^{144}Sm(n,n′γ) 1993Ga16

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	A. A. Sonzogni	NDS 93, 599 (2001)	1-Dec-2000

E=2-4.5 MeV; measured γ, γ(θ) at 5 angles (40° to 150°), DSAM. Single BGO Compton-suppressed Ge detector. Supersedes earlier publication by same group 1990Ga01.

^{144}Sm Levels

E(level)†	Jπ‡	$T_{1/2}$#	E(level)†	Jπ‡	$T_{1/2}$#
0.0	0^+	stable	3529.55 *4*	3^-	29 fs *+8–6*
1660.097 *10*	2^+	0.38 ps *+21–10*	3559.67 *5*	2^+	27 fs *+6–5*
1810.258 *16*	3^-	>0.62 ps	3564.26 *5*	(3^-)	32 fs *+12–9*
2190.952 *25*	4^+	>0.14 ps	3596.87 *8*	(4^-)	0.10 ps *+10–3*
2323.66 *8*	6^+	>7.0 ps	3626.71 *5*	(2,3,4,5)	44 fs *+23–14*
2423.22 *3*	2^+	37 fs *+5–4*	3647.13 *5*	(4^+)	0.12 ps *+9–4*
2477.720 *22*	0^+	>1.2 ps	3668.51 *10*	(5^-)	25 fs *+26–13*
2587.85 *4*	4^+	>0.12 ps	3688.66 *5*	$(3^+,4^+)$	21 fs *+4–3*
2644.762 *14*	$1^{(+)}$	0.19 ps *+6–4*	3714.45 *6*	$(1^+,2^+,3)$	12 fs *+5–3*
2660.760 *14*	$2^{(+)}$	0.5 ps *+5–2*	3722.76 *5*	$(2^+,3^+,4^+)$	5.5 fs *+23–21*
2688.464 *14*	$3^{(+)}$	0.5 ps *+9–2*	3732.00 *5*	$(2^+,3^+,4^+)$	15 fs *3*
2707.10 *11*	(5^+)	>36 fs	3740.17 *5*	(1,2,3,4)	0.10 ps *+5–3*
2799.65 *3*	2^+	69 fs *14*	3778.53 *9*	(3^-)	13 fs *+8–6*
2822.59 *4*	0^+	>0.76 ps	3786.38 *17*	(2,4)	0.2 ps *+5–1*
2825.793 *19*	(5^-)	>0.51 ps	3817.93 *15*	$1^{(-)}$	10 fs *+7–6*
2883.079 *21*	(4^+)	0.4 ps *+8–2*	3823.44 *6*	$(0^+,1,2,3)$	24 fs *+8–6*
3019.383 *20*	4^+	0.4@ ps *+5–1*	3846.3 *10*	(4^-)	&
3079.40 *15*	(5,6,7)	>7 ps	3856.05 *10*	$(2^-,3^-,4^-)$	32 fs *+20–12*
3118.70 *3*	$(3,4^-)$	0.24 ps *+17–8*	3867.93 *12*	5^-	0.08 ps *+11–3*
3124.13 *7*	7^-	>55 fs	3877.98 *6*	$(1^+,2^+,3)$	40 fs *+16–11*
3134.23 *5*	0^+	0.14 ps *+16–6*	3884.86 *20*	$(1,2^+)$	8 fs *+11–7*
3195.83 *4*	$(3,4^+,5)$	0.06 ps *+3–2*	3886.83 *8*	$5^{(+)}$	28 fs *+21–12*
3225.81 *5*	1^-	7.6 fs *21*	3890.52 *17*	1^-	<5.9 fs
3266.27 *8*		>15 fs	3906.987 *20*	$1^{(+)}$	19 fs *+14–9*
3307.97 *4*	$(2^+,3)$	40 fs *+10–8*	3914.04 *9*	(3,4)	23 fs *+16–10*
3308.06 *4*	$(2,3^-,4^-)$	0.08 ps *+4–2*	3939.94 *12*	(5^-)	0.04 ps *+6–2*
3308.35 *10*	(6^+)	>38 fs	3949.46 *6*	(3,4,5)	34 fs *+12–8*
3343.64 *5*	(3,4,5,6)	>190 fs	3965.67 *19*	$1^{(+)}$	<5 fs
3360.74 *4*	(3^-)	0.26 ps *+20–8*	3985.96 *21*	2^+	33 fs *+25–14*
3391.12 *3*	(2^-)	32 fs *+6–5*	3986.06 *5*	(3^+)	21 fs *+8–6*
3404.66 *4*	$(2^+,3)$	0.16 ps *+12–6*	4072.14 *14*	(2,3,4)	0.03 ps *+4–2*
3413.85 *3*	2^+	53 fs *+9–7*	4082.91 *19*		0.03 ps *+5–2*
3494.04 *4*	(4^+)	0.01 ps *+3–2*	4124.1 *3*	$1^{(-)}$	11 fs *+18–10*
3523.64 *4*	(2^+)	62 fs *+12–10*	4157.43 *18*		<24 fs

