

$^{63}\text{Cu}(^{16}\text{O},\text{n}2\text{p}\gamma),(^{19}\text{F},\alpha\text{pn}\gamma)$ 1997Wi01

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, Jun Chen and Ameenah R. Farhan		NDS 194,3 (2024)	8-Jan-2024

1997Wi01 (also 1990Wi02): two experiments were performed. In the first E(^{16}O)=69 MeV beam from Pittsburgh EN tandem was used and in the second E(^{19}F) beam was obtained from Notre Dame FN tandem. Detector system was the same for two experiments and consisted of six Compton- suppressed HPGe detectors and a 14-element BGO multiplicity filter. Measured E γ , I γ , $\gamma\gamma$ coin. Deduced levels, J, π , bands. Comparisons with cranked mean-field calculations.

[Additional information 1.](#)

 ^{76}Br Levels

E(level) [†]	J $\pi^{\ddagger}$	T _{1/2}	Comments
0 ^a	1 ⁻		
45.8 ^a 5	2 ⁻		
103.0 [#] 10	4 ⁺	1.31 s 2	%IT>99.4 T _{1/2} : from Adopted Levels.
212.4 ^a 7	3 ⁻		
245.6 [#] 10	5 ⁺		
301.7 [@] 10	4 ⁻		
357.4 [#] 10	6 ⁺		
363.4 ^a 9	4 ⁻		
426.0 10	(5 ⁻)		
467.2 [@] 10	5 ⁻		
583.1 ^a 10	5 ⁻		
592.0 ^{&} 10	(5 ⁻)		
595.7 [#] 11	7 ⁺		
687.7 [@] 10	6 ⁻		
689.0 [#] 11	8 ⁺		
788.2 ^{&} 10	(6 ⁻)		
988.2 ^{&} 10	(7 ⁻)		
1025.4 [@] 10	7 ⁻		
1121.0 [#] 11	9 ⁺		
1338.5 [@] 10	8 ⁻		
1512.3 [#] 11	10 ⁺		
1538.0 ^{&} 11	(8 ⁻)		
1748.5 ^{&} 10	(9 ⁻)		
1825.3 [@] 11	(9 ⁻)		
1994.1 [#] 12	11 ⁺		
2218.3 [@] 10	(10 ⁻)		
2352.0 ^{&} 12	(10 ⁻)		
2627.5 [#] 12	12 ⁺		
2689.6 ^{&} 10	(11 ⁻)		
2736.7 [@] 12	(11 ⁻)		
3108.0 [#] 13	(13 ⁺)		
3251.0 ^{&} 16	(12 ⁻)		
3286.0 [@] 11	(12 ⁻)		
3706.4 ^{&} 12	(13 ⁻)		

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$^{63}\text{Cu}(^{16}\text{O},\text{n}2\text{p}\gamma),(^{19}\text{F},\alpha\text{p}\text{n}\gamma)$ **1997Wi01 (continued)** ^{76}Br Levels (continued)

E(level) [†]	J π [‡]	Comments
4002.6 [#] 13	(14 ⁺)	
4434.3 [#] 14	(15 ⁺)	
5553.6 [#] 16	(16 ⁺)	
5932.3 [#] 17	(17 ⁺)	
7305.8 [#]	(18 ⁺)	E(level): corresponding level is 8961 in ($^{30}\text{Si},2\alpha\text{n}\gamma$) (1997Pa35) with revised assignment of 1753 γ .
7589.3 [#] 20	(19 ⁺)	

[†] From a least-squares fit to E γ data assuming 0.5 keV uncertainty when E γ stated to nearest tenth of a keV, 1 keV otherwise.

[‡] As proposed in [1997Wi01](#) based on band assignments and previous values for low-lying, low-spin levels.

[#] Band(A): $\pi\text{g}_{9/2}\otimes\nu\text{g}_{9/2}, K^\pi=4^+$.

@ Band(B): Band based on 4⁻.

& Band(C): Band based on (5⁻).

^a Band(D): Band based on 1⁻.

