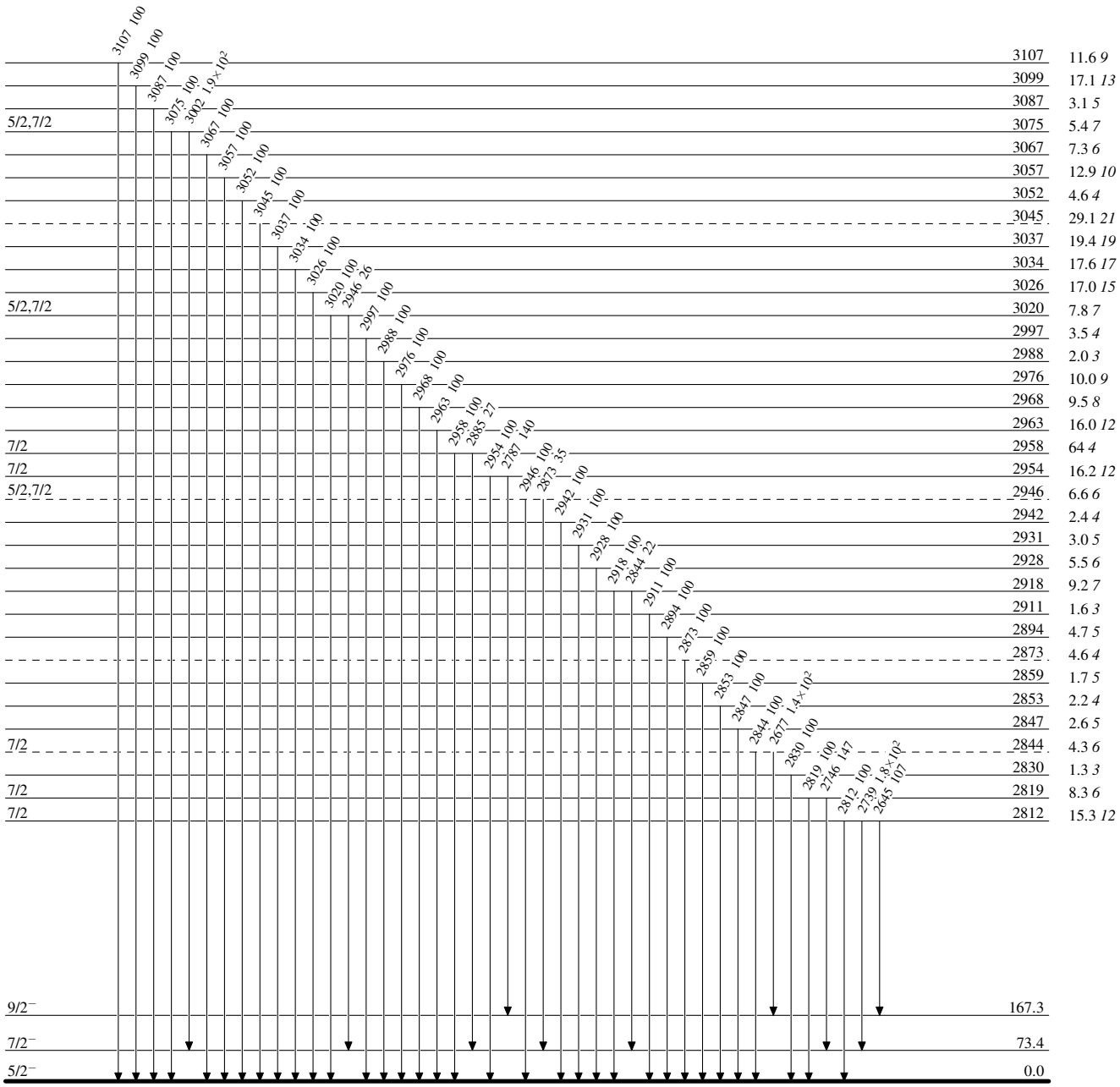


$^{163}_{66}Dy_{97}$

^{163}Dy(γ,γ') 2003No02

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

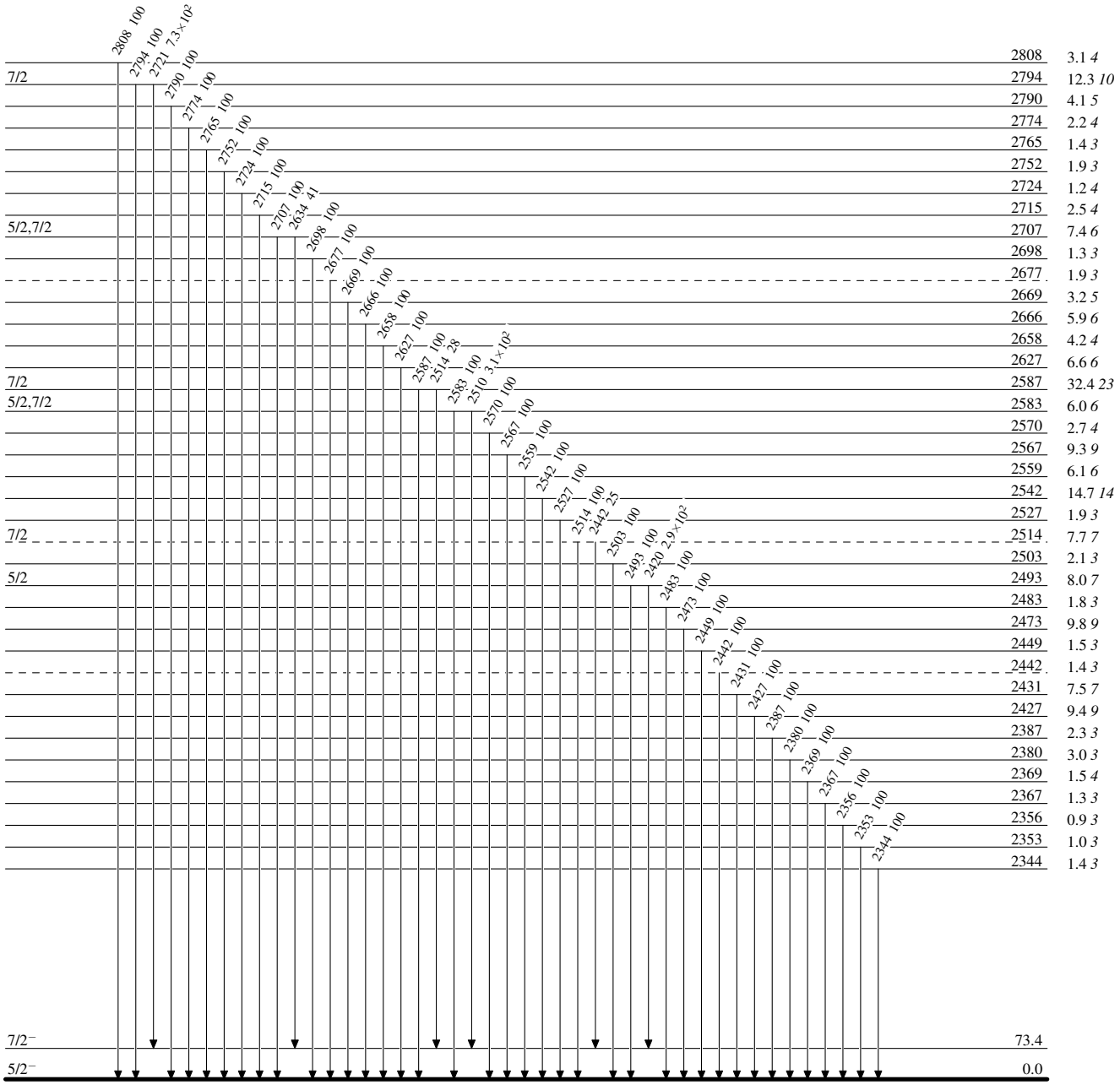


$^{163}_{66}Dy_{97}$

