

⁴⁸Ti(³⁰Si,p2n γ) 1999So10

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Alexandru Negret, Balraj Singh		NDS 114, 841 (2013)	30-Jun-2013

1999So10: ³⁰Si beam accelerated to 90 MeV by the Tandem accelerator at FSU. 190 $\mu\text{g}/\text{cm}^2$ target enriched to 99%. Measured $E\gamma$, $I\gamma$, $\gamma\gamma$, $\gamma\gamma(\theta)$ (DCO) using an array of ten Compton-suppressed Ge detectors at 35°, 145° and 90°. Comparisons with cranked-shell, Hartree-Fock-Bogoliubov, and particle-rotor models.

⁷⁵Br Levels

E(level)	J π [†]	E(level)	J π [†]	E(level)	J π [†]	E(level)	J π [†]
0.0 ^c	3/2 ⁻	2068.8 ^f 5	(13/2 ⁻)	4198.0 ^{&} 6	25/2 ⁺	7640.61 ^c 24	35/2 ⁻
119.35 ^b 8	5/2 ⁻	2132.5 ^e 5	13/2 ⁻	4348.46 ^b 16	25/2 ⁻	8050.6 ^d 18	(35/2 ⁻)
132.3 [‡] 3	5/2 ⁺	2300.9 [@] 6	17/2 ⁺	4415.8 [@] 11	25/2 ⁺	8277.9 [‡] 4	37/2 ⁺
154.40 [#] 10	3/2 ⁺	2354.94 ^b 13	17/2 ⁻	4524.4 ^a 9	25/2 ⁺	8333.18 ^b 24	37/2 ⁻
220.54 [‡] 14	9/2 ⁺	2605.3 ^d 6	15/2 ⁻	4781.1 ^e 11	25/2 ⁻	8644.2 15	(37/2 ⁺)
352.1 ^f 5	(5/2 ⁻)	2658.57 [‡] 17	(21/2 ⁺)	4967.59 ^c 19	27/2 ⁻	8691.7 ^{&} 12	(37/2 ⁺)
373.88 [#] 20	7/2 ⁺	2754.95 ^c 15	19/2 ⁻	5191.59 [‡] 22	29/2 ⁺	9211.3 ^c 3	39/2 ⁻
517.74 ^c 8	7/2 ⁻	2774.9 ^e 4	17/2 ⁻	5292.8 ^d 12	27/2 ⁻	9703.7 ^d 20	(39/2 ⁻)
773.12 ^b 10	9/2 ⁻	2863.3 [#] 3	19/2 ⁺	5525.7 ^{&} 7	29/2 ⁺	9882.7 ^b 3	41/2 ⁻
783.26 [‡] 12	13/2 ⁺	3222.4 [@] 5	21/2 ⁺	5602.66 ^b 19	29/2 ⁻	10150.2 [‡] 6	41/2 ⁺
847.6 [@] 5	9/2 ⁺	3224.7 ^d 6	19/2 ⁻	5708.1 [@] 14	(29/2 ⁺)	10411.8 ^{&} 16	(41/2 ⁺)
939.38 [#] 21	11/2 ⁺	3272.95 ^b 15	21/2 ⁻	5810.5 ^a 13	29/2 ⁺	10443.8 16	(41/2 ⁺)
1149.29 ^c 10	11/2 ⁻	3325.2 9	(19/2 ⁻)	6236.60 ^c 22	31/2 ⁻	10452.1 17	(41/2 ⁺)
1257.5 ^f 8	(9/2 ⁻)	3438.0 ^a 8	21/2 ⁺	6586.2 ^d 15	(31/2 ⁻)	10908.1 ^c 5	43/2 ⁻
1511.8 [@] 5	13/2 ⁺	3664.3 ^e 6	21/2 ⁻	6630.1 [‡] 3	33/2 ⁺	11514.7 ^d 23	(43/2 ⁻)
1515.28 ^b 11	13/2 ⁻	3776.56 ^c 16	23/2 ⁻	6938.97 ^b 22	33/2 ⁻	11655.2 ^b 5	45/2 ⁻
1613.05 [‡] 14	17/2 ⁺	3869.68 [‡] 20	25/2 ⁺	6991.1 11	(33/2 ⁺)	12106.3 [‡] 12	(45/2 ⁺)
1790.88 [#] 23	15/2 ⁺	4136.7 [#] 10	23/2 ⁺	7075.9 ^{&} 8	33/2 ⁺	12797.8 ^c 8	(47/2 ⁻)
1896.16 ^c 13	15/2 ⁻	4170.7 ^d 8	23/2 ⁻	7224.5 ^a 16	(33/2 ⁺)		

† From 1999So10.
[‡] Band(A): 5/2⁺ band.
[#] Band(B): 3/2⁺ band.
[@] Band(C): 9/2⁺ band.
[&] Band(D): 25/2⁺ band.
^a Band(E): 21/2⁺ band.
^b Band(F): 5/2⁻ band.
^c Band(G): 3/2⁻ band.
^d Band(H): 15/2⁻ band.
^e Band(I): 13/2⁻ band.
^f Band(J): 5/2⁻ band.

