

$^{55}\text{Mn}(\alpha, n\gamma)$ 1971Ro08, 1971Xe01, 1975Br05

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja and B. Singh	ENSDF	31-Oct-2015

1971Ro08: E=5-10 MeV. Measured $E\gamma$, $I\gamma$, $\gamma\gamma$, $\gamma(\tau)$.

1971Xe01: E=7.5-12.5 MeV from Washington University cyclotron. Measured $E\gamma$, $I\gamma$, $\gamma\gamma$.

1975Br05: E=9.5 MeV beam from Ohio State Van de Graaff accelerator. Measured lifetimes by DSAM.

1972Ge14: E=10 MeV. Measured $\gamma(\theta)$, lifetimes by DSAM.

The level scheme is that proposed by 1971Xe01; however, some γ placements proposed by 1971Ro08, but not adopted by 1971Xe01, are retained by the evaluators and are noted.

 ^{58}Co Levels

E(level) [†]	J ^π #	T _{1/2} [@]	Comments
0.0	2 ⁺	70.86 d 6	T _{1/2} : from Adopted Levels.
24.89	5 ⁺	9.10 h 9	%IT=100 T _{1/2} : from Adopted Levels.
53.12 7	4 ⁺	11.4 μs 6	%IT=100 T _{1/2} : from 1971Ro08.
111.73 7	3 ⁺	0.12 ns 2	T _{1/2} : from 1972Ge14.
365.64 7	3 ⁺	1.1 ps +6-3	J ^π : J=3 from $\gamma(\theta)$ and RUL (1975Br05). T _{1/2} : weighted average of 1.2 ps +7-4 (1975Br05) and 1.0 ps +8-4 (1972Ge14).
373.89 10	5 ⁺	0.8 ps +5-3	J ^π : J=3 from $\gamma(\theta)$ and RUL (1975Br05). T _{1/2} : weighted average of 1.5 ps +9-5 (1975Br05) and 0.62 ps +51-24 (1972Ge14).
457.46 8	4 ⁺	0.9 ps 3	J ^π : J=3 or 5 from RUL and $\gamma(\theta)$ (1975Br05). T _{1/2} : weighted average of 0.87 ps +31-26 (1975Br05) and 0.8 ps +6-3 (1972Ge14).
885.60 10	3 ⁺ , 4 ⁺	0.15 ps +5-3	J ^π : J=5 is ruled out by $\gamma(\theta)$ of 1975Br05. T _{1/2} : weighted average of 0.17 ps +8-5 (1975Br05) and 0.14 ps +6-3 (1972Ge14).
1040.09 12	3 ⁺	0.14 ps +6-4	J ^π : J=3 or 5 from $\gamma(\theta)$ (1975Br05). T _{1/2} : from 1972Ge14.
1044.28 11	(3 ⁺)	>1.2 ps	T _{1/2} : from 1972Ge14.
1050.12 10	1 ⁺	0.14 ps +6-3	T _{1/2} : from 1972Ge14.
1075.52 25	6 ⁺		
1184.60 11	5 ⁺	0.15 ps +5-3	T _{1/2} : weighted average of 0.17 ps +8-5 (1975Br05) and 0.14 ps +6-3 (1972Ge14).
1236.54 13	2 ⁺		
1351.48 15			
1353.45 13	(2 ⁺)	0.6 ps +14-4	T _{1/2} : from 1975Br05.
1376.96 12	1 ⁺	0.16 ps +9-6	T _{1/2} : from 1975Br05.
1418.08 17	(5 ⁺)		
1424.56 [‡] 16	(6 ⁺)		
1434.93 25	1 ⁺	0.6 ps +21-4	T _{1/2} : from 1975Br05. J ^π : J=4 ruled out in (γ, θ) (1975Br05).
1513.28 [‡] 12	(3 ⁺ , 4, 5 ⁺)		
1522.54 22			
1524.4 4			
1548.78 21	5 ⁺		
1554.69 14	(1 ⁺ , 2, 3 ⁺)		
1605.59 15	3 ⁺		
1730.0 3	1 ⁺		
1740.5 4			
1749.35 19	(3, 4) ⁺		
1757.2 3	(1 ⁺ , 2, 3 ⁺)		
1865.8 3	(2 ⁺ , 3, 4 ⁺)		
1928.99 20	(7 ⁺)		

Continued on next page (footnotes at end of table)

$^{55}\text{Mn}(\alpha, n\gamma)$ **1971Ro08, 1971Xe01, 1975Br05** (continued) ^{58}Co Levels (continued)† From a least-squares fit to the E_γ data with the 24.89 level held fixed.‡ Level not reported by [1971Xe01](#).