† From least-squares fit to Eγ.
‡ As given by authors. From excitation functions and γ(θ).
# From DSAM.
@ 30% possible systematic error due to ^{56}Co contamination.
& not extracted because of ^{56}Co contamination.

^{144}Sm(n,n′γ) 1993Ga16 (continued)

γ(^{144}Sm)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
132.6 *1*	0.41 *4*	2323.66	6^+	2190.952	4^+			
[x]136.43 *13*	0.78 *25*							
150.22 *12*	36.0 *10*	1810.258	3^-	1660.097	2^+			
[x]165.42 *14*	0.12 *6*							
237.62 *11*	0.33 *2*	2660.760	$2^{(+)}$	2423.22	2^+	E2+M1	−0.1 *+4−3*	
[x]340.40 *8*	4.42 *2*							
372.3 *1*	0.25 *2*	3079.40	(5,6,7)	2707.10	(5^+)			
380.66 *7*	15.0 *2*	2190.952	4^+	1810.258	3^-			
383.44 *7*	2.86 *5*	2707.10	(5^+)	2323.66	6^+			
396.91 *7*	5.45 *5*	2587.85	4^+	2190.952	4^+			
440.48 *7*	0.36 *2*	3266.27		2825.793	(5^-)			
[x]449.5 *3*	0.10 *12*							
482.56 *9*	0.14 *1*	3308.35	(6^+)	2825.793	(5^-)			
497.56 *5*	3.14 *15*	2688.464	$3^{(+)}$	2190.952	4^+	E2+M1	+0.09 *+7−6*	
502.54 *7*	0.25 *2*	3626.71	(2,3,4,5)	3124.13	7^-			
[x]515.42 *9*	0.55 *3*							
530.76 *5*	8.8 *1*	2190.952	4^+	1660.097	2^+			
[x]542.61 *12*	0.11 *2*							
[x]553.04 *11*	0.16 *2*							
[x]558.51 *12*	0.09 *2*							
[x]619.73 *8*	0.16 *2*							
[x]643.39 *8*	0.30 *2*							
[x]694.55 *12*	0.48 *19*							
[x]696.37 *6*	0.47 *2*							
[x]710.97 *10*	0.20 *2*							
[x]716.45 *3*	1.99 *4*							
[x]743.43 *7*	0.38 *3*							
755.79 *4*	0.63 *3*	3343.64	(3,4,5,6)	2587.85	4^+			
763.12 *5*	0.47 *3*	2423.22	2^+	1660.097	2^+	E2+M1		δ: two values are reported, δ=+1.2 *+21−13* and δ=+0.3 *+30−4*.
770.74 *17*	0.30 *2*	3596.87	(4^-)	2825.793	(5^-)	E2+M1		δ: two values are reported, δ=−0.4 *+2−4* and δ=−1.9 *18*.
777.59 *3*	1.23 *3*	2587.85	4^+	1810.258	3^-			
800.42 *7*	0.45 *3*	3124.13	7^-	2323.66	6^+			
817.62 *2*	2.09 *4*	2477.720	0^+	1660.097	2^+			
828.31 *4*	0.50 *2*	3019.383	4^+	2190.952	4^+	E2+M1		δ: two values are reported, δ=−0.17 *+22−19* and δ=+1.4 *+8−5*.
[x]834.94 *13*	0.18 *2*							
850.41 *7*	0.25 *3*	2660.760	$2^{(+)}$	1810.258	3^-	M2+E1		
[x]881.39 *13*	0.09 *3*							
[x]893.89 *4*	0.71 *4*							
[x]937.81 *14*	0.20 *4*							
984.66 *1*	3.60 *5*	2644.762	$1^{(+)}$	1660.097	2^+	E2+M1		
1000.66 *1*	5.06 *5*	2660.760	$2^{(+)}$	1660.097	2^+	E2+M1		δ: two values are reported, δ=−0.17 *+4−5* and δ=+4.1 *+11−8*.
1004.87 *3*	0.65 *2*	3195.83	$(3,4^+,5)$	2190.952	4^+			
1015.53 *1*	3.19 *4*	2825.793	(5^-)	1810.258	3^-			
[x]1024.83 *11*	0.19 *2*							
1028.36 *1*	2.34 *3*	2688.464	$3^{(+)}$	1660.097	2^+	E2+M1		δ: two values are reported, δ=+2.1 *+2−3* and δ=−0.22 *+6−7*.
1072.85 *5*	1.17 *4*	2883.079	(4^+)	1810.258	3^-	M2+E1	−0.07 *+7−9*	
[x]1121.01 *11*	0.40 *3*							
[x]1126.44 *14*	0.21 *3*							
[x]1149.93 *20*	0.62 *5*							
1162.49 *3*	1.38 *3*	2822.59	0^+	1660.097	2^+			