 $\gamma(^{76}\text{Br})$

E γ [†]	I γ [†]	E $_i$ (level)	J $^\pi_i$	E $_f$	J $^\pi_f$	Comments
45.8		45.8	2 ⁻	0	1 ⁻	
93.3		689.0	8 ⁺	595.7	7 ⁺	Additional information 17.
103.8		467.2	5 ⁻	363.4	4 ⁻	Additional information 8.
104.5		687.7	6 ⁻	583.1	5 ⁻	Additional information 14.
112.0	83 8	357.4	6 ⁺	245.6	5 ⁺	Additional information 5.
124.4		426.0	(5 ⁻)	301.7	4 ⁻	
142.4	100 5	245.6	5 ⁺	103.0	4 ⁺	Additional information 3.
151.0		363.4	4 ⁻	212.4	3 ⁻	Additional information 7.
157.1		583.1	5 ⁻	426.0	(5 ⁻)	
165.6		467.2	5 ⁻	301.7	4 ⁻	Additional information 9.
166.0		592.0	(5 ⁻)	426.0	(5 ⁻)	
166.6		212.4	3 ⁻	45.8	2 ⁻	Additional information 2.
196.2		788.2	(6 ⁻)	592.0	(5 ⁻)	
198.9		301.7	4 ⁻	103.0	4 ⁺	Additional information 4.
200.0 ^{‡#}		988.2	(7 ⁻)	788.2	(6 ⁻)	
210.5 [#]		1748.5	(9 ⁻)	1538.0	(8 ⁻)	E γ : from level-energy difference.
219.7		583.1	5 ⁻	363.4	4 ⁻	Additional information 11.
220.4		687.7	6 ⁻	467.2	5 ⁻	Additional information 15.
221.1		467.2	5 ⁻	245.6	5 ⁺	Additional information 10.
228.6		592.0	(5 ⁻)	363.4	4 ⁻	
238.2	44 3	595.7	7 ⁺	357.4	6 ⁺	Additional information 12.
254.4	17 2	357.4	6 ⁺	103.0	4 ⁺	Additional information 6.
261.8		687.7	6 ⁻	426.0	(5 ⁻)	
300.6	19 1	988.2	(7 ⁻)	687.7	6 ⁻	Additional information 19.
312.8		1338.5	8 ⁻	1025.4	7 ⁻	E γ : from 1990Wi02 . The γ shown in level-scheme figure in 1997Wi01 without E γ value. Level-energy difference is 313.1.
330.5		687.7	6 ⁻	357.4	6 ⁺	
331.5	38 4	689.0	8 ⁺	357.4	6 ⁺	Additional information 18.
337.7		1025.4	7 ⁻	687.7	6 ⁻	Additional information 22.
350.2	7 1	595.7	7 ⁺	245.6	5 ⁺	Additional information 13.
350.3		1338.5	8 ⁻	988.2	(7 ⁻)	Additional information 26.
386.0	11 2	687.7	6 ⁻	301.7	4 ⁻	Additional information 16.
391.3		1512.3	10 ⁺	1121.0	9 ⁺	Additional information 28.

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$^{63}\text{Cu}(^{16}\text{O},\text{n}2\text{p}\gamma),(^{19}\text{F},\alpha\text{p}\text{n}\gamma)$ **1997Wi01** (continued) $\gamma(^{76}\text{Br})$ (continued)