$^{48}\text{Ti}(^{30}\text{Si,p}2\text{n}\gamma)$ **1999So10 (continued)** $\gamma(^{75}\text{Br})$

DCO ratios correspond to gates on $\Delta J=2$, Q transitions. Expected values are ≈ 1 for $\Delta J=2$, Q transitions and ≈ 0.5 for $\Delta J=1$, dipole and 0-2 for $\Delta J=1$, dipole+quadrupole transitions.

E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
87.9 5	53	220.54	9/2 ⁺	132.3	5/2 ⁺	
119.3 1	57	119.35	5/2 ⁻	0.0	3/2 ⁻	R(DCO)=0.67 3.
131.9 5	>144	132.3	5/2 ⁺	0.0	3/2 ⁻	
153 1	<1 [†]	373.88	7/2 ⁺	220.54	9/2 ⁺	R(DCO)=0.63 1 for 153+154.4.
154.4 1	7	154.40	3/2 ⁺	0.0	3/2 ⁻	R(DCO)=0.63 1 for 154.4+153.
156.2 9	1	939.38	11/2 ⁺	783.26	13/2 ⁺	R(DCO)=0.50 7.
219.5 2	>12 [†]	373.88	7/2 ⁺	154.40	3/2 ⁺	
232.7 9	<1	352.1	(5/2 ⁻)	119.35	5/2 ⁻	
241.4 9	<1 [†]	373.88	7/2 ⁺	132.3	5/2 ⁺	
255.2 1	1	773.12	9/2 ⁻	517.74	7/2 ⁻	R(DCO)=0.43 9.
297.0 9	<1	517.74	7/2 ⁻	220.54	9/2 ⁺	R(DCO)=0.62 13.
328 1	<1	4198.0	25/2 ⁺	3869.68	25/2 ⁺	R(DCO)=0.50 21.
352.1 9	3	352.1	(5/2 ⁻)	0.0	3/2 ⁻	
365.9 1	1	1149.29	11/2 ⁻	783.26	13/2 ⁺	R(DCO)=0.51 25.
365.9 1	1	1515.28	13/2 ⁻	1149.29	11/2 ⁻	R(DCO)=0.54 5.
376.0 1	1	1149.29	11/2 ⁻	773.12	9/2 ⁻	R(DCO)=0.47 12.
385.1 9	<1	517.74	7/2 ⁻	132.3	5/2 ⁺	R(DCO)=0.63 7.
398.2 1	10	517.74	7/2 ⁻	119.35	5/2 ⁻	R(DCO)=0.50 7.
419.5 9	1	2774.9	17/2 ⁻	2354.94	17/2 ⁻	
420.6 9	2	773.12	9/2 ⁻	352.1	(5/2 ⁻)	
450.0 9	2	3224.7	19/2 ⁻	2774.9	17/2 ⁻	R(DCO)=0.62 6.
458.5 1	2	2354.94	17/2 ⁻	1896.16	15/2 ⁻	R(DCO)=0.40 4.
472.9 9	1	2605.3	15/2 ⁻	2132.5	13/2 ⁻	
473.6 9	<1	847.6	9/2 ⁺	373.88	7/2 ⁺	
505.8 9	<1	4170.7	23/2 ⁻	3664.3	21/2 ⁻	
517.8 1	52	517.74	7/2 ⁻	0.0	3/2 ⁻	R(DCO)=0.75 5.
517.8 1	2	3272.95	21/2 ⁻	2754.95	19/2 ⁻	
552.6 2	4	773.12	9/2 ⁻	220.54	9/2 ⁺	R(DCO)=0.88 6.
562.7 1	100	783.26	13/2 ⁺	220.54	9/2 ⁺	R(DCO)=0.97 18.
562.8 9	2	3222.4	21/2 ⁺	2658.57	(21/2 ⁺)	
565.5 1	13 [†]	939.38	11/2 ⁺	373.88	7/2 ⁺	R(DCO)=0.96 5.
571 2	1	3325.2	(19/2 ⁻)	2754.95	19/2 ⁻	
572.2 1	1	4348.46	25/2 ⁻	3776.56	23/2 ⁻	R(DCO)=0.49 19.
572.9 9	1	1511.8	13/2 ⁺	939.38	11/2 ⁺	R(DCO)=0.48 6.
617 1	1	2132.5	13/2 ⁻	1515.28	13/2 ⁻	
619.9 9	2	3224.7	19/2 ⁻	2605.3	15/2 ⁻	R(DCO)=0.94 8.
627.0 9	5	847.6	9/2 ⁺	220.54	9/2 ⁺	R(DCO)=0.92 7.
631.6 1	46	1149.29	11/2 ⁻	517.74	7/2 ⁻	R(DCO)=0.84 6.
634.0 9	<1	5602.66	29/2 ⁻	4967.59	27/2 ⁻	R(DCO)=0.82 7.
642.3 9	3	2774.9	17/2 ⁻	2132.5	13/2 ⁻	R(DCO)=0.91 6.
653.9 1	48	773.12	9/2 ⁻	119.35	5/2 ⁻	R(DCO)=0.87 4.
664.1 9	7	1511.8	13/2 ⁺	847.6	9/2 ⁺	R(DCO)=1.04 10.
706.1 1	1	2774.9	17/2 ⁻	2068.8	(13/2 ⁻)	
709.4 9	<1	2605.3	15/2 ⁻	1896.16	15/2 ⁻	R(DCO)=0.98 10.
715.2 9	2	847.6	9/2 ⁺	132.3	5/2 ⁺	R(DCO)=0.98 7.
719.2 9	1 [†]	939.38	11/2 ⁺	220.54	9/2 ⁺	R(DCO)=0.39 18.
719.9 9	1	3325.2	(19/2 ⁻)	2605.3	15/2 ⁻	
728.8 9	6	1511.8	13/2 ⁺	783.26	13/2 ⁺	R(DCO)=0.88 4.
732.0 9	5	1515.28	13/2 ⁻	783.26	13/2 ⁺	R(DCO)=0.88 1.

