^{58}Ni(^{3}He,pnγ) 1989Ju02,1989Sc28

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 151, 1 (2018)	1-Apr-2018

Other: 1982HaZU.

1989Ju02: E(^{3}He)=15-27 MeV; measured excit, Eγ, Iγ, ce, γγ coin, γ(θ); 97% ^{58}Ni target, Ge and Ge(Li) detectors, electron spectrometer.

1989Sc28: E(^{3}He)=12 MeV; measured Eγ, Iγ, γγ coin.

α(K)exp values were normalized by 1989Ju02 using the ^{58}Ni(2^{+} to g.s.) E2-transition.

^{59}Cu Levels

E(level)[†]	Jπ[#]	E(level)[†]	Jπ[#]	E(level)[†]	Jπ[#]	E(level)[†]	Jπ[#]
0.0[&]	3/2−	2318.4[‡] *11*		2992.0 *14*	(7/2−)	3737.1[‡] *20*	
491.39 *21*	1/2−	2324.8[‡] *11*		3042.7[b] *3*	9/2+	4100.20[a] *25*	13/2−
913.98[@] *15*	5/2−	2390.96[@] *22*	9/2−	3121.7[‡] *8*		4293.7[‡] *20*	
1398.69[&] *18*	7/2−	2587.75[&] *21*	11/2−	3129.2[‡] *9*		4528.4[b] *4*	13/2+
1865.08[a] *18*	7/2−	2664.48[a] *22*	9/2−	3329.52[a] *24*	11/2−	4903.5[a] *3*	15/2−
1987.75 *21*	5/2	2706.0 *3*	5/2−	3447.77[@] *24*	13/2−	5427.8[b] *5*	17/2+
2266.7 *10*	3/2+	2714.97 *18*	7/2−	3579.9[‡] *8*		5721.8[a] *3*	(17/2−)

[†] From 1989Ju02, except otherwise noted.
[‡] From 1989Sc28; absent in higher E(^{3}He) data of 1989Ju02.
[#] From 1989Ju02, based on γ(θ) and α(K)exp data.
[@] Band(A): $f_{5/2}$ collective band. (1989Ju02).
[&] Band(B): $p_{3/2}$ collective band. (1989Ju02).
[a] Band(C): $f^{-1}_{7/2}$ collective band. (1989Ju02).
[b] Band(D): $g_{9/2}$ collective band. (1989Ju02).

γ(^{59}Cu)

$E_γ$[†]	$I_γ$[†#]	E_i(level)	$J^π_i$	E_f	$J^π_f$	Mult.[&]	δ[a]	Comments
337[‡] *1*		2324.8		1987.75	5/2			
422.6 *2*	≈1.0[@]	913.98	5/2−	491.39	1/2−			
455.0 *2*	≤0.5	3042.7	9/2+	2587.75	11/2−			
465.3	12.0[@]	1865.08	7/2−	1398.69	7/2−			$E_γ$,$I_γ$: Eγ=465.3 *2* is 4σ low and branching is high cf. (p,γ) and (^{3}He,dγ). Iγ taken from coin spectrum, so 465γ from ^{59}Ni should not contribute.
484.8 *2*	13.2	1398.69	7/2−	913.98	5/2−	M1+E2	−0.09 *12*	α(K)exp=150×10^{-5} *30*. A_2=−0.21 *2*, A_4=−0.06 *3*.
491.4 *2*	32.5	491.39	1/2−	0.0	3/2−	M1(+E2)		α(K)exp=110×10^{-5} *20*; implies abs(δ)<0.93. A_2=−0.054 *3*, A_4=−0.009 *4*.
652.3 *2*	1.1	4100.20	13/2−	3447.77	13/2−			A_2=+0.06 *8*, A_4=−0.07 *13*.
665.2 *2*	11.1	3329.52	11/2−	2664.48	9/2−	M1+E2	+0.09 *5*	α(K)exp=71×10^{-5} *14*. A_2=−0.099 *8*, A_4=+0.04 *1*.
722.8 *2*	≈0.2	2587.75	11/2−	1865.08	7/2−			
727.5 *2*	2.3	2714.97	7/2−	1987.75	5/2			
741.8 *2*	4.6[@]	3329.52	11/2−	2587.75	11/2−			A_2≈+0.2.
770.9 *2*	8.4	4100.20	13/2−	3329.52	11/2−	D+Q	+0.07 *5*	A_2=−0.108 *6*, A_4=+0.056 *9*.