$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
396.2 ^{‡#}		988.2	(7 ⁻)	592.0	(5 ⁻)	
405.1		988.2	(7 ⁻)	583.1	5 ⁻	Additional information 20.
409.9		1748.5	(9 ⁻)	1338.5	8 ⁻	Additional information 30.
420.4 [#]		3706.4	(13 ⁻)	3286.0	(12 ⁻)	Additional information 49.
424.8		788.2	(6 ⁻)	363.4	4 ⁻	
432.0	32 3	1121.0	9 ⁺	689.0	8 ⁺	Additional information 24.
469.8		2218.3	(10 ⁻)	1748.5	(9 ⁻)	Additional information 37.
471.3		2689.6	(11 ⁻)	2218.3	(10 ⁻)	Additional information 41.
481.5 [#]		3108.0	(13 ⁺)	2627.5	12 ⁺	Additional information 45.
481.8	9 1	1994.1	11 ⁺	1512.3	10 ⁺	Additional information 35.
486.7 [#]		1825.3	(9 ⁻)	1338.5	8 ⁻	Additional information 33.
521.0		988.2	(7 ⁻)	467.2	5 ⁻	Additional information 21.
525.3		1121.0	9 ⁺	595.7	7 ⁺	Additional information 25.
549.8 [#]		1538.0	(8 ⁻)	988.2	(7 ⁻)	
558.1		1025.4	7 ⁻	467.2	5 ⁻	Additional information 23.
596.4		3286.0	(12 ⁻)	2689.6	(11 ⁻)	E_γ : in 1997Pa35, only a tentative placement is shown from 3286 level; main placement of 595.8 γ is from a 4301 level which is given in Adopted dataset.
633.4		2627.5	12 ⁺	1994.1	11 ⁺	Additional information 47.
650.9		1338.5	8 ⁻	687.7	6 ⁻	Additional information 39.
723.1		1748.5	(9 ⁻)	1025.4	7 ⁻	Additional information 27.
749.8		1538.0	(8 ⁻)	788.2	(6 ⁻)	Additional information 31.
760.2		1748.5	(9 ⁻)	988.2	(7 ⁻)	Additional information 32.
799.9		1825.3	(9 ⁻)	1025.4	7 ⁻	Additional information 34.
814.0		2352.0	(10 ⁻)	1538.0	(8 ⁻)	
823.3		1512.3	10 ⁺	689.0	8 ⁺	Additional information 29.
864.3		2689.6	(11 ⁻)	1825.3	(9 ⁻)	Additional information 42.
873.1		1994.1	11 ⁺	1121.0	9 ⁺	Additional information 36.
879.9		2218.3	(10 ⁻)	1338.5	8 ⁻	Additional information 38.
899		3251.0	(12 ⁻)	2352.0	(10 ⁻)	
911.4		2736.7	(11 ⁻)	1825.3	(9 ⁻)	Additional information 44.
941.1		2689.6	(11 ⁻)	1748.5	(9 ⁻)	Additional information 43.
1016.8		3706.4	(13 ⁻)	2689.6	(11 ⁻)	Additional information 50.
1067.7		3286.0	(12 ⁻)	2218.3	(10 ⁻)	Additional information 48.
1113.9		3108.0	(13 ⁺)	1994.1	11 ⁺	Additional information 46.
1115.2		2627.5	12 ⁺	1512.3	10 ⁺	Additional information 40.
1326.3		4434.3	(15 ⁺)	3108.0	(13 ⁺)	Additional information 52.
1375.1		4002.6	(14 ⁺)	2627.5	12 ⁺	Additional information 51.
1498		5932.3	(17 ⁺)	4434.3	(15 ⁺)	Additional information 53.
1551		5553.6	(16 ⁺)	4002.6	(14 ⁺)	
1657 [#]		7589.3	(19 ⁺)	5932.3	(17 ⁺)	
1753 [#]		7305.8	(18 ⁺)	5553.6	(16 ⁺)	E_γ : this g is placed from a 8961 level in ($^{30}\text{Si},2\alpha\text{n}\gamma$) (1997Pa35).

[†] From 1997Wi01, unless otherwise noted.