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$^{48}\text{Ti}(^{30}\text{Si},\text{p}2\text{n}\gamma)$ **1999So10** (continued) $\gamma(^{75}\text{Br})$ (continued)

E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments	
742.0	1	3	2354.94	17/2 ⁻	1613.05	17/2 ⁺	
742.3	1	40	1515.28	13/2 ⁻	773.12	9/2 ⁻	R(DCO)=1.00 9.
746.7	1	46	1896.16	15/2 ⁻	1149.29	11/2 ⁻	R(DCO)=0.97 9.
780	2	3	3438.0	21/2 ⁺	2658.57	(21/2 ⁺)	R(DCO)=0.90 8.
789.8	9	11	2300.9	17/2 ⁺	1511.8	13/2 ⁺	R(DCO)=1.07 5.
811.6	9	1	2068.8	(13/2 ⁻)	1257.5	(9/2 ⁻)	
829.9	1	81	1613.05	17/2 ⁺	783.26	13/2 ⁺	R(DCO)=1.06 13.
839.7	1	40	2354.94	17/2 ⁻	1515.28	13/2 ⁻	R(DCO)=1.00 12.
846	2	1	4170.7	23/2 ⁻	3325.2	(19/2 ⁻)	R(DCO)=0.76 30.
851.5	1	14	1790.88	15/2 ⁺	939.38	11/2 ⁺	R(DCO)=0.97 6.
858.9	1	34	2754.95	19/2 ⁻	1896.16	15/2 ⁻	R(DCO)=1.04 12.
879.1	9	3	2774.9	17/2 ⁻	1896.16	15/2 ⁻	R(DCO)=0.95 21.
889.3	9	7	3664.3	21/2 ⁻	2774.9	17/2 ⁻	R(DCO)=1.07 27.
905.7	9	1	1257.5	(9/2 ⁻)	352.1	(5/2 ⁻)	
909.7	9	1	3664.3	21/2 ⁻	2754.95	19/2 ⁻	
917.9	1	30	3272.95	21/2 ⁻	2354.94	17/2 ⁻	R(DCO)=1.03 2.
921.7	9	8	3222.4	21/2 ⁺	2300.9	17/2 ⁺	R(DCO)=0.94 9.
946.5	9	4	4170.7	23/2 ⁻	3224.7	19/2 ⁻	R(DCO)=0.99 7.
975.1	9	4	4198.0	25/2 ⁺	3222.4	21/2 ⁺	R(DCO)=1.18 13.
983.3	9	3	2132.5	13/2 ⁻	1149.29	11/2 ⁻	R(DCO)=0.84 4.
1007.6	9	6	1790.88	15/2 ⁺	783.26	13/2 ⁺	R(DCO)=1.23 8.
1021.9	1	24	3776.56	23/2 ⁻	2754.95	19/2 ⁻	R(DCO)=1.00 6.
1045.5	1	60	2658.57	(21/2 ⁺)	1613.05	17/2 ⁺	R(DCO)=1.00 1.
1072.4	2	11	2863.3	19/2 ⁺	1790.88	15/2 ⁺	R(DCO)=0.94 7.
1075.2	1	27	4348.46	25/2 ⁻	3272.95	21/2 ⁻	R(DCO)=1.02 5.
1086.3	9	5	4524.4	25/2 ⁺	3438.0	21/2 ⁺	R(DCO)=1.26 17.
1116.8	9	7	4781.1	25/2 ⁻	3664.3	21/2 ⁻	R(DCO)=1.10 37.
1122.1	9	3	5292.8	27/2 ⁻	4170.7	23/2 ⁻	R(DCO)=1.10 37.
1137.0	9	3	3438.0	21/2 ⁺	2300.9	17/2 ⁺	R(DCO)=1.11 12.
1191.0	1	19	4967.59	27/2 ⁻	3776.56	23/2 ⁻	R(DCO)=1.03 2.
1193.4	9	5	4415.8	25/2 ⁺	3222.4	21/2 ⁺	R(DCO)=1.14 18.
1211.1	1	38	3869.68	25/2 ⁺	2658.57	(21/2 ⁺)	R(DCO)=1.03 7.
1254.2	1	20	5602.66	29/2 ⁻	4348.46	25/2 ⁻	R(DCO)=1.06 13.
1259.7	9	4	2774.9	17/2 ⁻	1515.28	13/2 ⁻	
1269.0	1	13	6236.60	31/2 ⁻	4967.59	27/2 ⁻	R(DCO)=1.05 7.
1273.4	9	5	4136.7	23/2 ⁺	2863.3	19/2 ⁺	R(DCO)=1.35 16.
							E_γ : an 1152.8 γ from (23/2 ⁺) member was tentatively proposed by 1985Lu02 . No 1152.8 γ is reported by 1999So10 .
1286.1	9	6	5810.5	29/2 ⁺	4524.4	25/2 ⁺	R(DCO)=1.28 13.
1292.2	9	1	5708.1	(29/2 ⁺)	4415.8	25/2 ⁺	
1293.4	9	3	6586.2	(31/2 ⁻)	5292.8	27/2 ⁻	
1302.0	9	4	4524.4	25/2 ⁺	3222.4	21/2 ⁺	
1308.4	9	3	3664.3	21/2 ⁻	2354.94	17/2 ⁻	R(DCO)=0.97 11.
1321.9	1	22	5191.59	29/2 ⁺	3869.68	25/2 ⁺	R(DCO)=0.96 6.
1327.4	9	5	5525.7	29/2 ⁺	4198.0	25/2 ⁺	
1328.4	9	2	3224.7	19/2 ⁻	1896.16	15/2 ⁻	R(DCO)=0.95 10.
1336.3	1	16	6938.97	33/2 ⁻	5602.66	29/2 ⁻	R(DCO)=1.01 5.
1394.2	1	10	8333.18	37/2 ⁻	6938.97	33/2 ⁻	R(DCO)=1.03 2.
1404.0	1	8	7640.61	35/2 ⁻	6236.60	31/2 ⁻	R(DCO)=1.03 11.
1414	1	3	7224.5	(33/2 ⁺)	5810.5	29/2 ⁺	
1438.5	2	13	6630.1	33/2 ⁺	5191.59	29/2 ⁺	R(DCO)=0.99 3.
1464.4	9	1	8050.6	(35/2 ⁻)	6586.2	(31/2 ⁻)	
1465.4	9	3	6991.1	(33/2 ⁺)	5525.7	29/2 ⁺	R(DCO)=0.89 15.
1516.9	9	5	2300.9	17/2 ⁺	783.26	13/2 ⁺	R(DCO)=0.85 4.
1539.8	9	11	4198.0	25/2 ⁺	2658.57	(21/2 ⁺)	R(DCO)=0.95 28.
1549.5	2	6	9882.7	41/2 ⁻	8333.18	37/2 ⁻	R(DCO)=1.05 3.

