

$^{152}\text{Sm}(\text{n},\text{n}'\gamma)$ 2009GaZR,1986Be12

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. J. Martin	NDS 114, 1497 (2013)	31-Aug-2013

1986Be12: fast reactor neutrons; measured: $E\gamma$, $I\gamma$.

1993Ju04: $E(\text{n})=1.3$ MeV; measured: Doppler shift.

2009Ga21: $E(\text{n})=1.2$ to 3.0 MeV; measured $T_{1/2}$, excit, $\gamma(\theta)$.

2009GaZR: $E(\text{n})=1.2$ to 3.0 MeV; measured $E\gamma$.

2008Ku10: $E(\text{n})=1.2$ to 3.0 MeV; measured $T_{1/2}$.

 ^{152}Sm Levels

Others: 1977Si20, 1977Co26, 1977Mc02, 1976Co25.

E(level) [†]	$J\pi^{\ddagger}$	$T_{1/2}^{\#}$	Comments
0.0	0^+		
121.782	2^+		E(level): Rounded-off value from Adopted Levels. Held fixed by 2009GaZR.
366.479	4^+		E(level): Rounded-off value from Adopted Levels. Held fixed by 2009GaZR.
684.791 6	0^+		
706.822 5	6^+		
810.458 4	2^+		
963.368 4	1^-	20 fs 3	
1022.981 4	4^+		
1041.125 4	3^-	27 fs 5	
1082.853 11	0^+		
1085.822 8	2^+		
1125.27 8	8^+		
1221.651 13	5^-	73 fs +16-12	
1233.846 6	3^+		
1292.755 5	2^+		
1310.42 4	6^+		
1371.686 7	4^+		
1505.54 18	7^-		
1510.814 10	1^-	91 fs 6	
1529.798 10	2^-	0.27 ps +6-4	
1559.582 14	5^+		
1579.383 9	3^-	72 fs 6	
1609?	10^+		
1612.864 13	4^+		
1649.868 13	2^-	164 fs +33-24	
1659.567 12	0^+	123 fs +45-29	J^π : $J^\pi=0^+$ is established from 696 γ (E) and 696 γ (θ) (2008Ku10).
1680.571 8	1^-	38.1 fs 28	
1681.980 13	4^-	>596 fs	
1728.41 10	6^+		
1730.219 12	3^-	82 fs +11-9	J^π : $J^\pi=0^+$ is established from 792 γ (E) and 792 γ (θ) (2008Ku10).
1755.015 13	0^+	>277 fs	$T_{1/2}$: From priv comm communicated to the evaluator by P. E. Garrett. this replaces the value of 168 fs +90-46 given in 2008Ku10.
1756.995 17	4^+		
1764.26 4	5^-	0.08 ps +9-4	
1769.141 10	2^+	130 fs +42-28	
1776.549 8	(2^+)		
1779.120 8	3^-	56 fs +11-9	
1803.975 15	5^-		
1821.89 3	(4^-)		

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$^{152}\text{Sm}(n,n'\gamma)$ **2009GaZR,1986Be12 (continued)** ^{152}Sm Levels (continued)

E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]
1890.90 4	5 ⁺	1954.30 4	3 ⁻ ,4,5 ⁻	2042.801 23	0 ⁺ ,1,2	2091.217 15	1 ⁻ ,2
1892.494 22	0 ⁺ ,1,2	1958.29 4	2 ⁺ ,3,4 ⁺	2044.20 7	3,4 ⁺	2091.65 7	
1906.146 24	2 ⁺	1963.96 3	1,2 ⁺	2046.16 16	4 ⁺ ,5,6,7 ⁺	2096.79 3	3 ⁺ ,4
1907.76 5	(3 ⁺)	1976.97 5	4 ⁺ ,5,6 ⁺	2048.02 16		2112.70 4	2 ⁺ ,3,4 ⁺
1920.48 8	6 ⁻	2003.98 15	6 ⁺	2051.49 9		2127.18 7	0 ⁺ ,1,2
1929.85 5	6 ⁻	2006.62 8	0,1,2,3 ⁻	2051.84 6	4 ⁺	2129.87 5	1 ⁻ ,2,3 ⁻
1933.30 4	4 ⁺ ,5,6 ⁺	2011.56 6	3 ⁻ ,4,5 ⁻	2053.52 10		2137.70 5	
1944.623 15	1 ⁻ ,2	2011.75 5	2 ⁺ ,3,4 ⁺	2063.79 3	1 ⁻ ,2,3 ⁻	2137.93 6	2 ⁺ ,3,4 ⁺
1945.101 21	1,2 ⁺	2038.38 3	1,2 ⁺	2069.32 8	0 ⁺ ,1,2,3 ⁻		
1946.16 4	0,1,2,3 ⁻	2039.94 11	6 ⁺	2070.80 6	3 ⁻ ,4,5 ⁻		

[†] From a least-squares fit to the $E\gamma$ data as given by [2009GaZR](#). the uncertainties are statistical only, and a systematic uncertainty of 50 eV should be added in quadrature. In addition to the levels listed here, [1986Be12](#) suggest a possible level at 2362 deexcited by a 1399 γ . The 1399 γ is also placed by [1986Be12](#) from the 1764 level. [2009GaZR](#) place the transition only from the 1764 level. no 2362 level is proposed in any other dataset.

[‡] From Adopted Levels.

[#] From [1993Ju04](#) for the 963 and 1041 levels. Values for the higher levels are from [2009Ga21](#) and [2008Ku10](#) (1659, 1755, 1769) using DSA.

 $\gamma(^{152}\text{Sm})$

E_γ [†]	I_γ [#]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
119.25 ^h 12		1082.853	0 ⁺	963.368	1 ⁻	
121.782	810 90	121.782	2 ⁺	0.0	0 ⁺	E_γ : Rounded-off value from Adopted Levels. Used as a calibration point by 2009GaZR .
^x 127.3 2	9 4					
147.8 [‡] 3	2.3 6	1233.846	3 ⁺	1085.822	2 ⁺	I_γ : From $I_\gamma/I_\gamma(867\gamma+1112\gamma)=0.00115$ 6 in Adopted Gammas, one expects $I_\gamma=0.102$ 12. Most of the intensity of this transition must belong elsewhere.
^x 183.0 1	3.9 6					
209.72 ^h 10		1292.755	2 ⁺	1082.853	0 ⁺	
212.571 12	7.3 9	1022.981	4 ⁺	810.458	2 ⁺	
^x 222.9 1	4.4 5					
244.698	432 50	366.479	4 ⁺	121.782	2 ⁺	E_γ : Rounded-off value from Adopted Levels. Used as a calibration point by 2009GaZR .
251.619 7	9.2 13	1292.755	2 ⁺	1041.125	3 ⁻	
255.96 14		1906.146	2 ⁺	1649.868	2 ⁻	
269.54 ^h 3	2.0 7	1292.755	2 ⁺	1022.981	4 ⁺	
272.379 12	3 1	1082.853	0 ⁺	810.458	2 ⁺	
275.34 ^h 10		1085.822	2 ⁺	810.458	2 ⁺	
^x 276.9 1	5 1					
285.82 3		1371.686	4 ⁺	1085.822	2 ⁺	
287.467 23		1310.42	6 ⁺	1022.981	4 ⁺	
295.84 5		1529.798	2 ⁻	1233.846	3 ⁺	
315.861 ^h 14	3.0 6	1022.981	4 ⁺	706.822	6 ⁺	
320.16 4		1612.864	4 ⁺	1292.755	2 ⁺	
325.689 24		1559.582	5 ⁺	1233.846	3 ⁺	
329.292 ^h 4	11.4 ^d 14	1292.755	2 ⁺	963.368	1 ⁻	
329.292 ^h 4	0.43 ^d 3	1371.686	4 ⁺	1041.125	3 ⁻	