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^{144}Sm(n,n′γ) 1993Ga16 (continued)

γ(^{144}Sm) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
[x]1179.76 *20*	0.25 *2*							
[x]1197.11 *13*	0.18 *3*							
1209.10 *6*	0.43 *2*	3019.383	4^+	1810.258	3^-	M2+E1	+0.05 *11*	
1213.71 *3*	0.89 *3*	3404.66	$(2^+,3)$	2190.952	4^+			
1222.97 *2*	1.76 *4*	2883.079	(4^+)	1660.097	2^+	M3+E2	−0.12 *+12−14*	
1308.44 *2*	1.82 *5*	3118.70	$(3,4^-)$	1810.258	3^-			
[x]1344.35 *14*	0.20 *3*							
1359.31 *2*	3.5 *1*	3019.383	4^+	1660.097	2^+	M3+E2	−0.09 *+15−17*	
[x]1385.40 *5*	0.68 *4*							
[x]1411.7 *5*	0.16 *3*							
[x]1419.1 *3*	0.04 *3*							
1435.77 *4*	1.04 *7*	3626.71	(2,3,4,5)	2190.952	4^+			
1474.13 *4*	0.89 *5*	3134.23	0^+	1660.097	2^+	E2		
1477.5 *1*	0.30 *3*	3668.51	(5^-)	2190.952	4^+	M2+E1	+0.11 *16*	
1497.79 *3*	2.77 *4*	3308.06	$(2,3^-,4^-)$	1810.258	3^-			
[x]1516.24 *20*	0.17 *3*							
[x]1530.55 *23*	0.17 *3*							
[x]1538.06 *10*	0.25 *4*							
[x]1540.52 *14*	0.18 *3*							
[x]1546.91 *20*	0.11 *2*							
1563.07 *19*	0.14 *2*	3886.83	$5^{(+)}$	2323.66	6^+	E2+M1		
1580.87 *4*	0.53 *2*	3391.12	(2^-)	1810.258	3^-	E2+M1	+1.2 *+15−6*	
[x]1594.81 *10*	0.28 *2*							
1603.46 *11*	0.23 *3*	3413.85	2^+	1810.258	3^-	M2+E1		
1647.86 *3*	0.95 *3*	3307.97	$(2^+,3)$	1660.097	2^+			
1660.09 *1*	104.0 *2*	1660.097	2^+	0.0	0^+			
[x]1663.10 *9*	0.66 *6*							
[x]1665.42 *16*	0.35 *6*							
1683.77 *3*	1.08 *6*	3494.04	(4^+)	1810.258	3^-	M2+E1	−0.22 *+13−18*	