From Adopted Levels.

@ From DSAM ([1975Br05](#) and/or [1972Ge14](#)). $\gamma(^{58}\text{Co})$

E_γ #	I_γ †	E_i (level)	J_i^π	E_f	J_f^π	Mult. ‡	δ ‡	Comments
24.89		24.89	5 ⁺	0.0	2 ⁺	M3		E_γ , Mult.: from Adopted Gammas.
28.30 <i>15</i>		53.12	4 ⁺	24.89	5 ⁺			
52.96 <i>13</i>		53.12	4 ⁺	0.0	2 ⁺			I_γ : $I(53\gamma)/I(28\gamma)=2.5$ 2 (branching=100 4 and 40 4) (1971Ro08).
58.49 <i>12</i>	67 8	111.73	3 ⁺	53.12	4 ⁺			I_γ : 59 7 (1971Ro08).
91.63 <i>27</i>	1.1 <i>1</i>	457.46	4 ⁺	365.64	3 ⁺			
111.52 <i>15</i>	63 2	111.73	3 ⁺	0.0	2 ⁺			I_γ : 102 2 (1971Ro08).
253.39 <i>24</i>	0.6 <i>1</i>	365.64	3 ⁺	111.73	3 ⁺			
^x 307.6 <i>3</i>								
312.39 <i>16</i>	0.77 7	365.64	3 ⁺	53.12	4 ⁺			I_γ : from $I_\gamma(312)/I_\gamma(366)$ (1971Ro08) and $I_\gamma(366)$.
320.76 <i>12</i>	99 3	373.89	5 ⁺	53.12	4 ⁺	D+Q	-0.050 25	Mult.: $A_2=-0.20$ 6, $A_4=+0.00$ 8.
326.36 & <i>16</i>	0.8	1376.96	1 ⁺	1050.12	1 ⁺			
332.50 & <i>16</i>	5.0 2	1376.96	1 ⁺	1044.28	(3 ⁺)			
345.59 <i>12</i>	14.2 6	457.46	4 ⁺	111.73	3 ⁺			
349.10 <i>16</i>	3.4	373.89	5 ⁺	24.89	5 ⁺			
365.58 <i>12</i>	65 2	365.64	3 ⁺	0.0	2 ⁺	D+(Q)	-0.018 23	Mult.: $A_2=-0.29$ 4, $A_4=+0.04$ 6.
^x 377.09 <i>16</i>								
404.20 <i>25</i>	0.6 <i>1</i>	457.46	4 ⁺	53.12	4 ⁺			
432.53 <i>12</i>	73 3	457.46	4 ⁺	24.89	5 ⁺	D+Q	-0.11 5	Mult.: $A_2=+0.33$ 8, $A_4=-0.02$ 12.
466.19 & <i>25</i>	1.4 <i>1</i>	1351.48		885.60	3 ⁺ , 4 ⁺			
473.27 ^d <i>16</i>	1.8 ^d 3	1513.28	(3 ⁺ , 4, 5 ⁺)	1040.09	3 ⁺			Placed only from 1513 level in 1971Ro08 .
473.27 ^d <i>16</i>	1.8 ^d 3	1548.78	5 ⁺	1075.52	6 ⁺			
504.43 ^d <i>12</i>	20.8 ^d 10	1554.69	(1 ⁺ , 2, 3 ⁺)	1050.12	1 ⁺			
504.43 ^d <i>12</i>	20.8 ^d 10	1928.99	(7 ⁺)	1424.56	(6 ⁺)			Placed only from 1929 level in 1971Ro08 .
510.8 <i>4</i>		885.60	3 ⁺ , 4 ⁺	373.89	5 ⁺			
519.90 <i>14</i>	10.5 6	885.60	3 ⁺ , 4 ⁺	365.64	3 ⁺			
^x 523.63 <i>26</i>								
582.87 <i>20</i>	7.7 4	1040.09	3 ⁺	457.46	4 ⁺			
^x 616.70 <i>20</i>	3.4 4							
^x 623.01 <i>20</i>								
^x 629.2 @ <i>4</i>	1.5 2							
663.17 & <i>20</i>	3.6 3	1548.78	5 ⁺	885.60	3 ⁺ , 4 ⁺			
670.1 @ <i>5</i>		1044.28	(3 ⁺)	373.89	5 ⁺			I_γ : weak γ .
674.50 <i>20</i>	3.9 4	1040.09	3 ⁺	365.64	3 ⁺			
684.09 <i>20</i>	0.8 3	1050.12	1 ⁺	365.64	3 ⁺			
^x 699.4 <i>8</i>								
701.7 <i>6</i>	11.6 6	1075.52	6 ⁺	373.89	5 ⁺			
707.2 @ <i>3</i>	7.0 4	1757.2	(1 ⁺ , 2, 3 ⁺)	1050.12	1 ⁺			
727.13 <i>12</i>	28.5 10	1184.60	5 ⁺	457.46	4 ⁺			
^x 748.1 <i>3</i>	1.5 4							