^{163}Dy(γ,γ′) 2003No02

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

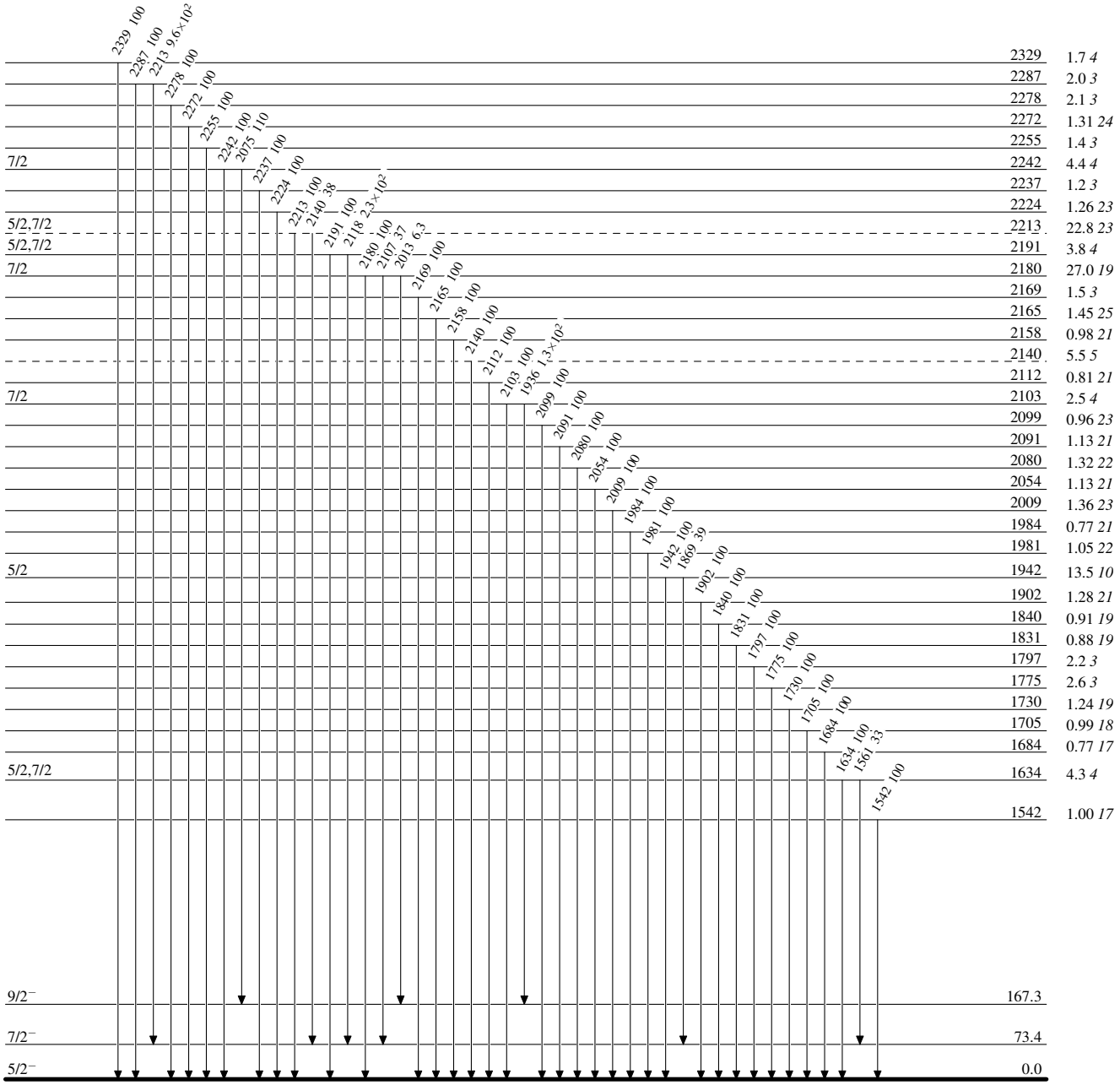


$^{163}_{66}Dy_{97}$

^{163}Dy(γ,γ′) 2003No02

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

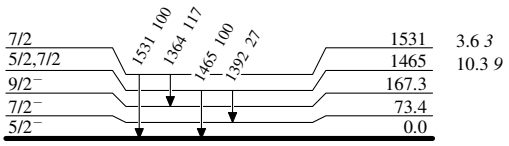


$^{163}_{66}Dy_{97}$

^{163}Dy(γ,γ′) 2003No02

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



$^{163}_{66}Dy_{97}$