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$^{152}\text{Sm}(n,n'\gamma)$ **2009GaZR,1986Be12** (continued) $\gamma(^{152}\text{Sm})$ (continued)

E_γ †	I_γ #	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
331.33 3		1890.90	5 ⁺	1559.582	5 ⁺	
340.336 3	67 8	706.822	6 ⁺	366.479	4 ⁺	
^x 354.7 1	2.6 6					
357.26 ^h	<2	1649.868	2 ⁻	1292.755	2 ⁺	
358.28 8		1730.219	3 ⁻	1371.686	4 ⁺	
360.90 5	2 1	1920.48	6 ⁻	1559.582	5 ⁺	
^x 362.2 3	2 1					
370.24 3		1929.85	6 ⁻	1559.582	5 ⁺	
376.24 6		1906.146	2 ⁺	1529.798	2 ⁻	
378.94 7		1612.864	4 ⁺	1233.846	3 ⁺	
380.27 10	<2	1505.54	7 ⁻	1125.27	8 ⁺	
383.21 7		2063.79	1 ⁻ ,2,3 ⁻	1680.571	1 ⁻	
385.23 3		1756.995	4 ⁺	1371.686	4 ⁺	
388.75 5		2069.32	0 ⁺ ,1,2,3 ⁻	1680.571	1 ⁻	
^x 390.6 1	2 1					
391.19 ^h	<0.8	1612.864	4 ⁺	1221.651	5 ⁻	
^x 397.1 2	4.4 6					
401.62 6		2051.49		1649.868	2 ⁻	
^x 404.0 1						
415.40 ^h 6	<15	1649.868	2 ⁻	1233.846	3 ⁺	
418.45 5	<5	1125.27	8 ⁺	706.822	6 ⁺	
443.894 ^h 3	3.7 ^c 5	1529.798	2 ⁻	1085.822	2 ⁺	
443.98 ^h	42 ^c 5	810.458	2 ⁺	366.479	4 ⁺	
^x 459.5 2	3 1					
462.16 3		1755.015	0 ⁺	1292.755	2 ⁺	
475.70 ^h		1769.141	2 ⁺	1292.755	2 ⁺	
482.165 ^h 18	10	1292.755	2 ⁺	810.458	2 ⁺	
484 ^k	<10	1609?	10 ⁺	1125.27	8 ⁺	E_γ, I_γ : Transition looked for by 1986Be12 but only an upper limit could be obtained. Not reported by 2009GaZR. The 10 ⁺ member of the g.s. band is thus probably not populated in (n,n'γ).
488.57 5		1529.798	2 ⁻	1041.125	3 ⁻	
493.62 ^h 16		1579.383	3 ⁻	1085.822	2 ⁺	
496.31 3		1730.219	3 ⁻	1233.846	3 ⁺	
514.569 ^h 24		1221.651	5 ⁻	706.822	6 ⁺	
519.430 ^h 23		1890.90	5 ⁺	1371.686	4 ⁺	
523.177 18	4.9 7	1756.995	4 ⁺	1233.846	3 ⁺	
535.26 4	<3	1769.141	2 ⁺	1233.846	3 ⁺	
537.13 4		2096.79	3 ⁺ ,4	1559.582	5 ⁺	
547.35 ^h 8		1510.814	1 ⁻	963.368	1 ⁻	
556.38 ^h 10		1579.383	3 ⁻	1022.981	4 ⁺	
563.009 4	104 ^b 13	684.791	0 ⁺	121.782	2 ⁺	
564.079 14	11.3 ^b 16	1649.868	2 ⁻	1085.822	2 ⁺	
566.430 ^h 5		1529.798	2 ⁻	963.368	1 ⁻	
571.781 15	3.4 10	1612.864	4 ⁺	1041.125	3 ⁻	
^x 588.0 2	2.8 4					
588.047 19	2.8 4	1821.89	(4 ⁻)	1233.846	3 ⁺	
590.11 7		1612.864	4 ⁺	1022.981	4 ⁺	
603.51 5	3 1	1310.42	6 ⁺	706.822	6 ⁺	
^x 605	<2					
644.387 18	2.6 5	1730.219	3 ⁻	1085.822	2 ⁺	
^x 646.4 6	1.4 6					

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$^{152}\text{Sm}(\text{n},\text{n}'\gamma)$ **2009GaZR,1986Be12** (continued) $\gamma(^{152}\text{Sm})$ (continued)

E_γ †	I_γ #	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
652.312 24	2 1	1945.101	1,2 ⁺	1292.755	2 ⁺	
656.507 3	31 ^g 5	1022.981	4 ⁺	366.479	4 ⁺	
656.507 ^h 3	3 ^g 3	1890.90	5 ⁺	1233.846	3 ⁺	
665.056 ^h 18	2 1	1371.686	4 ⁺	706.822	6 ⁺	
671.172 13	5 1	1756.995	4 ⁺	1085.822	2 ⁺	
674.636 3	38 4	1041.125	3 ⁻	366.479	4 ⁺	
683.24 4		1769.141	2 ⁺	1085.822	2 ⁺	
688.676 3	129 16	810.458	2 ⁺	121.782	2 ⁺	
696.197 7	<5	1659.567	0 ⁺	963.368	1 ⁻	
700.44 ^h 11		1510.814	1 ⁻	810.458	2 ⁺	
705.43 ^h 9	@	1728.41	6 ⁺	1022.981	4 ⁺	
707.88 ^h 4	0.49 @ 6	1730.219	3 ⁻	1022.981	4 ⁺	
^x 707.9 1	3.5 @ 20					
719.349 ^h 4		1529.798	2 ⁻	810.458	2 ⁺	
719.35 ^h 4		1085.822	2 ⁺	366.479	4 ⁺	
725.127 19	2.1 4	2096.79	3 ⁺ ,4	1371.686	4 ⁺	I_γ : 1986Be12 report $I_\gamma=2.1$ 4 for an unplaced 725.5 4 transition.
727.990 13		1769.141	2 ⁺	1041.125	3 ⁻	
732.66 6		1954.30	3 ⁻ ,4,5 ⁻	1221.651	5 ⁻	
735.425 6	10 3	1776.549	(2 ⁺)	1041.125	3 ⁻	
737.84 4		1779.120	3 ⁻	1041.125	3 ⁻	
756.164 7	5.8 12	1779.120	3 ⁻	1022.981	4 ⁺	
768.85 3	1.5 15	1579.383	3 ⁻	810.458	2 ⁺	
780.94 ^h 5	4.1 ⁱ 7	1803.975	5 ⁻	1022.981	4 ⁺	
780.94 ^h 5		1821.89	(4 ⁻)	1041.125	3 ⁻	
^x 785.9 7	2 1					
789.96 6	3 1	2011.56	3 ⁻ ,4,5 ⁻	1221.651	5 ⁻	I_γ : 1986Be12 report $I_\gamma=3$ 1 for an unplaced 789.1 8 transition.
791.654 8	6.2 10	1755.015	0 ⁺	963.368	1 ⁻	
798.7 ^h 2	5.8 7	1505.54	7 ⁻	706.822	6 ⁺	
805.774 10	<5	1769.141	2 ⁺	963.368	1 ⁻	
810.452 4	43 5	810.458	2 ⁺	0.0	0 ⁺	
810.49 ^h		2044.20	3,4 ⁺	1233.846	3 ⁺	
813.176 6	5 2	1776.549	(2 ⁺)	963.368	1 ⁻	
817.84 ^h		2051.84	4 ⁺	1233.846	3 ⁺	
820.31 5		1906.146	2 ⁺	1085.822	2 ⁺	
826.02 3	4 2	1510.814	1 ⁻	684.791	0 ⁺	
839.33 7		1649.868	2 ⁻	810.458	2 ⁺	
841.585 3	90 10	963.368	1 ⁻	121.782	2 ⁺	
849.14 4		2070.80	3 ⁻ ,4,5 ⁻	1221.651	5 ⁻	
852.67 4	<5	1559.582	5 ⁺	706.822	6 ⁺	
855.170 8	26 4	1221.651	5 ⁻	366.479	4 ⁺	
862.259 19		1945.101	1,2 ⁺	1082.853	0 ⁺	
865.04 3		1906.146	2 ⁺	1041.125	3 ⁻	
867.402 ^h 5	23 6	1233.846	3 ⁺	366.479	4 ⁺	
870.111 6	8 3	1680.571	1 ⁻	810.458	2 ⁺	
878.70 8		2003.98	6 ⁺	1125.27	8 ⁺	
^x 880.4 1	3.8 6					
884.76 9		1907.76	(3 ⁺)	1022.981	4 ⁺	
896.12 4		2129.87	1 ⁻ ,2,3 ⁻	1233.846	3 ⁺	
901.188 6	18 2	1022.981	4 ⁺	121.782	2 ⁺	
903.501 12		1944.623	1 ⁻ ,2	1041.125	3 ⁻	
906.011 10	8 1	1612.864	4 ⁺	706.822	6 ⁺	