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$^{48}\text{Ti}(^{30}\text{Si},\text{p}2\text{n}\gamma)$ **1999So10** (continued) $\gamma(^{75}\text{Br})$ (continued)

E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
1550.3 9	7	7075.9	33/2 ⁺	5525.7	29/2 ⁺	R(DCO)=0.98 9.
1570.7 2	5	9211.3	39/2 ⁻	7640.61	35/2 ⁻	R(DCO)=1.10 14.
1609.9 9	7	3222.4	21/2 ⁺	1613.05	17/2 ⁺	R(DCO)=0.76 2.
1615.8 9	6	8691.7	(37/2 ⁺)	7075.9	33/2 ⁺	
1647.8 2	6	8277.9	37/2 ⁺	6630.1	33/2 ⁺	R(DCO)=0.85 16.
1653 1	1	9703.7	(39/2 ⁻)	8050.6	(35/2 ⁻)	
1653.1 9	23	8644.2	(37/2 ⁺)	6991.1	(33/2 ⁺)	
1656.4 9	10	5525.7	29/2 ⁺	3869.68	25/2 ⁺	R(DCO)=1.00 10.
1696.7 4	2	10908.1	43/2 ⁻	9211.3	39/2 ⁻	R(DCO)=1.00 14.
1720 1	3	10411.8	(41/2 ⁺)	8691.7	(37/2 ⁺)	
1752 1	3	10443.8	(41/2 ⁺)	8691.7	(37/2 ⁺)	
1772.5 3	3	11655.2	45/2 ⁻	9882.7	41/2 ⁻	R(DCO)=0.97 13.
1807.8 9	2	10452.1	(41/2 ⁺)	8644.2	(37/2 ⁺)	
1811 1	1	11514.7	(43/2 ⁻)	9703.7	(39/2 ⁻)	
1872.3 4	4	10150.2	41/2 ⁺	8277.9	37/2 ⁺	R(DCO)=1.01 12.
1884.2 9	2	7075.9	33/2 ⁺	5191.59	29/2 ⁺	
1889.7 6	1	12797.8	(47/2 ⁻)	10908.1	43/2 ⁻	
1956 1	<1	12106.3	(45/2 ⁺)	10150.2	41/2 ⁺	E_γ : a 2057 γ from (45/2 ⁺) member was proposed by 1989Ma27 .

[†] Severe discrepancy in branching as compared to that in ^{75}Kr ϵ decay and/or other in-beam γ -ray studies (see Adopted Gammas for details).