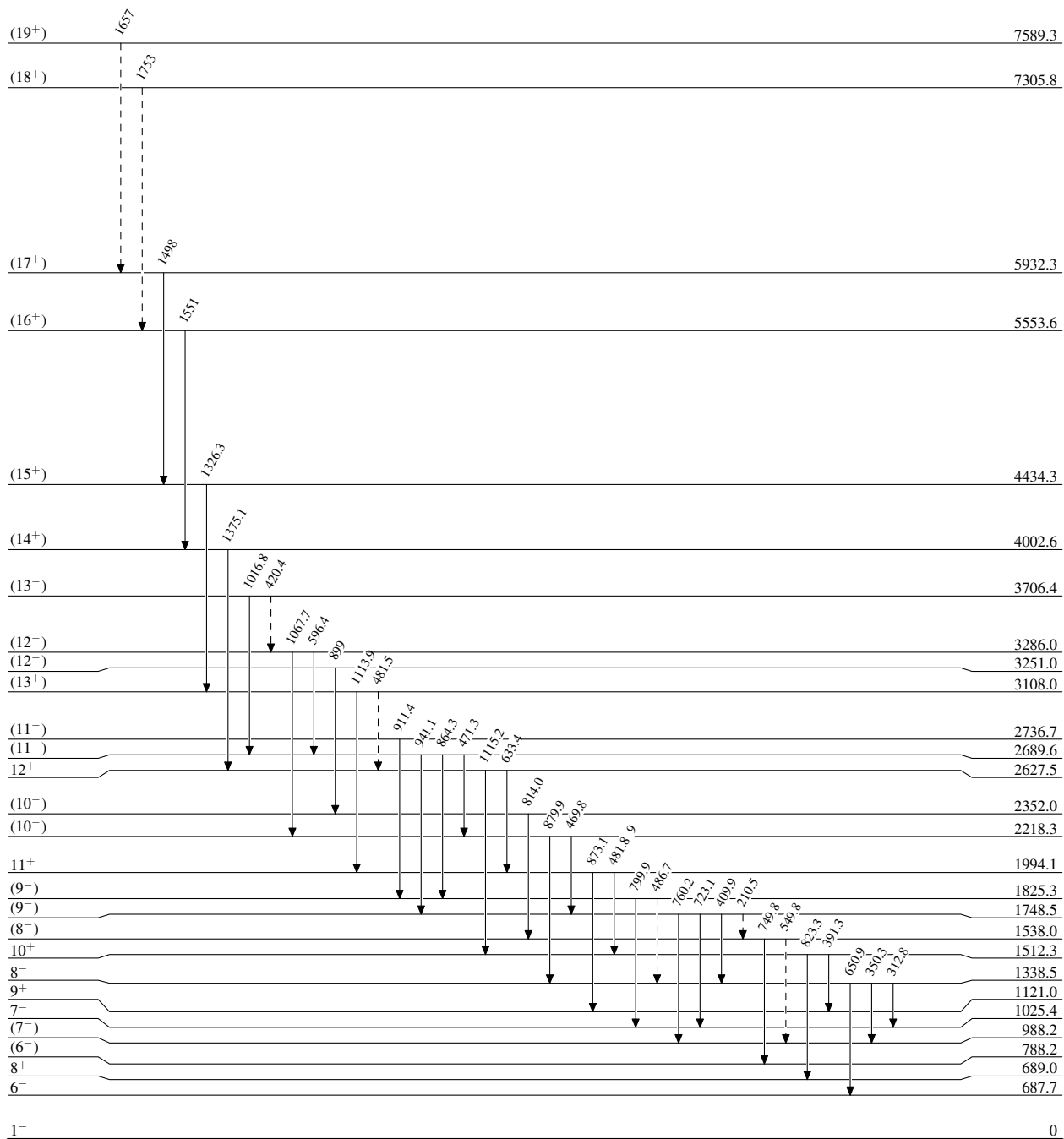
[‡] γ is not confirmed in ($^{30}\text{Si},2\alpha\text{n}\gamma$) (1997Pa35), considered as uncertain by evaluators.

[#] Placement of transition in the level scheme is uncertain.