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$^{152}\text{Sm}(n,n'\gamma)$ **2009GaZR,1986Be12** (continued) $\gamma(^{152}\text{Sm})$ (continued)

E_γ †	I_γ #	$E_i(\text{level})$	J_i^π	E_f	J_f^π
910.38 4		1933.30	$4^+, 5, 6^+$	1022.981	4^+
913.17 3		1954.30	$3^-, 4, 5^-$	1041.125	3^-
919.350 ^e 4	98 ^e 10	1041.125	3^-	121.782	2^+
919.351 ^{eh} 4	2.1 ^e 3	1730.219	3^-	810.458	2^+
926.271 4	24 3	1292.755	2^+	366.479	4^+
929.123 13	1.8 8	1892.494	$0^+, 1, 2$	963.368	1^-
935.28 ^h 4		1976.97	$4^+, 5, 6^+$	1041.125	3^-
935.33 4		1958.29	$2^+, 3, 4^+$	1022.981	4^+
^x 940.7 9	1.7 7				
942.85 3		1906.146	2^+	963.368	1^-
943.75 14	3.5 5	1310.42	6^+	366.479	4^+
^x 946.2 13	1.9 4				
^x 948.6 8	2 1				
954.00 4		1976.97	$4^+, 5, 6^+$	1022.981	4^+
958.707 11	10 3	1769.141	2^+	810.458	2^+
961.080 9	33 11	1082.853	0^+	121.782	2^+
962.20 10		2048.02		1085.822	2^+
963.27 4	78 ^j 9	963.368	1^-	0.0	0^+
964.023 18	73 ^d 7	1085.822	2^+	121.782	2^+
968.635 7	7.3 11	1779.120	3^-	810.458	2^+
970.38 5		2011.56	$3^-, 4, 5^-$	1041.125	3^-
981.243 15	5.5 7	1944.623	$1^-, 2$	963.368	1^-
982.791 20	7 1	1946.16	$0, 1, 2, 3^-$	963.368	1^-
989.08 ^h 6		2011.75	$2^+, 3, 4^+$	1022.981	4^+
995.775 7	6.4 8	1680.571	1^-	684.791	0^+
1005.201 5	28.9 19	1371.686	4^+	366.479	4^+
1021.45 ^h 4		2044.20	$3, 4^+$	1022.981	4^+
1021.59 6	5.2 7	1728.41	6^+	706.822	6^+
1022.68 3		2063.79	$1^-, 2, 3^-$	1041.125	3^-
^x 1029.5 2	4.3 9				
1029.77 ^h		2070.80	$3^-, 4, 5^-$	1041.125	3^-
1043.25 5		2006.62	$0, 1, 2, 3^-$	963.368	1^-
^x 1044.4 2	9.9 12				
1050.098 16		2091.217	$1^-, 2$	1041.125	3^-
1057.36 3	2 1	1764.26	5^-	706.822	6^+
1071.48 4		2112.70	$2^+, 3, 4^+$	1041.125	3^-
1079.429 14	<2	2042.801	$0^+, 1, 2$	963.368	1^-
1084.37 4		1769.141	2^+	684.791	0^+
1085.820 6	49 5	1085.822	2^+	0.0	0^+
1096.70 ^h	8 ^{&} 2	1907.76	(3^+)	810.458	2^+
1097.144 9	<7 ^{&i}	1803.975	5^-	706.822	6^+
1100.410 23		2063.79	$1^-, 2, 3^-$	963.368	1^-
1112.059 4	66 7	1233.846	3^+	121.782	2^+
1127.840 11		2091.217	$1^-, 2$	963.368	1^-
^x 1139.7 2	3 1				
1147.75 6		1958.29	$2^+, 3, 4^+$	810.458	2^+
1153.41 4		1963.96	$1, 2^+$	810.458	2^+
^x 1161.6 3	3 1				
1166.34 5		2129.87	$1^-, 2, 3^-$	963.368	1^-
1170.975 12	3.3 5	1292.755	2^+	121.782	2^+
1183.95 7		1890.90	5^+	706.822	6^+
1193.104 10	17 2	1559.582	5^+	366.479	4^+
1212.895 6	20 ^d 2	1579.383	3^-	366.479	4^+

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$^{152}\text{Sm}(\text{n},\text{n}'\gamma)$ **2009GaZR,1986Be12** (continued) $\gamma(^{152}\text{Sm})$ (continued)