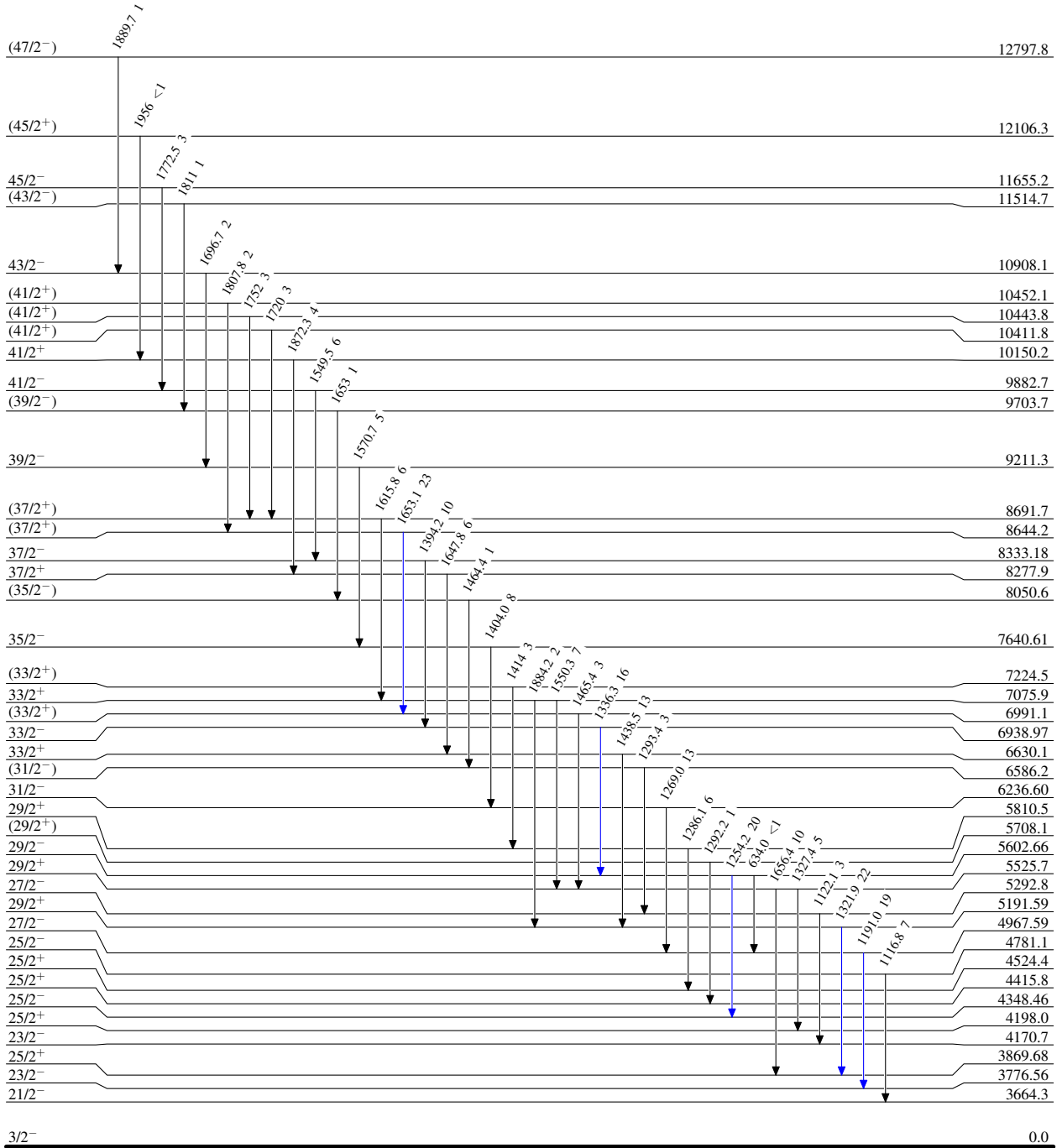
⁴⁸Ti(³⁰Si,p2n γ) 1999So10

Level Scheme

Intensities: Relative I _{γ}

Legend

- I _{γ} < 2% × I _{γ} ^{max}
- I _{γ} < 10% × I _{γ} ^{max}
- I _{γ} > 10% × I _{γ} ^{max}