Continued on next page (footnotes at end of table)

$^{55}\text{Mn}(\alpha, n\gamma)$ **1971Ro08, 1971Xe01, 1975Br05 (continued)** $\gamma(^{58}\text{Co})$ (continued)

E_γ #	I_γ †	E_i (level)	J_i^π	E_f	J_f^π	Mult. ‡	Comments
773.93 <i>12</i>	22.7 <i>8</i>	885.60	3 ⁺ ,4 ⁺	111.73	3 ⁺		
832.9 <i>3</i>	2.7 <i>3</i>	885.60	3 ⁺ ,4 ⁺	53.12	4 ⁺		
860.8 <i>5</i>	6.5 <i>6</i>	885.60	3 ⁺ ,4 ⁺	24.89	5 ⁺		
863.3 @ <i>2</i>	4.9 <i>6</i>	1749.35	(3,4) ⁺	885.60	3 ⁺ ,4 ⁺		E_γ : γ assigned to $^{55}\text{Mn}(\alpha, p\gamma)^{58}\text{Fe}$ in 1971Ro08 , by 1971Xe01 observed it in coincidence with neutrons.
^x 870.78 <i>20</i>							
893.88 & <i>16</i>	17.7 <i>6</i>	1351.48		457.46	4 ⁺		
^x 926.4 <i>3</i>							
932.50 <i>20</i>	3.2 <i>5</i>	1044.28	(3 ⁺)	111.73	3 ⁺		
938.16 <i>16</i>	8.9 <i>10</i>	1050.12	1 ⁺	111.73	3 ⁺		
979.9 @ <i>5</i>	1.5 <i>5</i>	1865.8	(2 ⁺ ,3,4 ⁺)	885.60	3 ⁺ ,4 ⁺		
987.90 <i>16</i>	7.1 <i>10</i>	1353.45	(2) ⁺	365.64	3 ⁺		
1039.80 <i>25</i>	5.1 <i>7</i>	1040.09	3 ⁺	0.0	2 ⁺		
1044.18 ^e <i>14</i>	14 ^{eb} <i>3</i>	1044.28	(3 ⁺)	0.0	2 ⁺		
1044.18 ^e <i>14</i>	<3.8 ^{eb}	1418.08	(5) ⁺	373.89	5 ⁺		
1049.4 <i>3</i>	15.1 ^c <i>17</i>	1050.12	1 ⁺	0.0	2 ⁺		
1050.81 <i>16</i>	75 ^c <i>8</i>	1424.56	(6 ⁺)	373.89	5 ⁺		
1124.80 <i>20</i>	6.5 <i>7</i>	1236.54	2 ⁺	111.73	3 ⁺		
1131.50 <i>16</i>	8.6 <i>9</i>	1184.60	5 ⁺	53.12	4 ⁺		
1139.4 <i>5</i>		1513.28	(3 ⁺ ,4,5 ⁺)	373.89	5 ⁺		
1147.61 ^d <i>17</i>	5.5 ^d <i>8</i>	1513.28	(3 ⁺ ,4,5 ⁺)	365.64	3 ⁺		
1147.61 ^d <i>17</i>	5.5 ^d <i>8</i>	1605.59	3 ⁺	457.46	4 ⁺		
1157.0 <i>4</i>	1.5 <i>4</i>	1522.54		365.64	3 ⁺		I_γ : from $I(1157\gamma+1159\gamma)=5.7$ <i>5</i> and $I(1157\gamma)/I(1411\gamma)=0.78$ <i>7</i> in (p, γ).
1159.3 ^d <i>6</i>	4.2 ^d <i>7</i>	1184.60	5 ⁺	24.89	5 ⁺		
1159.3 ^d <i>6</i>	4.2 ^d <i>7</i>	1524.4		365.64	3 ⁺		
1189.4 @ <i>4</i>		1554.69	(1 ⁺ ,2,3 ⁺)	365.64	3 ⁺		I_γ : weak γ .
1236.52 <i>15</i>	19.3 <i>10</i>	1236.54	2 ⁺	0.0	2 ⁺		
1241.53 <i>20</i>	3.0 <i>7</i>	1353.45	(2) ⁺	111.73	3 ⁺		
1353.5 <i>4</i>	2.5 <i>6</i>	1353.45	(2) ⁺	0.0	2 ⁺		
1356.1 @ ^f <i>5</i>	1.8 <i>6</i>	1730.0	1 ⁺	373.89	5 ⁺	[E4]	E_γ : this transition to 373.9, 5 ⁺ seen only in ($\alpha, n\gamma$) is highly improbable, it is either a wrong placement or defines a separate level near this energy.
1363.14 & ^a <i>20</i>	8.5 <i>5</i>	1730.0	1 ⁺	365.64	3 ⁺		
1377.97 ^a <i>20</i>	5.6 <i>5</i>	1376.96	1 ⁺	0.0	2 ⁺		
^x 1392.2 <i>7</i>							
1399.1 <i>3</i>	8.7 <i>6</i>	1424.56	(6 ⁺)	24.89	5 ⁺		
1408.1 @ <i>4</i>		1865.8	(2 ⁺ ,3,4 ⁺)	457.46	4 ⁺		I_γ : weak γ .
1410.75 <i>25</i>	1.9 <i>4</i>	1522.54		111.73	3 ⁺		
^x 1414.9 <i>8</i>							
^x 1419.20 <i>25</i>							
1434.91 <i>25</i>	6.4 <i>5</i>	1434.93	1 ⁺	0.0	2 ⁺		
1488.20 <i>25</i>	5.2 <i>10</i>	1513.28	(3 ⁺ ,4,5 ⁺)	24.89	5 ⁺		
1494.66 <i>25</i>	7.9 <i>9</i>	1605.59	3 ⁺	111.73	3 ⁺		
1524.1 & <i>4</i>	5.1 <i>5</i>	1524.4		0.0	2 ⁺		
^x 1551.9 @ <i>4</i>	5.4 <i>8</i>						
1555.3 @ <i>3</i>	8.1 <i>14</i>	1554.69	(1 ⁺ ,2,3 ⁺)	0.0	2 ⁺		
^x 1562.8 @ <i>6</i>	1.1 <i>5</i>						
1606.3 @ <i>4</i>	2.8 <i>4</i>	1605.59	3 ⁺	0.0	2 ⁺		