E_γ [†]	I_γ [#]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
1213.7 ^h	0.8 ^a 5	1920.48	6 ⁻	706.822	6 ⁺	
1223.16 7	<3	1929.85	6 ⁻	706.822	6 ⁺	
1226.32 5	3.2 7	1933.30	4 ⁺ ,5,6 ⁺	706.822	6 ⁺	
1227.96 3	3.2 7	2038.38	1,2 ⁺	810.458	2 ⁺	I_γ : 1986Be12 report $I_\gamma=3.2$ 7 for an unplaced 1226.8 3 transition.
1233.73 5		2044.20	3,4 ⁺	810.458	2 ⁺	
1243.06 7		2053.52		810.458	2 ⁺	
1245.88 ^h	<3	1612.864	4 ⁺	366.479	4 ⁺	
1249.909 12	6.4 7	1371.686	4 ⁺	121.782	2 ⁺	
1260.41 4	3 1	1945.101	1,2 ⁺	684.791	0 ⁺	
1270.11 8		1976.97	4 ⁺ ,5,6 ⁺	706.822	6 ⁺	
1292.756 10	15 5	1292.755	2 ⁺	0.0	0 ⁺	
1296.65 ^h 21		2003.98	6 ⁺	706.822	6 ⁺	
^x 1298.4 1	7.2 10					
1315.494 8	10.0 12	1681.980	4 ⁻	366.479	4 ⁺	
1327.23 3		2137.70		810.458	2 ⁺	
1333.11 7		2039.94	6 ⁺	706.822	6 ⁺	
1339.33 10		2046.16	4 ⁺ ,5,6,7 ⁺	706.822	6 ⁺	
^x 1351.5 5	5 2					
1352.97 20	1.9 6	2038.38	1,2 ⁺	684.791	0 ⁺	I_γ : 1986Be12 report $I_\gamma=1.9$ 6 for an unplaced 1353.6 6 transition.
1362.31 ^h	<1	1728.41	6 ⁺	366.479	4 ⁺	
1363.734 9	8.5 10	1730.219	3 ⁻	366.479	4 ⁺	
1389.026 6	25 ^f 3	1510.814	1 ⁻	121.782	2 ⁺	
1389.027 ^h 6	1.04 ^f 15	1756.995	4 ⁺	366.479	4 ⁺	
1397.88 4	3.9 9	1764.26	5 ⁻	366.479	4 ⁺	
1408.012 6	25 3	1529.798	2 ⁻	121.782	2 ⁺	
1437.62 5	4.2 ⁱ 8	1803.975	5 ⁻	366.479	4 ⁺	
1455.38 4		1821.89	(4 ⁻)	366.479	4 ⁺	
1457.647 17	9.4 11	1579.383	3 ⁻	121.782	2 ⁺	
1524.47 8		1890.90	5 ⁺	366.479	4 ⁺	
1528.061 10	6.5 9	1649.868	2 ⁻	121.782	2 ⁺	
1541.24 ^h 4		1907.76	(3 ⁺)	366.479	4 ⁺	
1558.76 5		1680.571	1 ⁻	121.782	2 ⁺	
1566.82 6		1933.30	4 ⁺ ,5,6 ⁺	366.479	4 ⁺	
1591.81 6		1958.29	2 ⁺ ,3,4 ⁺	366.479	4 ⁺	
1608.52 3	<1.5	1730.219	3 ⁻	121.782	2 ⁺	
1610.41 10		1976.97	4 ⁺ ,5,6 ⁺	366.479	4 ⁺	
1645.30 4		2011.75	2 ⁺ ,3,4 ⁺	366.479	4 ⁺	
1647.28 4	<1.5	1769.141	2 ⁺	121.782	2 ⁺	
1677.73 10		2044.20	3,4 ⁺	366.479	4 ⁺	
1680.56 6		1680.571	1 ⁻	0.0	0 ⁺	
1746.27 3		2112.70	2 ⁺ ,3,4 ⁺	366.479	4 ⁺	
1769.320 ^h 25	<1.5	1769.141	2 ⁺	0.0	0 ⁺	
1771.33 8		2137.93	2 ⁺ ,3,4 ⁺	366.479	4 ⁺	
1784.27 4		1906.146	2 ⁺	121.782	2 ⁺	
1785.97 3	8 1	1907.76	(3 ⁺)	121.782	2 ⁺	
1823.22 4		1945.101	1,2 ⁺	121.782	2 ⁺	
1842.19 3	7 1	1963.96	1,2 ⁺	121.782	2 ⁺	
1889.95 3		2011.75	2 ⁺ ,3,4 ⁺	121.782	2 ⁺	
1906.14 4		1906.146	2 ⁺	0.0	0 ⁺	
1916.563 23		2038.38	1,2 ⁺	121.782	2 ⁺	
1930.05 4	6 1	2051.84	4 ⁺	121.782	2 ⁺	I_γ : 1986Be12 report $I_\gamma=6$ 1 for an unplaced 1930.3 4 transition.

Continued on next page (footnotes at end of table)

$^{152}\text{Sm}(n,n'\gamma)$ **2009GaZR,1986Be12 (continued)** $\gamma(^{152}\text{Sm})$ (continued)

$E_\gamma^\dagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	$E_\gamma^\dagger$	$I_\gamma^\#$	$E_i(\text{level})$	J_i^π	E_f	J_f^π
1931.74 15	2053.52		121.782	2 ⁺	1991.02 10		2112.70	2 ⁺ ,3,4 ⁺	121.782	2 ⁺
1945.15 8	1945.101	1,2 ⁺	0.0	0 ⁺	2005.38 5		2127.18	0 ⁺ ,1,2	121.782	2 ⁺
1947.6 3	2069.32	0 ⁺ ,1,2,3 ⁻	121.782	2 ⁺	2016.17 5		2137.93	2 ⁺ ,3,4 ⁺	121.782	2 ⁺
1963.98 5	1963.96	1,2 ⁺	0.0	0 ⁺	^x 2066.6 3	3.8 6				
1969.86 4	2091.65		121.782	2 ⁺	^x 2095.9 3	3 1				

[†] From **2009GaZR**, except where noted otherwise. The data of **2009GaZR** are unpublished, and should be considered as preliminary. The uncertainties are statistical only, and the authors state that α systematic uncertainty of 50 eV should be added in quadrature. this systematic uncertainty has been included by the evaluator in the Adopted Gammas dataset.

[‡] From **1986Be12**. Not reported by **2009GaZR**.

[#] From **1986Be12** taken at 90°. Transitions with no listed I_γ were not reported by **1986Be12**.

[@] **2009GaZR** report $E_\gamma=707.88$ 4 which is doubly placed from the 1728 and 1730 levels. **1986Be12** report $I_\gamma=4$ 2 for $E_\gamma=707.9$ 1. from $I_\gamma/I_\gamma(644\gamma+1364\gamma)=0.044$ 3 for the 1730 level in ADOPTED gammas, one gets $I_\gamma(708\gamma)=0.49$ 6 for placement from the 1730 level. this leaves $I_\gamma=3.5$ 20 for placement from the 1728 level; however, such a large branch from the 1728 level is not consistent with data from Coulomb excitation or $(\alpha,2n\gamma)$ where the 707 γ is not seen. most of the excess intensity must belong elsewhere.

[&] **1986Be12** report $E_\gamma=1097.1$ 1 with $I_\gamma=10$ 5 placed from the 1804 level. **2009GaZR** report two γ 's close to this energy and placed from the 1804 and 1908 levels. From $I_\gamma/I_\gamma(1786\gamma)=0.98$ 17 from the 1098 level as determined in Coulomb excitation, one gets $I_\gamma(1097\gamma)=8$ 2 for placement from that level, leaving $I_\gamma=2$ 5 for placement from the 1804 level.

^a **1986Be12** report $E_\gamma=1212.9$ 1 with $I_\gamma=21$ 2 doubly placed from the 1579 and 1920 levels. From $I_\gamma/I_\gamma(360.7\gamma)=0.38$ 13 from ADOPTED gammas for the 1920 level, one expects $I_\gamma(1212.9\gamma)=0.8$ 5 for placement from the 1920 level, leaving $I_\gamma=20$ 2 for placement from the 1579 level. Note also that from $I_\gamma/I_\gamma(1458\gamma)=2.83$ 3 from the 1579 level in Adopted Gammas, one expects $I_\gamma=27$ 3 for placement from this level, consistent with assigning nearly all the intensity to the 1579 level.

^b **1986Be12** report $E_\gamma=562.9$ 1 with $I_\gamma=115$ 13 doubly placed from the 685 and 1650 levels. From $I_\gamma/I_\gamma(1528\gamma)=1.74$ 4 from the 1650 level in Adopted Gammas, one gets $I_\gamma=11.3$ 16 for placement from that level, leaving $I_\gamma=104$ 13 for placement from the 685 level.

^c **1986Be12** report $E_\gamma=443.9$ 1 with $I_\gamma=46$ 5 doubly placed from the 810 and 1530 levels. From $I_\gamma/I_\gamma(1408\gamma)=0.1485$ 4 from the 1530 level in Adopted Gammas, one gets $I_\gamma=3.7$ 5 for placement from that level, leaving $I_\gamma=42$ 5 for placement from the 810 level. from $I_\gamma/I_\gamma(689\gamma)=0.347$ 13 from the 810 level in Adopted Gammas, one gets $I_\gamma=45$ 6 for placement from that level. The evaluator adopts $I_\gamma=43$ 5 from these two determinations.

^d **1986Be12** report $E_\gamma=329.3$ 1 with $I_\gamma=11.8$ 14 placed from the 1293 level. **2009GaZR** place a 329 γ from both the 1293 level and the 1372 level. From $I_\gamma/(1005\gamma+1249\gamma)=0.0121$ 6 from the 1372 level in Adopted Gammas, one expects $I_\gamma=0.43$ 3 for placement from that level, leaving $I_\gamma=11.4$ 14 for placement from the 1293 level.