1695.88 *8*	0.32 *3*	3886.83	$5^{(+)}$	2190.952	4^+	E2+M1		δ: two values are reported, δ=−3.1 *+12−26* and δ=−0.3 *+2−4*.
1700.63 *3*	1.86 *8*	3360.74	(3^-)	1660.097	2^+	M2+E1	−0.04 *+9−10*	
1713.37 *3*	1.92 *9*	3523.64	(2^+)	1810.258	3^-	M2+E1	+0.20 *+12−9*	
1719.32 *6*	0.44 *2*	3529.55	3^-	1810.258	3^-	E2+M1		δ: two values are reported, δ=+0.1 *+14−2* and δ=+1.0 *+10−12*.
1723.15 *10*	0.26 *2*	3914.04	(3,4)	2190.952	4^+			
1731.01 *3*	1.07 *6*	3391.12	(2^-)	1660.097	2^+	M2+E1	−0.1 *+5−4*	
1744.51 *8*	0.30 *2*	3404.66	$(2^+,3)$	1660.097	2^+			
1748.98 *11*	0.18 *2*	3939.94	(5^-)	2190.952	4^+	M2+E1	−0.03 *+16−14*	
1753.79 *3*	1.42 *3*	3413.85	2^+	1660.097	2^+	E2+M1	−1.4 *+6−17*	
1758.50 *5*	0.52 *2*	3949.46	(3,4,5)	2190.952	4^+			
[x]1776.94 *15*	0.33 *7*							
1786.67 *8*	0.63 *2*	3596.87	(4^-)	1810.258	3^-	E2+M1		
1795.09 *5*	0.46 *2*	3986.06	(3^+)	2190.952	4^+	E2+M1		
1810.24 *2*	2.50 *3*	1810.258	3^-	0.0	0^+			
1858.49 *23*	0.18 *3*	3668.51	(5^-)	1810.258	3^-	M3+E2		
1869.42 *5*	0.75 *3*	3529.55	3^-	1660.097	2^+	M2+E1	−0.11 *9*	
1881.18 *15*	0.21 *2*	4072.14	(2,3,4)	2190.952	4^+			
1891.94 *18*	0.15 *2*	4082.91		2190.952	4^+			
1899.59 *5*	0.68 *4*	3559.67	2^+	1660.097	2^+	E2+M1		
1904.15 *5*	0.66 *3*	3564.26	(3^-)	1660.097	2^+	M2+E1	+0.08 *13*	
[x]1910.61 *9*	1.11 *6*							
[x]1918.40 *14*	0.15 *3*							
1929.90 *5*	0.56 *3*	3740.17	(1,2,3,4)	1810.258	3^-			
[x]1942.55 *14*	0.17 *2*							
1966.46 *17*	0.18 *2*	4157.43		2190.952	4^+			

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^{144}Sm(n,n′γ) 1993Ga16 (continued)