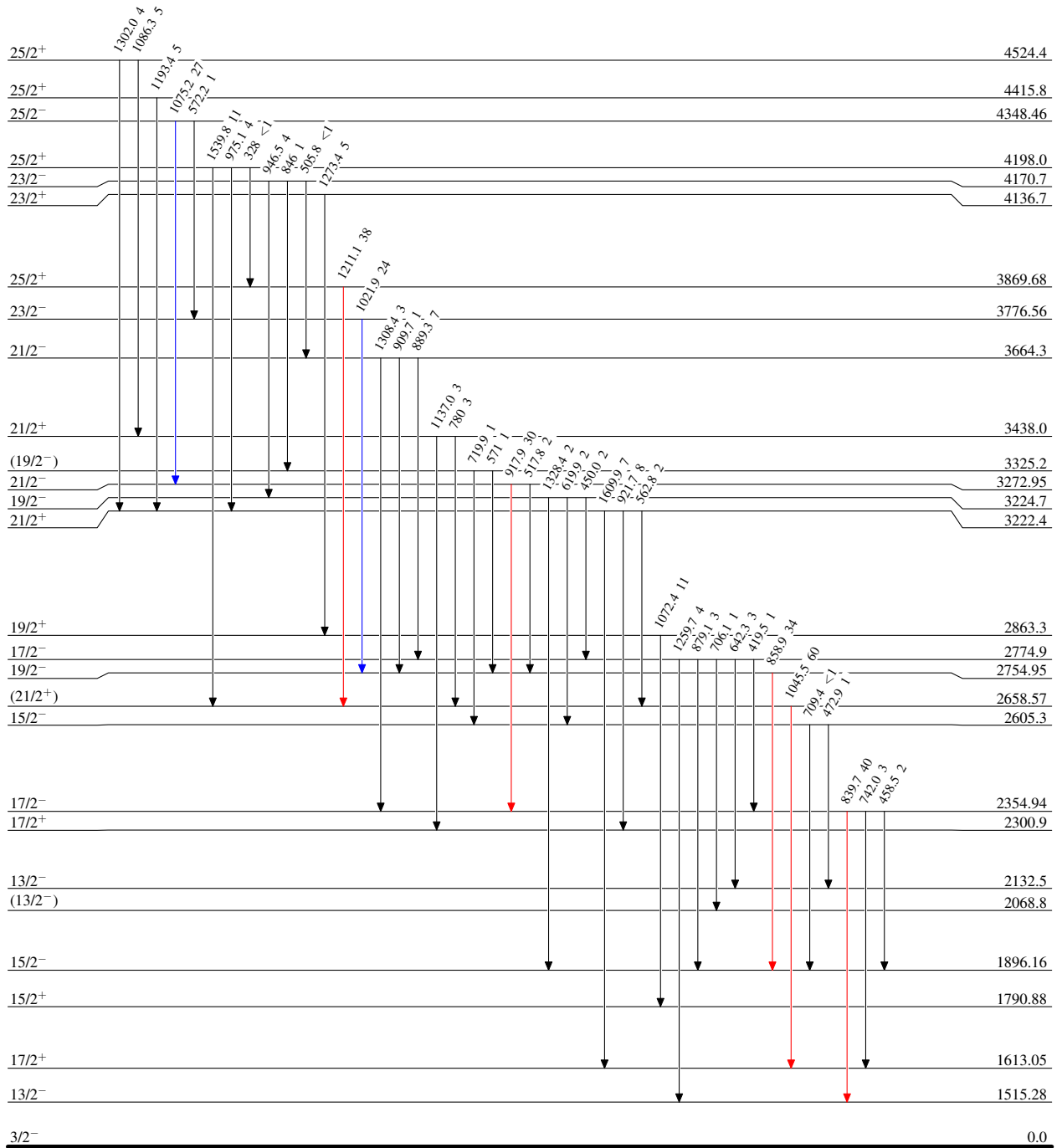
⁴⁸Ti(³⁰Si,p2n γ) 1999So10

Level Scheme (continued)

Intensities: Relative I γ

Legend

- I γ < 2% \times I γ^{max}
- I γ < 10% \times I γ^{max}
- I γ > 10% \times I γ^{max}