Continued on next page (footnotes at end of table)

$^{55}\text{Mn}(\alpha, n\gamma)$ 1971Ro08, 1971Xe01, 1975Br05 (continued) $\gamma(^{58}\text{Co})$ (continued)

E_γ #	I_γ †	$E_i(\text{level})$	J_i^π	E_f	J_f^π
^x 1614.4 @ 6	2.3				
1628.7 @ 4	5.7 5	1740.5		111.73	3 ⁺
1645.2 @ 4	10.1 15	1757.2	(1 ⁺ , 2, 3 ⁺)	111.73	3 ⁺
1696.9 @ 5	2.6 3	1749.35	(3, 4) ⁺	53.12	4 ⁺
1730.5 @ 4	1.1 3	1730.0	1 ⁺	0.0	2 ⁺
1749.4 @ 5	3.1 5	1749.35	(3, 4) ⁺	0.0	2 ⁺
^x 1792.1 @ 5	8.2 10				
^x 1807.7 @ 4	3.0 7				
1813.3 @ 6	1.3 3	1865.8	(2 ⁺ , 3, 4 ⁺)	53.12	4 ⁺
1866.0 @ 10	2.5 1	1865.8	(2 ⁺ , 3, 4 ⁺)	0.0	2 ⁺
^x 1960.2 @ 8	2.2 4				
^x 2050.4 @ 12	3.0 9				
^x 2058.1 @ 11	2.9 9				
^x 2109.4 @ 7	2.6 6				

† Relative I_γ at $E_\alpha=11.7$ MeV (1971Xe01), unless indicated otherwise.