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Legend

Level Scheme

Intensities: Relative I_γ -----► γ Decay (Uncertain) $^{76}_{35}\text{Br}_{41}$

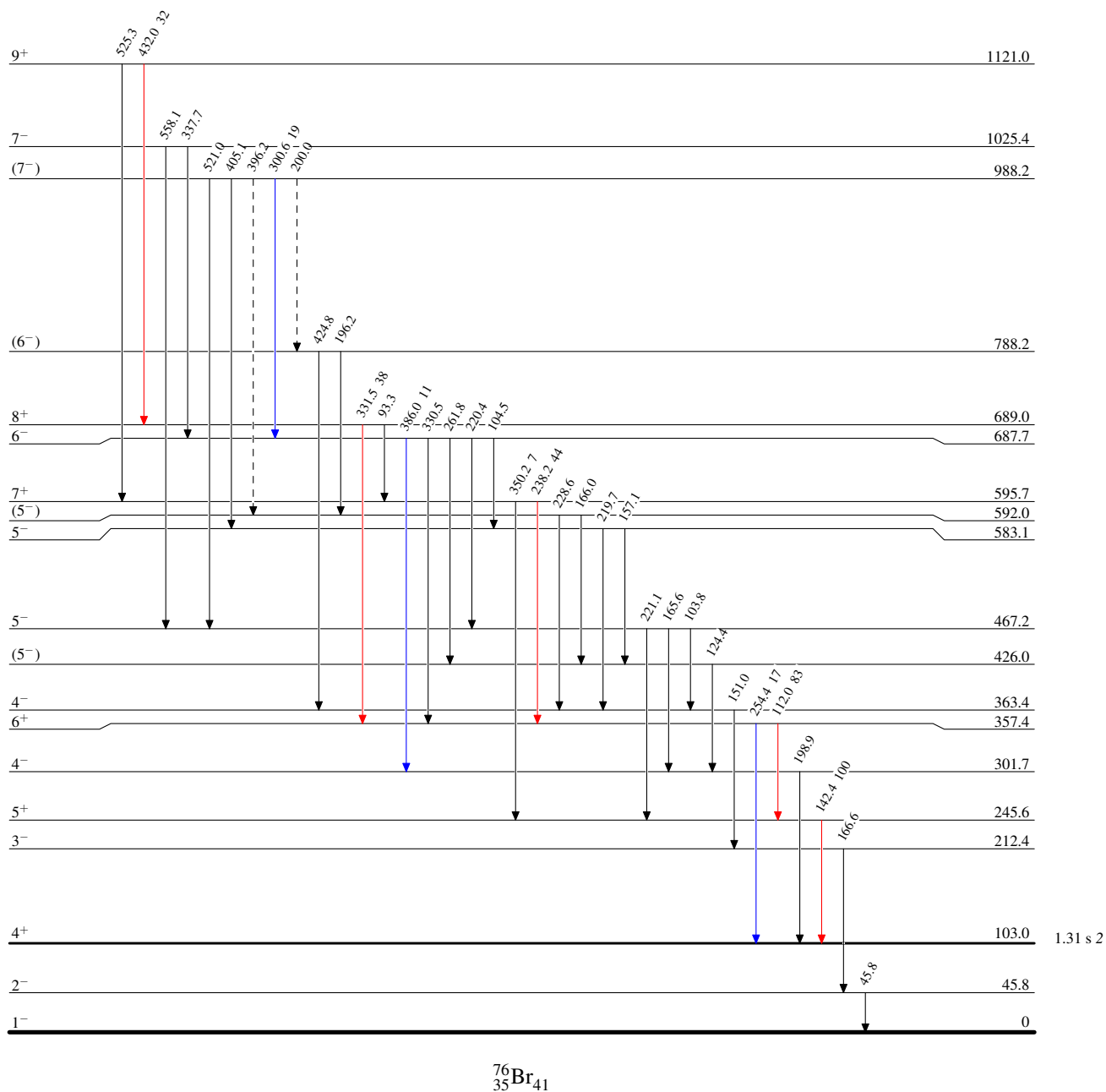
$^{63}\text{Cu}(^{16}\text{O},\text{n}2\text{p}\gamma),(^{19}\text{F},\alpha\text{pn}\gamma)$ 1997Wi01