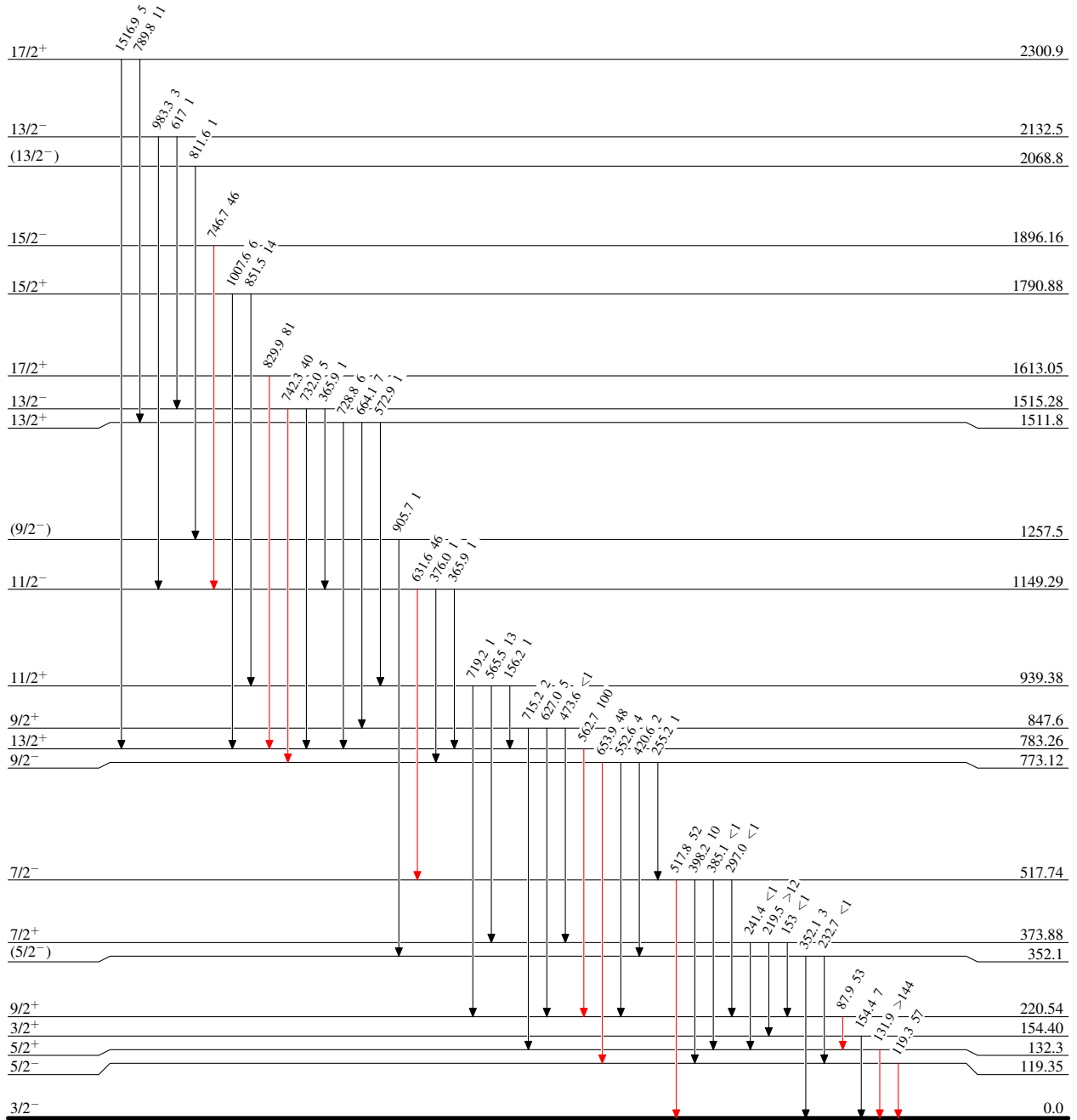
⁴⁸Ti(³⁰Si,p2n γ) 1999So10

Level Scheme (continued)