γ(^{144}Sm) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]
1976.11 *17*	0.55 *2*	3786.38	(2,4)	1810.258	3^-		
[x]1981.86 *9*	0.21 *2*						
1987.02 *5*	0.65 *2*	3647.13	(4^+)	1660.097	2^+	M3+E2	−0.2 *+2−3*
2028.55 *4*	0.92 *2*	3688.66	$(3^+,4^+)$	1660.097	2^+		
2036 *1*	0.34 *8*	3846.3	(4^-)	1810.258	3^-		
2045.78 *9*	0.44 *3*	3856.05	$(2^-,3^-,4^-)$	1810.258	3^-		
2054.34 *6*	0.76 *2*	3714.45	$(1^+,2^+,3)$	1660.097	2^+		
2057.66 *11*	0.32 *3*	3867.93	5^-	1810.258	3^-	M3+E2	
2062.65 *4*	0.84 *2*	3722.76	$(2^+,3^+,4^+)$	1660.097	2^+		
2071.89 *4*	0.86 *2*	3732.00	$(2^+,3^+,4^+)$	1660.097	2^+		
2080.07 *8*	0.43 *2*	3740.17	(1,2,3,4)	1660.097	2^+		
[x]2087.75 *11*	0.39 *2*						
2118.42 *9*	0.39 *3*	3778.53	(3^-)	1660.097	2^+	M2+E1	−0.04 *12*
2163.33 *6*	0.50 *3*	3823.44	$(0^+,1,2,3)$	1660.097	2^+		
[x]2174.17 *13*	0.15 *2*						
[x]2192.7 *3*	0.19 *2*						
2217.86 *6*	0.44 *2*	3877.98	$(1^+,2^+,3)$	1660.097	2^+		
2253.77 *14*	0.20 *2*	3914.04	(3,4)	1660.097	2^+		
[x]2271.75 *12*	0.15 *2*						
[x]2288.92 *7*	0.75 *3*						
2325.97 *12*	0.33 *2*	3986.06	(3^+)	1660.097	2^+	E2+M1	−0.5 *+2−9*
[x]2404.28 *16*	0.15 *4*						
2412.0 *3*	0.09 *2*	4072.14	(2,3,4)	1660.097	2^+		
2423.21 *3*	8.9 *1*	2423.22	2^+	0.0	0^+	E2	
2644.78 *6*	0.74 *3*	2644.762	$1^{(+)}$	0.0	0^+	M1	
2799.62 *3*	4.75 *7*	2799.65	2^+	0.0	0^+	E2	
3225.77 *5*	1.74 *4*	3225.81	1^-	0.0	0^+	E1	
3413.65 *6*	1.21 *6*	3413.85	2^+	0.0	0^+	E2	
3559.54 *9*	0.97 *3*	3559.67	2^+	0.0	0^+	E2	
3817.88 *15*	0.48 *3*	3817.93	$1^{(-)}$	0.0	0^+	E1	
3884.8 *2*	0.06 *14*	3884.86	$(1,2^+)$	0.0	0^+		
3890.46 *17*	0.63 *4*	3890.52	1^-	0.0	0^+	E1	
3906.93 *2*	0.29 *2*	3906.987	$1^{(+)}$	0.0	0^+	(M1)	
3965.61 *19*	0.44 *2*	3965.67	$1^{(+)}$	0.0	0^+	(M1)	
3985.90 *21*	0.29 *2*	3985.96	2^+	0.0	0^+	E2	
4124.0 *3*	0.17 *4*	4124.1	$1^{(-)}$	0.0	0^+	(E1)	

[†] Relative photon branching ratios (%).
[‡] From γ(θ).
[x] γ ray not placed in level scheme.