^e **1986Be12** report $E_\gamma=919.2$ 1 with $I_\gamma=100$ 10 placed from the 1041 level. **2009GaZR** report another transition with this energy placed from the 1730 level. From $I_\gamma(919\gamma)/I_\gamma(1363\gamma)=0.252$ 17 for the 1730 level from Adopted Gammas, one expects $I_\gamma(919\gamma)=2.1$ 3 for placement from this level. This leaves $I_\gamma=98$ 10 for placement from the 1041 level.

^f **1986Be12** report $E_\gamma=1389.1$ 1 with $I_\gamma=26$ 3 placed from the 1511 level. **2009GaZR** report another transition with this energy placed from the 1757 level. From $I_\gamma/I_\gamma(523\gamma+671\gamma)=0.105$ 8 for the 1757 level from Adopted Gammas, one expects $I_\gamma(1389\gamma)=1.04$ 15 for placement from the 1757 level. This leaves $I_\gamma=25$ 3 for placement from the 1511 level.

^g **1986Be12** report $E_\gamma=656.5$ 1 with $I_\gamma=34$ 4 placed from the 1023 level. **2009GaZR** report another transition with this energy placed from the 1891 level. From $I_\gamma/I_\gamma(213\gamma+316\gamma+901\gamma)=1.22$ 5 for the 1023 level from Adopted Gammas, one expects $I_\gamma(656\gamma)=34$ 4 for placement from the 1023 level. This leaves $I_\gamma=0$ 6 for placement from the 1891 level. The evaluator assigns $I_\gamma=3$ 3.

^h **2009GaZR** report several transitions from their raw file that are not included in their final level scheme. The evaluator has included these transitions when they have been reported in other datasets. The energies; however, are not included in the least-squares adjustment nor in Adopted Gammas.

ⁱ The branchings from the 1804 level are not consistent with those in 7.52-min β^- decay or Coulomb excitation. See ADOPTED gammas for a discussion.

Continued on next page (footnotes at end of table)

 $^{152}\text{Sm}(\text{n},\text{n}'\gamma)$ [2009GaZR,1986Be12](#) (continued)

 $\gamma(^{152}\text{Sm})$ (continued)

^j [1986Be12](#) report $E\gamma=963.5$ *1* with $I\gamma=162$ *17* doubly placed from the 963 and 1086 levels. From $I\gamma/I\gamma(841.6\gamma)=0.83$ *3* from the 963 level in Adopted Gammas, one gets $I\gamma=75$ *9* for placement from that level. From $I\gamma/I\gamma(1085\gamma)=1.430$ *4* from the 1086 level in Adopted Gammas, one gets $I\gamma=70$ *7* for placement from that level. The sum of these values is 145 *12* compared with 162 *17* for the direct measurement. The evaluator adopts a weighted average of 151 *10* for the sum, and apportions the intensities accordingly.

^k Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

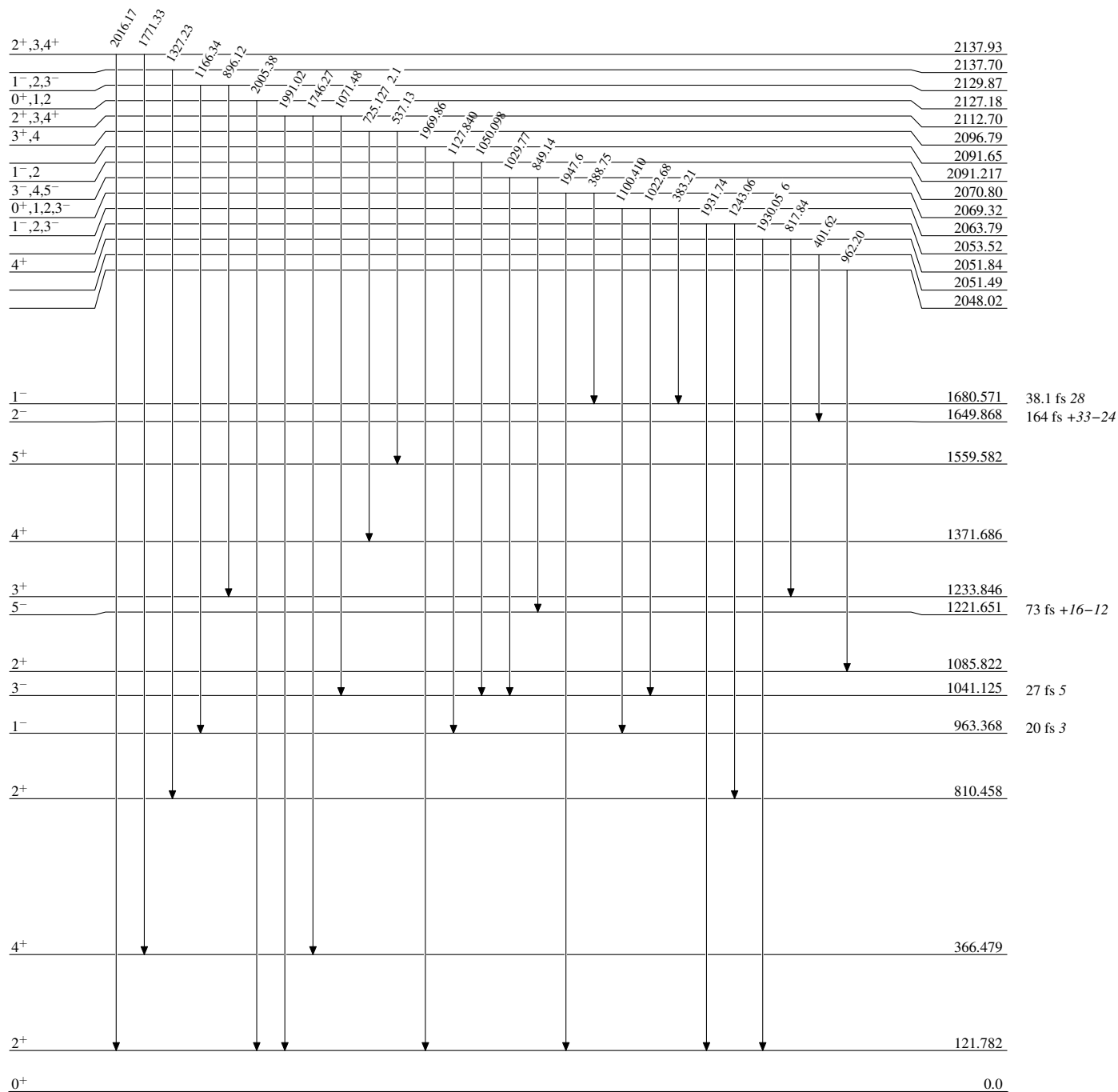
$^{152}\text{Sm}(n,n'\gamma)$ 2009GaZR,1986Be12