‡ From $\gamma(\theta)$ (1972Ge14).

From 1971Ro08, unless indicated otherwise.

@ From 1971Xe01.

& Unplaced by 1971Ro08; placement based on 1971Xe01.

^a Gives a poor fit to level energy.

^b 1971Xe01 report $I_\gamma=14.8$ 7 for a doubly-placed 1044 γ . Intensity divided by using branching ratios in (p, γ) dataset.

^c From branching in 1971Ro08.

^d Multiply placed with undivided intensity.

^e Multiply placed with intensity suitably divided.

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

^x γ ray not placed in level scheme.

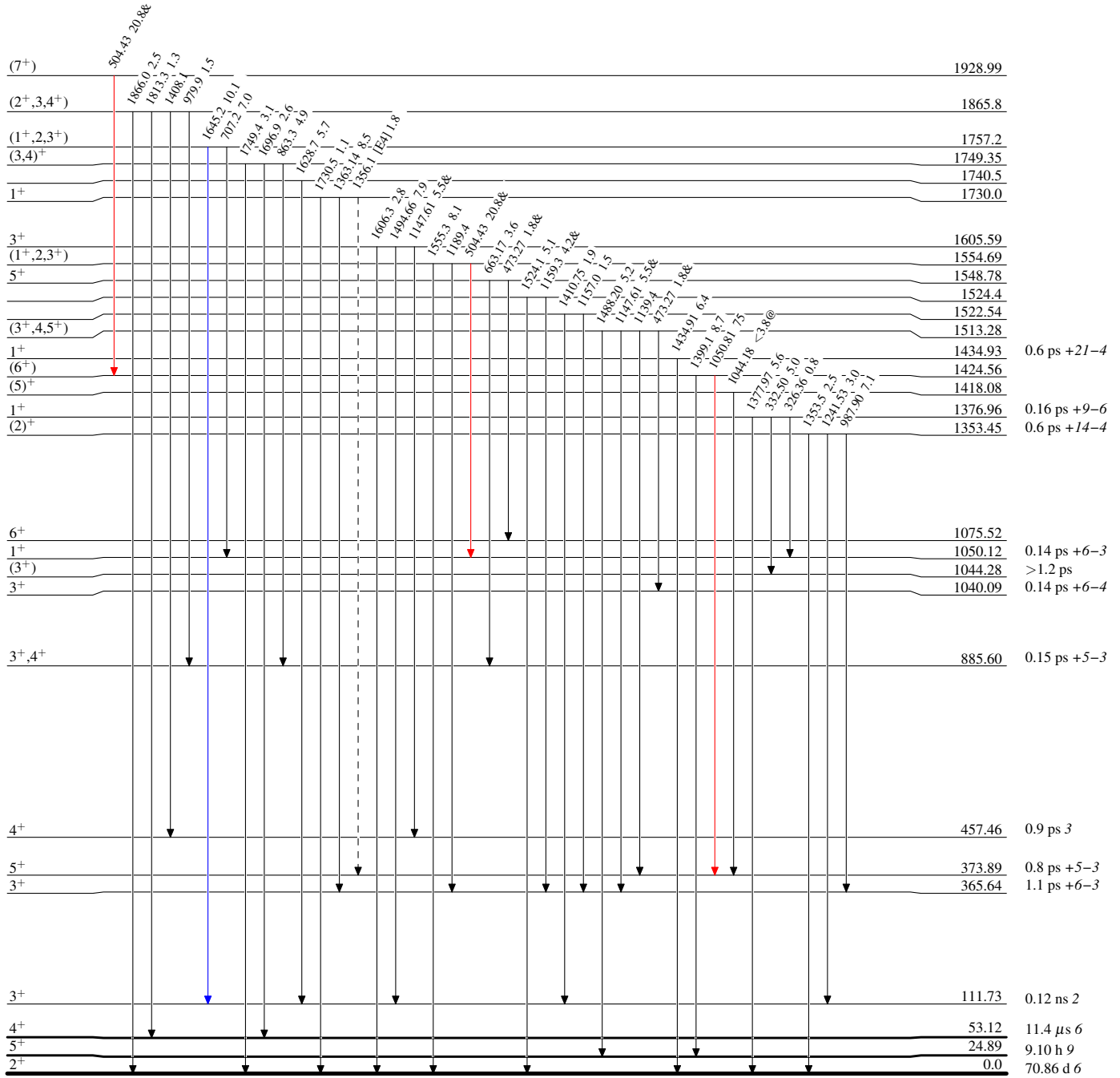
⁵⁵Mn(α,nγ) 1971Ro08,1971Xe01,1975Br05

Level Scheme

Legend

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}
- - - - - → γ Decay (Uncertain)