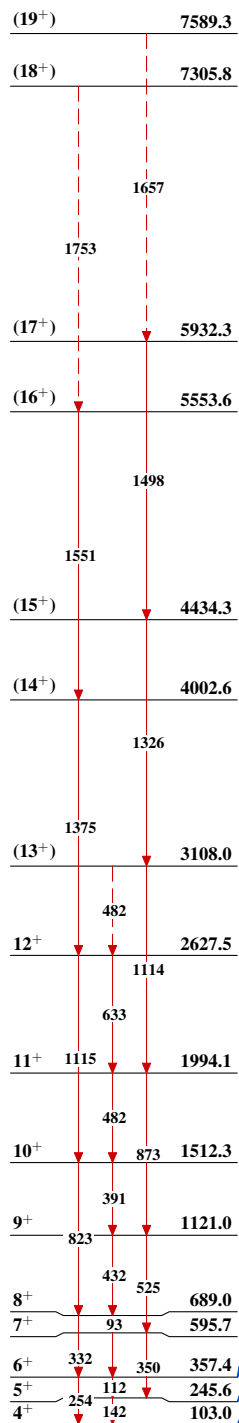
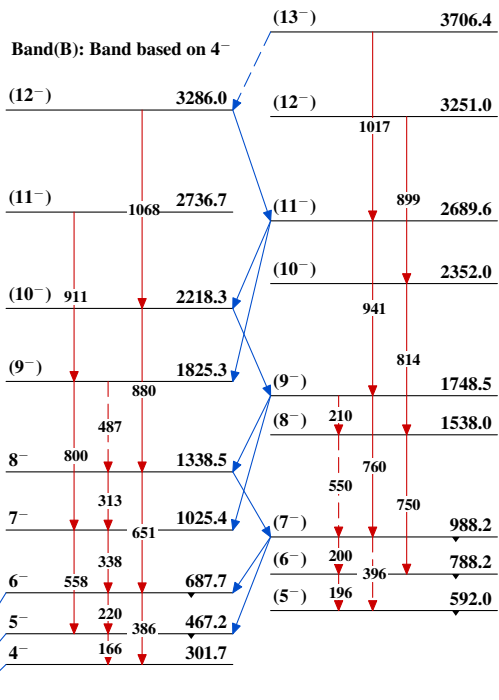
Level Scheme (continued)

Intensities: Relative I_γ

Legend

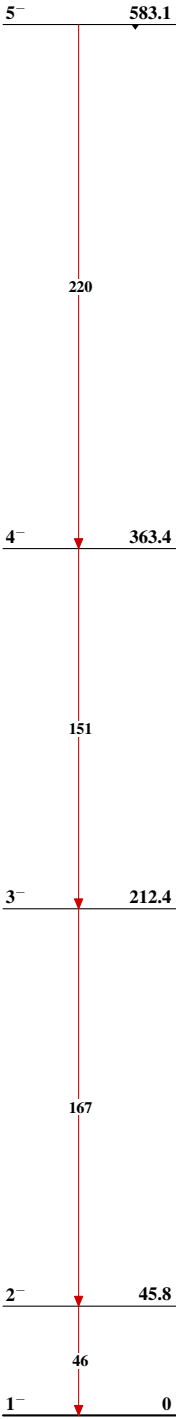
- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$
- - - - - γ Decay (Uncertain)



$^{63}\text{Cu}(^{16}\text{O},\text{n}2\text{p}\gamma),(^{19}\text{F},\alpha\text{pn}\gamma)$ 1997Wi01Band(A): $\pi g_{9/2} \otimes \nu g_{9/2}, K^\pi=4^+$ Band(C): Band based on (5⁻)Band(B): Band based on 4⁻

$^{63}\text{Cu}(^{16}\text{O},\text{n}2\text{p}\gamma),(^{19}\text{F},\alpha\text{p}\text{n}\gamma)$ 1997Wi01 (continued)

Band(D): Band based on 1^-



$^{76}_{35}\text{Br}_{41}$