Level Scheme

Intensities: Relative I_γ

Legend

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

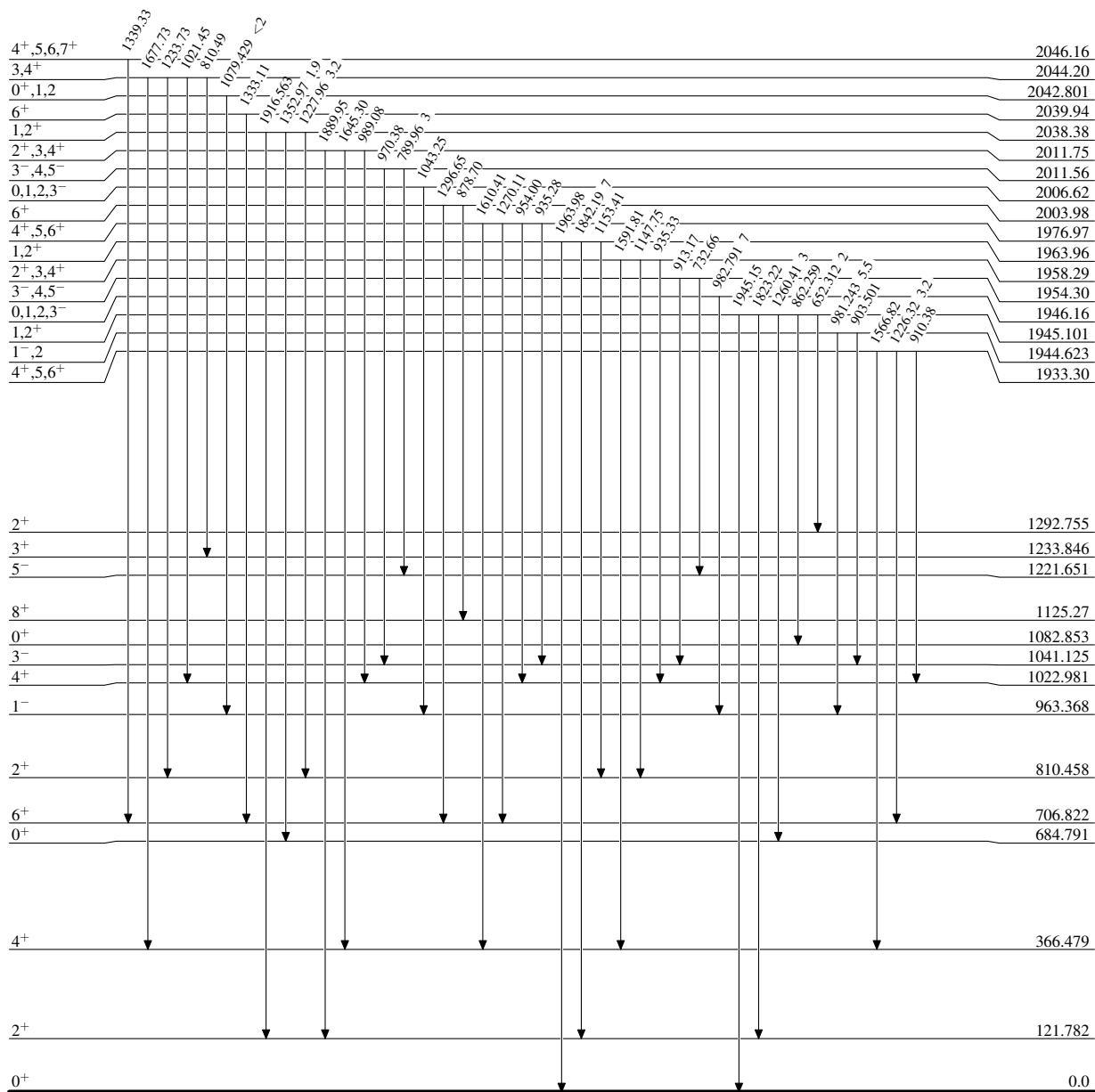
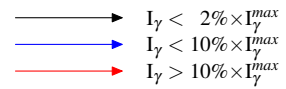


$^{152}\text{Sm}(n,n'\gamma)$ 2009GaZR,1986Be12

Level Scheme (continued)

Intensities: Relative I_γ

Legend

 $^{152}_{62}\text{Sm}_{90}$

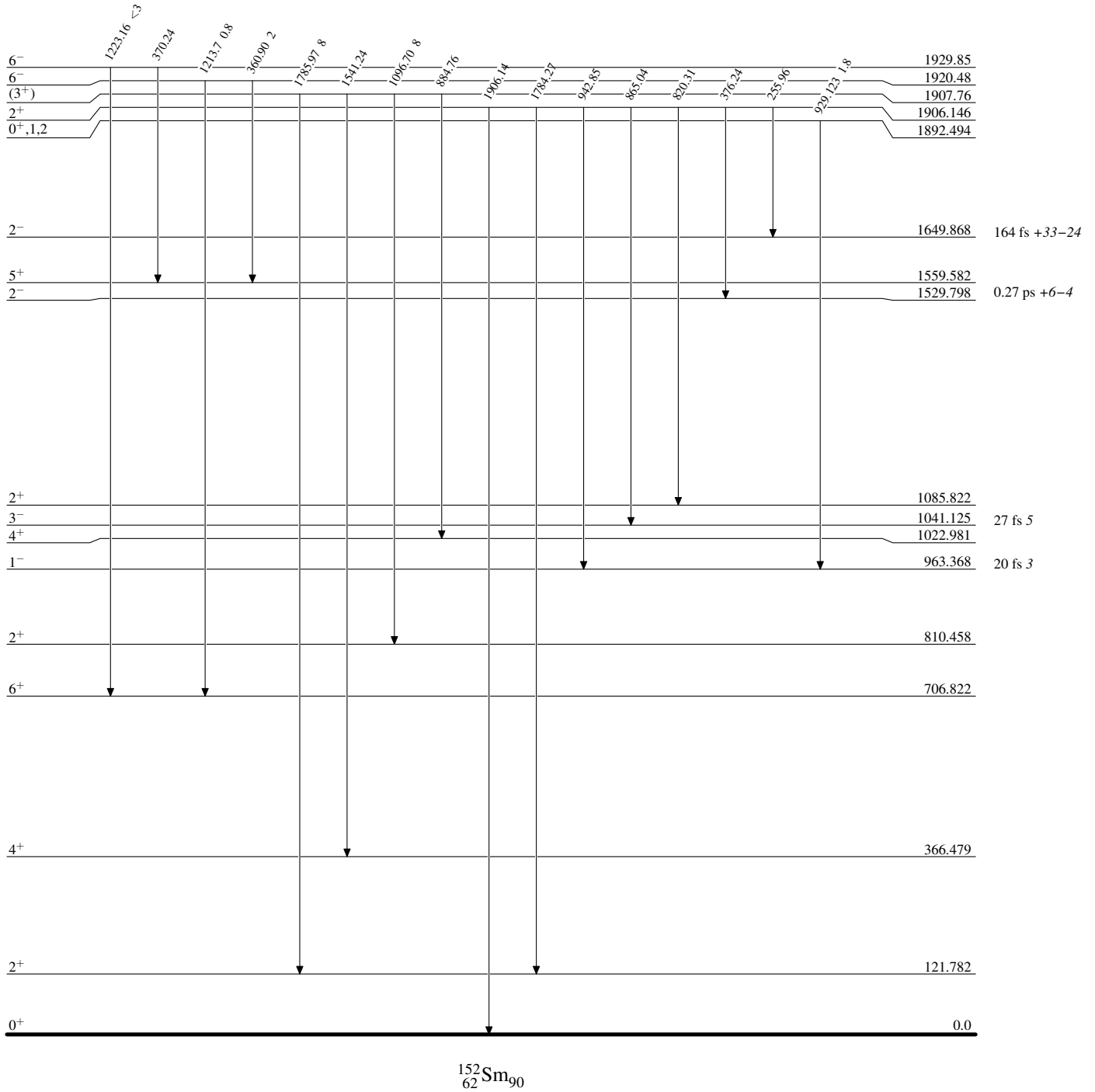
$^{152}\text{Sm}(n,n'\gamma)$ 2009GaZR,1986Be12

Level Scheme (continued)