^{144}Sm(n,n′γ) 1993Ga16

Level Scheme

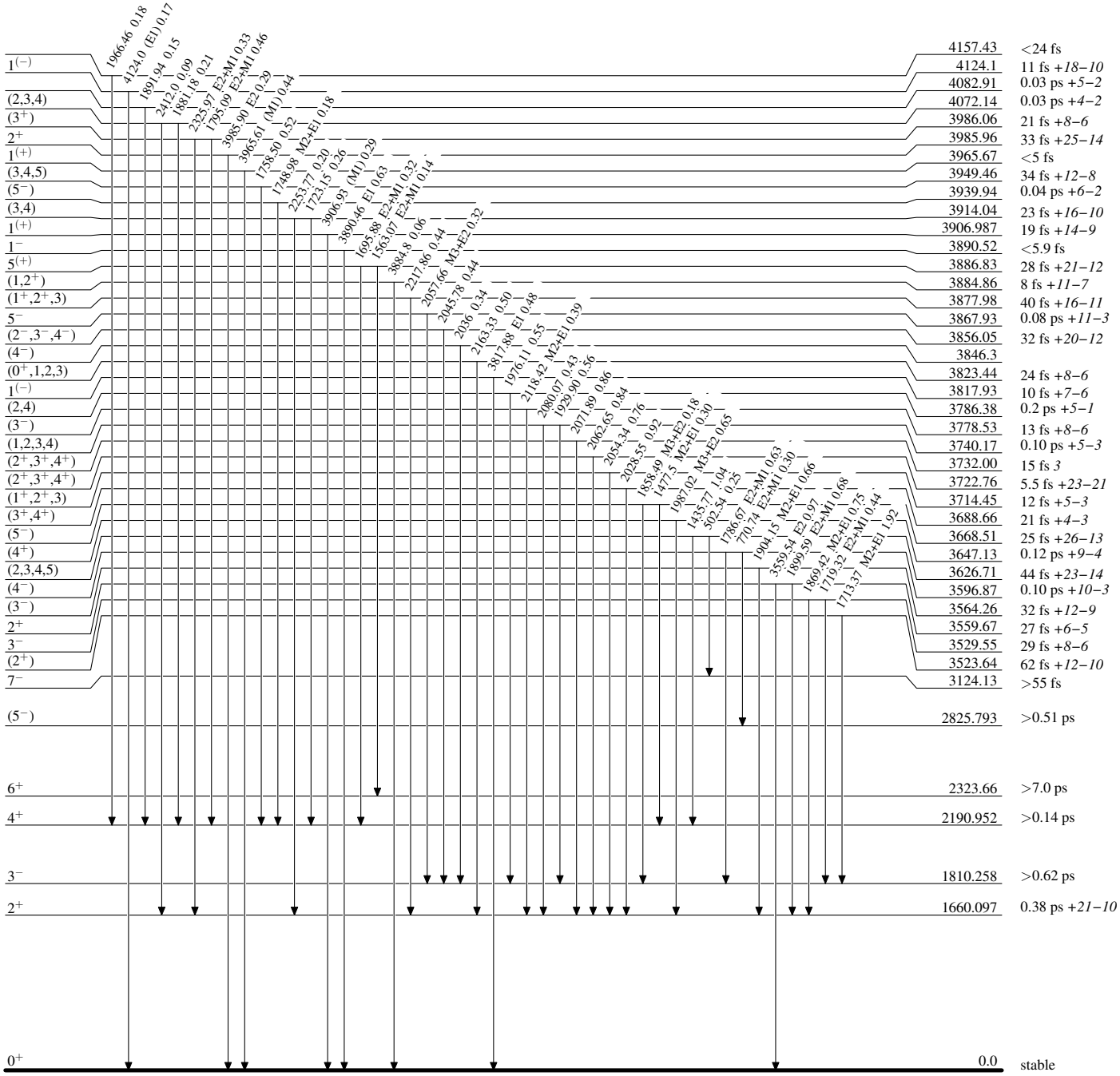
Intensities: Type not specified

Legend

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

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