⁵⁸Co₃₁

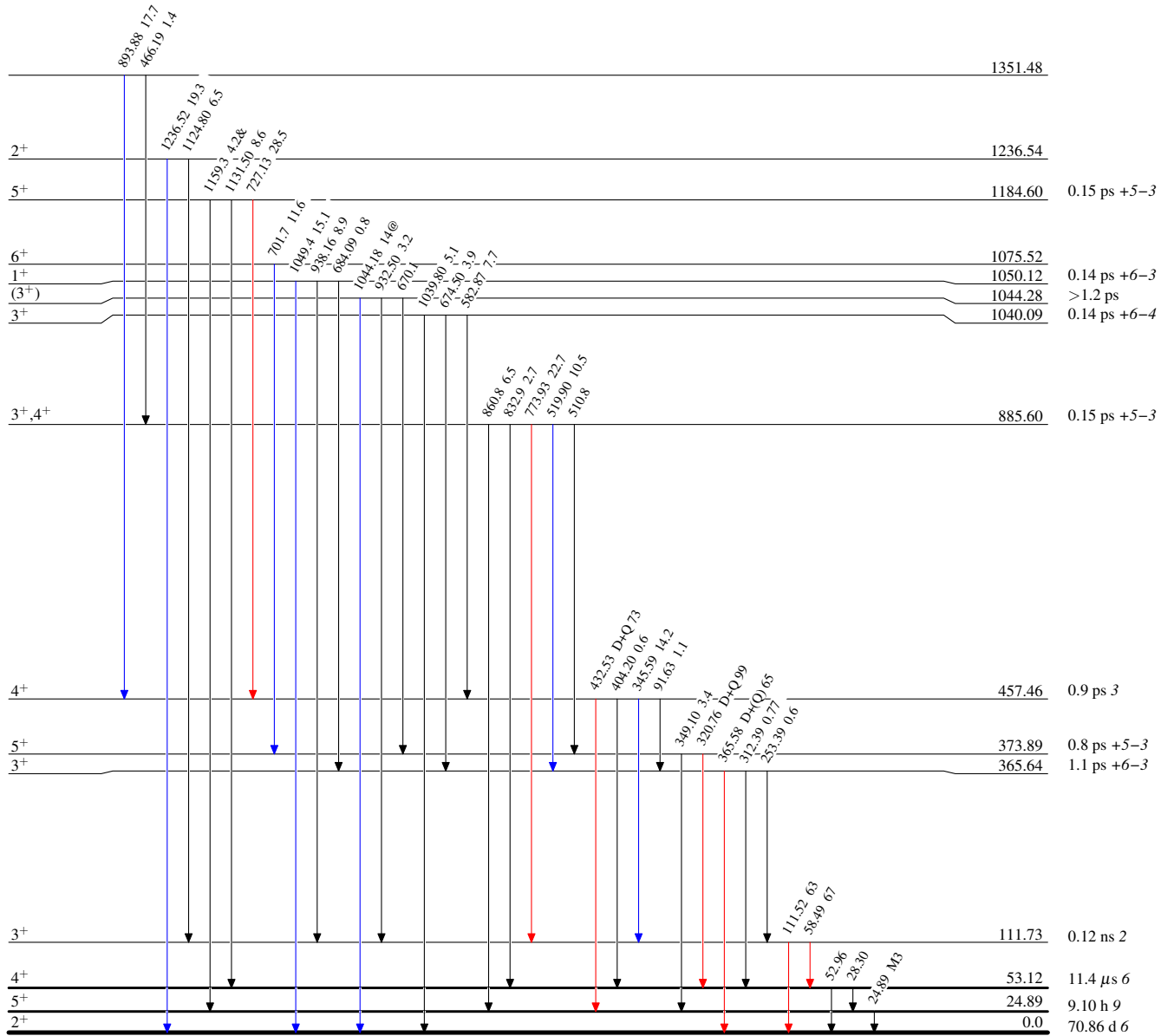
⁵⁵Mn(α,nγ) 1971Ro08,1971Xe01,1975Br05

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}



⁵⁸Co₃₁