Intensities: Relative I_γ

Legend

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



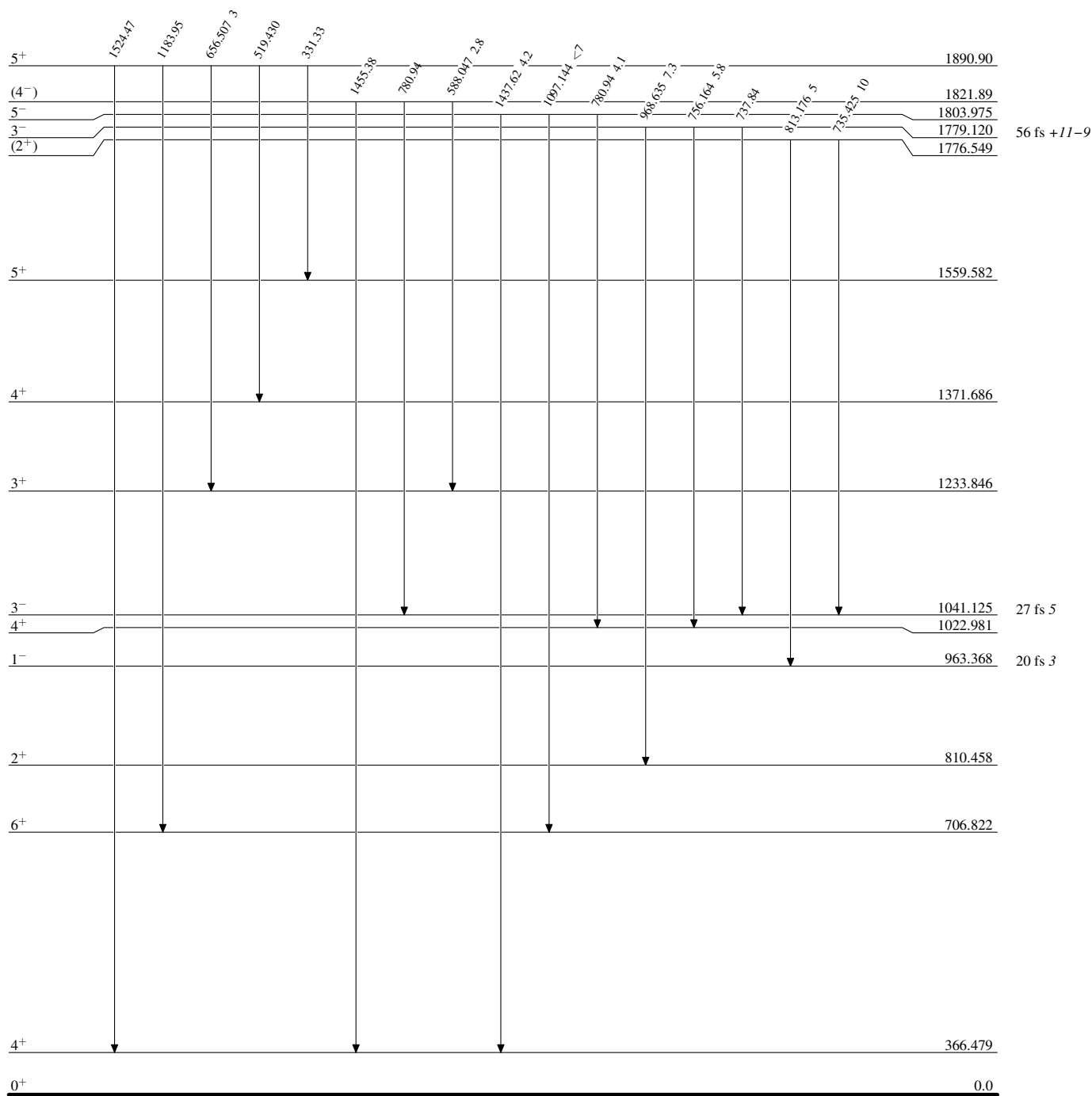
$^{152}\text{Sm}(n,n'\gamma)$ 2009GaZR,1986Be12

Level Scheme (continued)

Intensities: Relative I_γ

Legend

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


 $^{152}_{62}\text{Sm}_{90}$

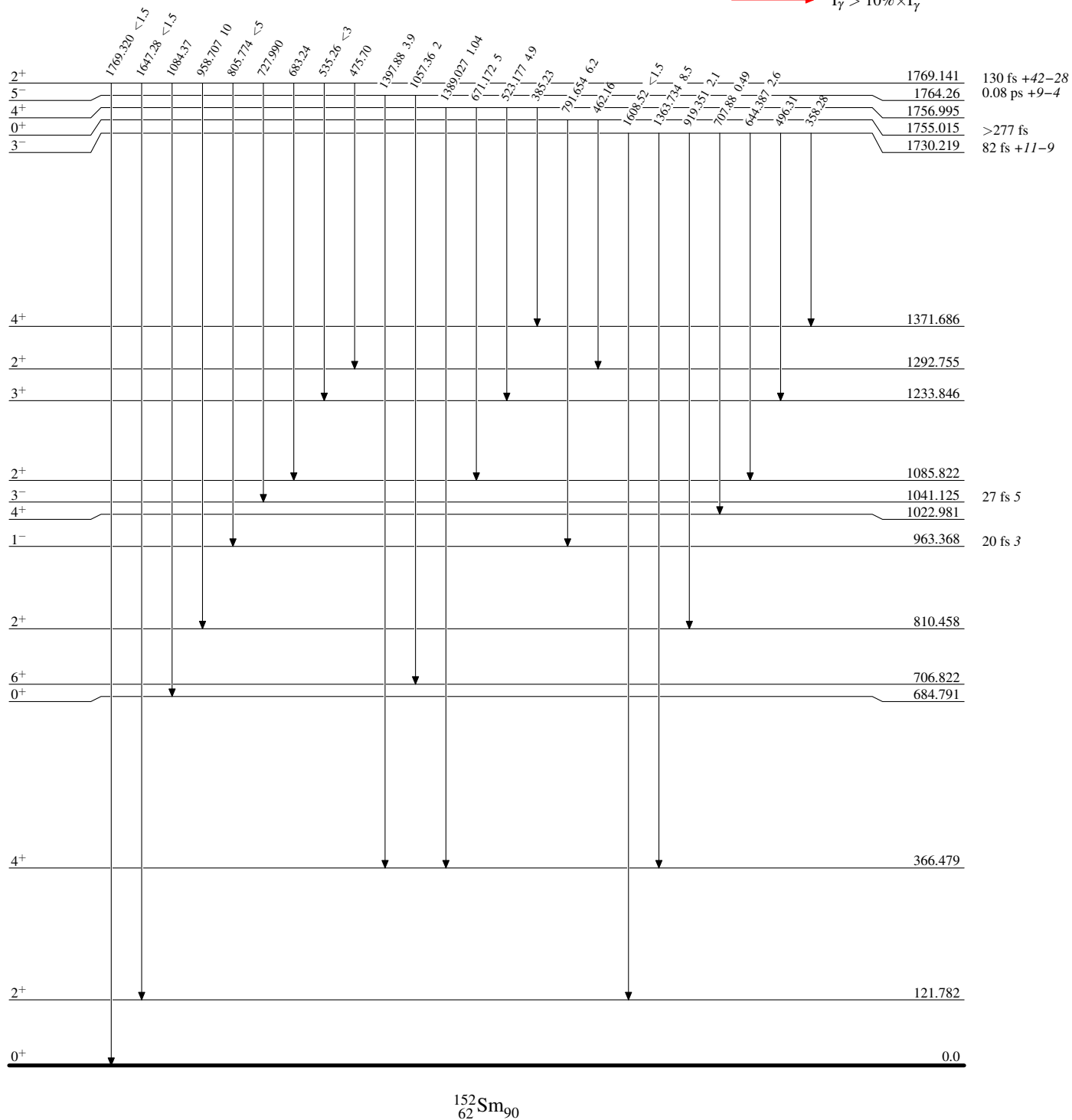
$^{152}\text{Sm}(n,n'\gamma)$ 2009GaZR,1986Be12

Level Scheme (continued)