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

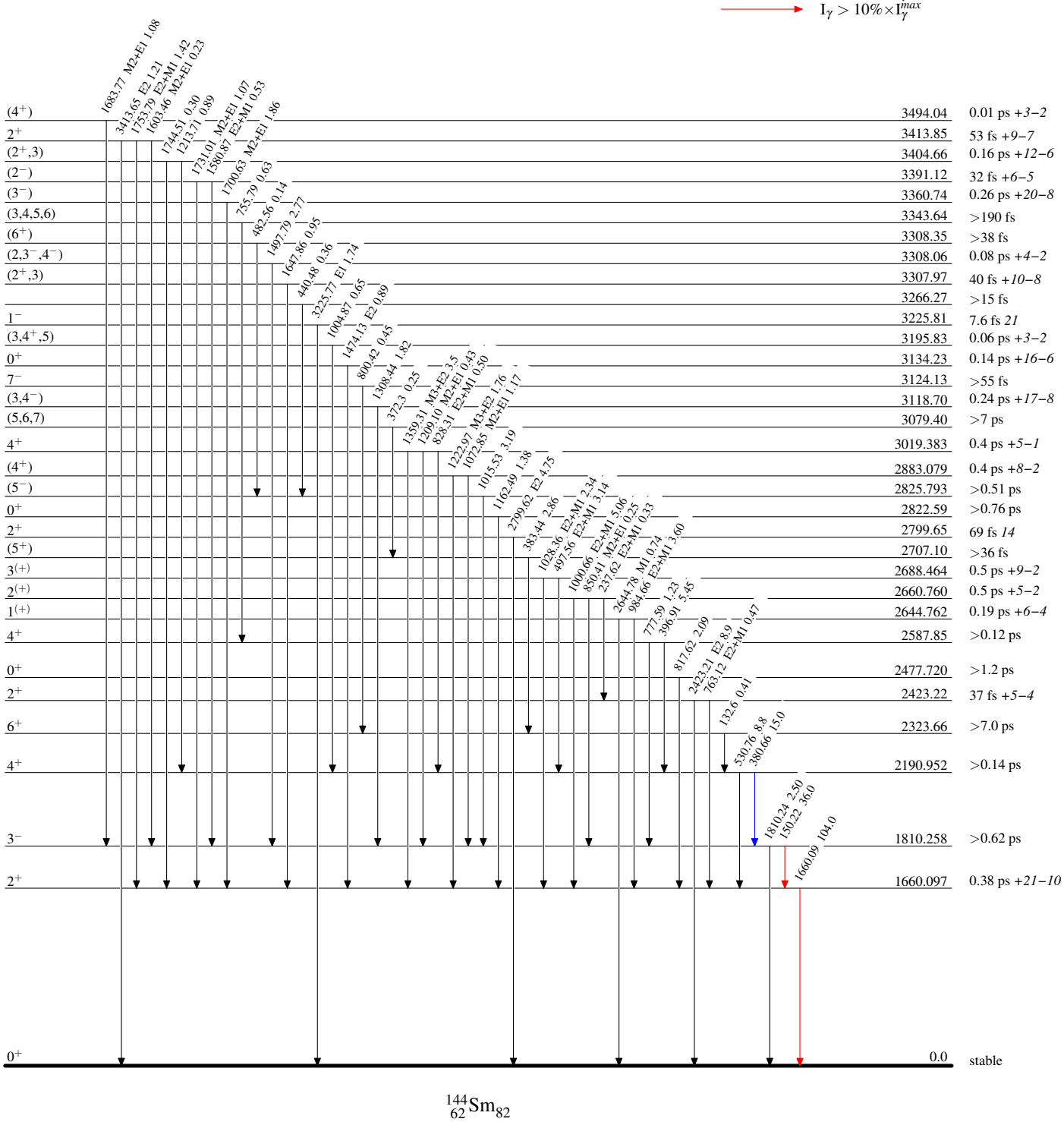


$^{144}_{62}Sm_{82}$

^{144}Sm(n,n′γ) 1993Ga16

Level Scheme (continued)

Intensities: Type not specified



$^{144}_{62}Sm_{82}$