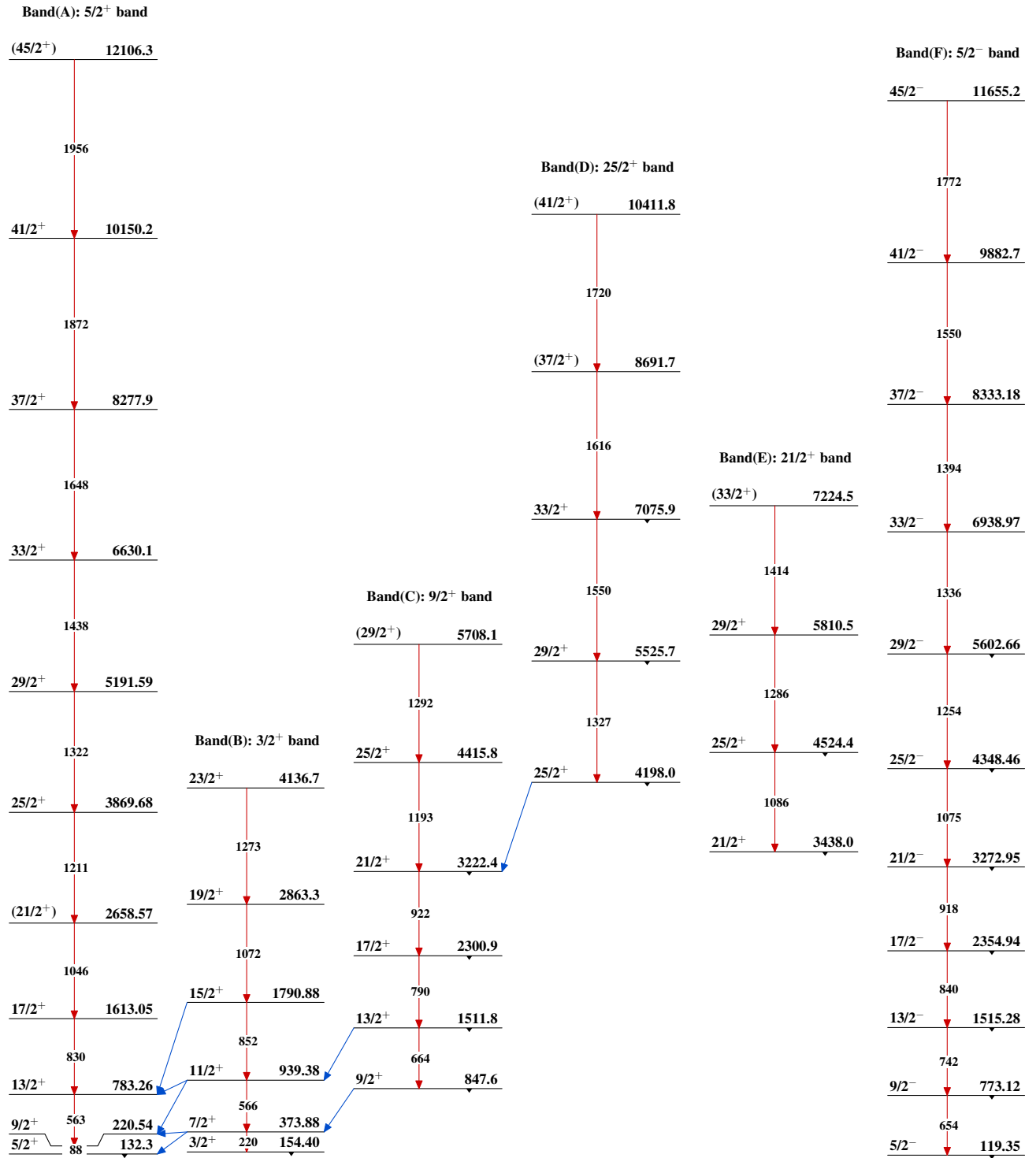
Intensities: Relative I γ

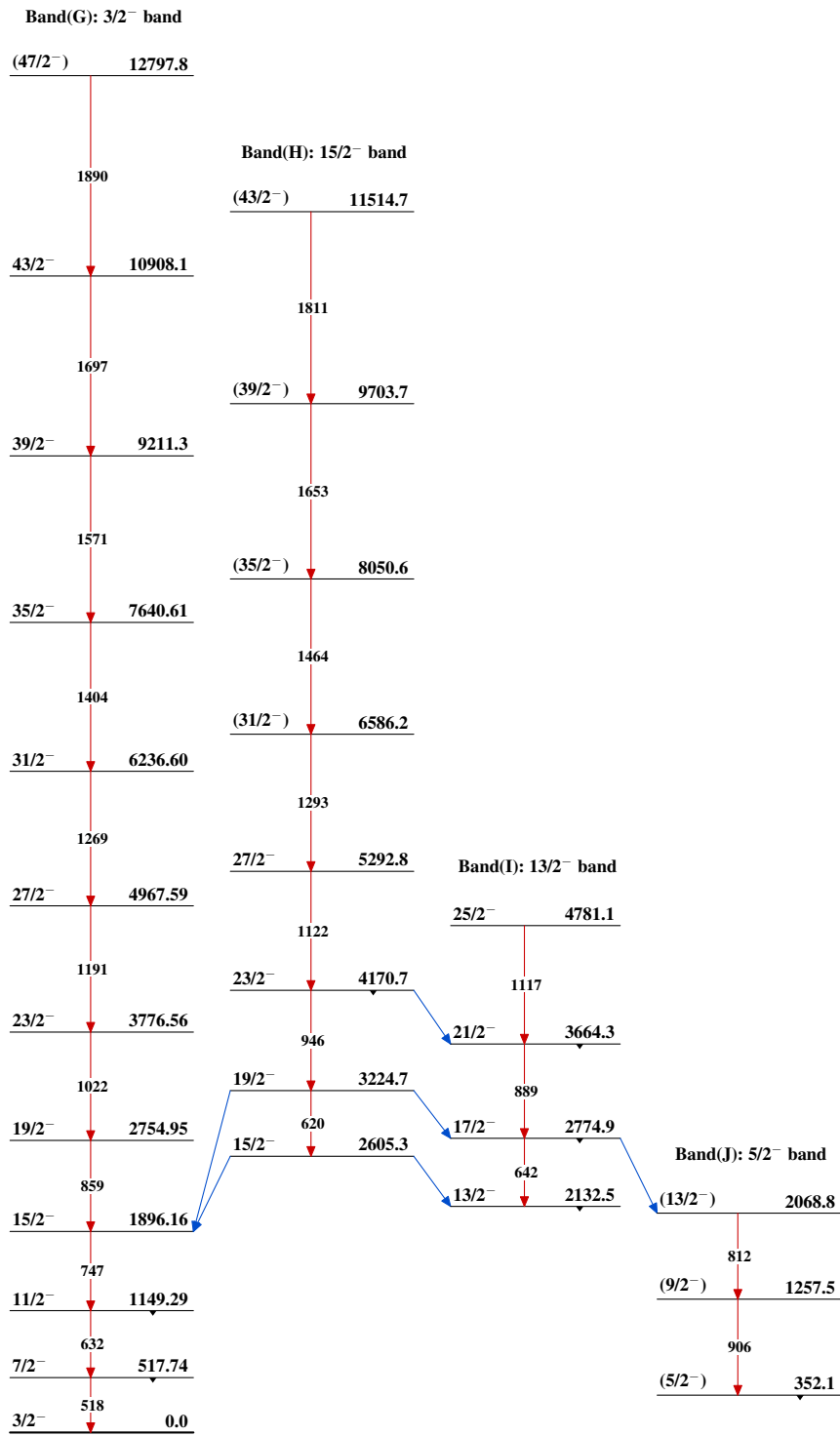
Legend

- I γ < 2% × I γ ^{max}
- I γ < 10% × I γ ^{max}
- I γ > 10% × I γ ^{max}



⁷⁵Br₄₀

$^{48}\text{Ti}(^{30}\text{Si},p2n\gamma)$ 1999So10

$^{48}\text{Ti}(^{30}\text{Si},p2n\gamma)$ 1999So10 (continued) $^{75}_{35}\text{Br}_{40}$