Intensities: Relative I_γ

Legend

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



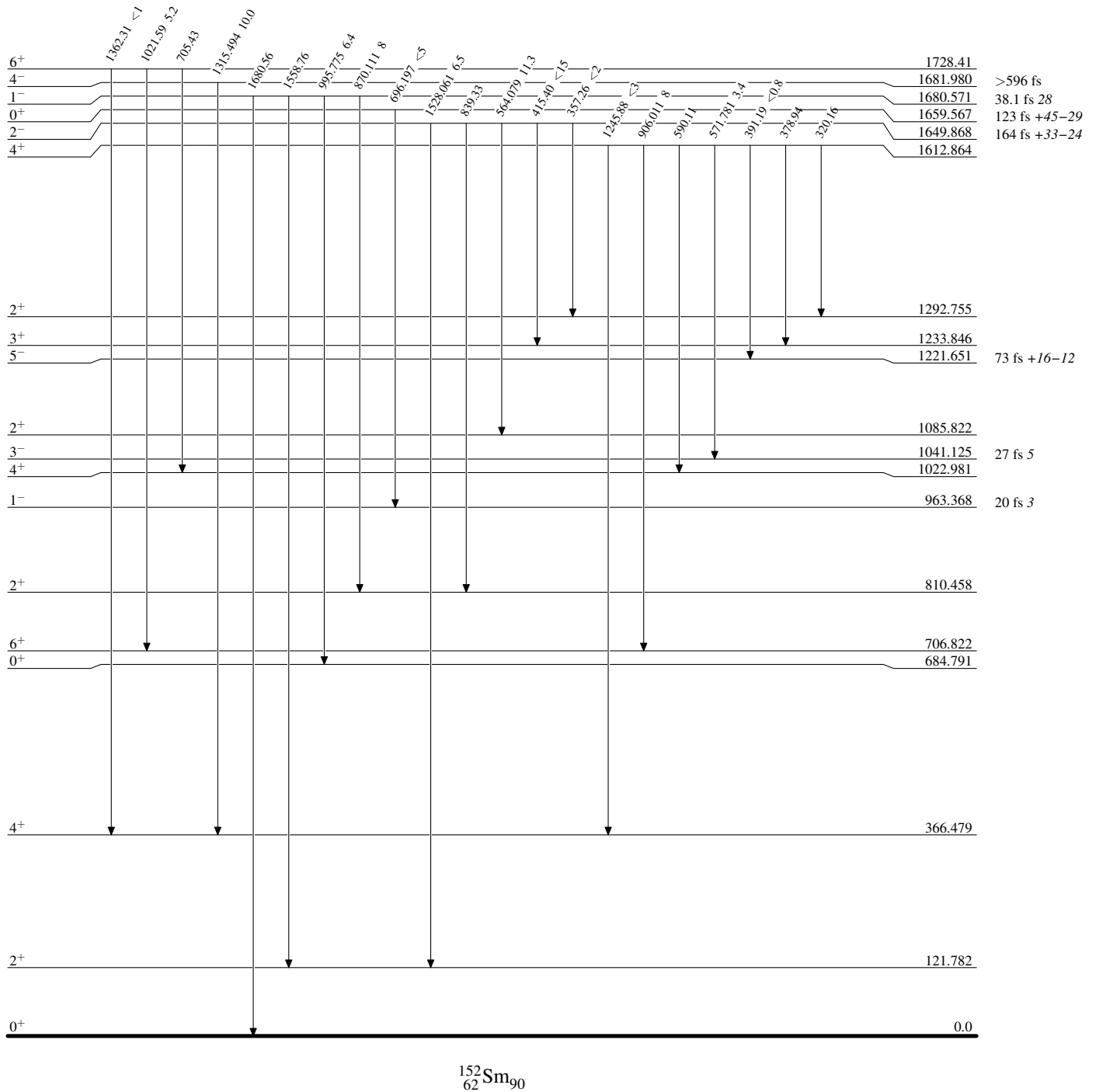
$^{152}\text{Sm}(n,n'\gamma)$ 2009GaZR,1986Be12

Level Scheme (continued)

Intensities: Relative I_γ

Legend

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



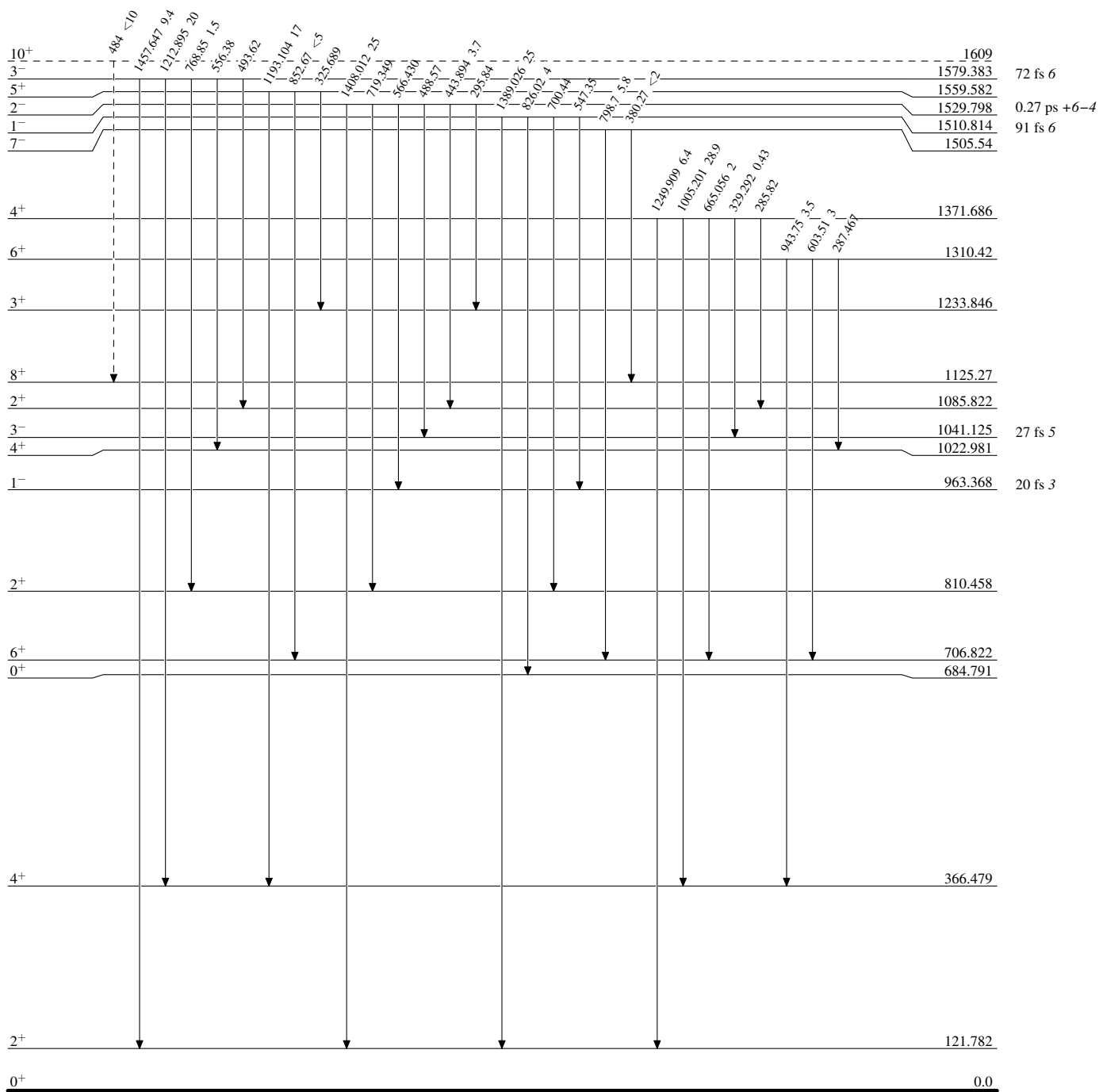
$^{152}\text{Sm}(n,n'\gamma)$ 2009GaZR,1986Be12

Legend

Level Scheme (continued)

Intensities: Relative I_γ

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

 $^{152}_{62}\text{Sm}_{90}$

¹⁵²Sm(n,n'γ) 2009GzR,1986Be12

Level Scheme (continued)

Intensities: Relative I_γ