Continued on next page (footnotes at end of table)

^{58}Ni(^{3}He,pnγ) 1989Ju02,1989Sc28 (continued)

γ(^{59}Cu) (continued)

E_γ[†]	I_γ[†#]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	δ[a]	Comments
799.3 *2*	20.6	2664.48	9/2⁻	1865.08	7/2⁻	D+Q	+0.31 *5*	A_2=+0.127 *6*, A_4=+0.040 *9*.
803.0 *2*	7.1	4903.5	15/2⁻	4100.20	13/2⁻	D+Q	+0.31 *6*	A_2=+0.175 *14*, A_4=−0.03 *2*.
818.1 *2*	0.7	5721.8	(17/2⁻)	4903.5	15/2⁻			A_2=−0.32 *15*.
860.2 *2*	1.7	3447.77	13/2⁻	2587.75	11/2⁻	D+Q	≈−1	A_2=−0.9 *2*.
899.4 *2*	3.5	5427.8	17/2⁺	4528.4	13/2⁺	E2		α(K)exp=33×10⁻⁵ *13*. A_2=+0.44 *4*, A_4=−0.13 *5*.
914.0 *2*	100.0	913.98	5/2⁻	0.0	3/2⁻	M1+E2	−0.8 +5−9	α(K)exp=23×10⁻⁵ *3*; implies abs(δ)<0.67. A_2=−0.382 *7*, A_4=+0.02 *1*.
951.2 *2*	12.3	1865.08	7/2⁻	913.98	5/2⁻	M1,E2		α(K)exp=23×10⁻⁵ *6*. A_2=−0.155 *4*, A_4=+0.047 *5*; δ=−0.02 +5−7 or −4 +3−6.
992.1 *2*	2.3	2390.96	9/2⁻	1398.69	7/2⁻			A_2>0.
1056.5 *2*	9.7	3447.77	13/2⁻	2390.96	9/2⁻	E2		α(K)exp=25×10⁻⁵ *5*. A_2=+0.22 *2*, A_4=−0.00 *3*.
1177.5 *2*	5.2	3042.7	9/2⁺	1865.08	7/2⁻	D(+Q)	−0.07 +5−7	A_2=−0.235 *12*, A_4=+0.04 *2*.
1189.2 *2*	17.0[@]	2587.75	11/2⁻	1398.69	7/2⁻			
1265.7 *2*	2.5	2664.48	9/2⁻	1398.69	7/2⁻			A_2=+0.2.
1398.1 *2*	64.3[@]	1398.69	7/2⁻	0.0	3/2⁻	E2		α(K)exp=11×10⁻⁵ *2*. A_2=+0.164 *6*, A_4=−0.021 *9*. Mult.: M1,E2 from α(K)exp, Q from γ(θ).
1435.4 *2*	4.5	4100.20	13/2⁻	2664.48	9/2⁻			A_2=+0.13 *2*, A_4=+0.12 *3*.
1464.1 *2*	4.2	3329.52	11/2⁻	1865.08	7/2⁻			A_2>0.
1476.8 *2*	22.0	2390.96	9/2⁻	913.98	5/2⁻	E2		α(K)exp=9×10⁻⁵ *3*. A_2=+0.12 *2*, A_4=−0.11 *3*. Mult.: M1,E2 from α(K)exp; ΔJ=2 from γ(θ).
1485.7 *2*	6.3	4528.4	13/2⁺	3042.7	9/2⁺	Q		A_2=+0.210 *17*, A_4=−0.08 *2*.
1574.8 *2*	3.2	4903.5	15/2⁻	3329.52	11/2⁻	Q		A_2=+0.25 *5*, A_4=−0.04 *7*.
1592[‡] *1*		3579.9		1987.75	5/2			
1621.7 *2*	2.1	5721.8	(17/2⁻)	4100.20	13/2⁻			A_2≈+0.2.
1644.9 *2*	20.2	3042.7	9/2⁺	1398.69	7/2⁻	E1		α(K)exp=4×10⁻⁵ *2*. A_2=−0.181 *10*, A_4=−0.01 *3*. δ: −0.02 *5*.
1775	≈2.0	2266.7	3/2⁺	491.39	1/2⁻			
1792.0 *2*	0.8[@]	2706.0	5/2⁻	913.98	5/2⁻			
1801.0 *2*	1.0	2714.97	7/2⁻	913.98	5/2⁻			A_2=−0.28 *5*, A_4=+0.10 *7*.
1827[‡] *1*		2318.4		491.39	1/2⁻			
1864.9 *2*	10.5	1865.08	7/2⁻	0.0	3/2⁻	E2		α(K)exp=8×10⁻⁵ *3*. A_2=+0.194 *6*, A_4=−0.040 *9*.
1931.3 *2*	2.9	3329.52	11/2⁻	1398.69	7/2⁻	Q		A_2=+0.25 *3*, A_4=−0.15 *4*.
1988.0 *2*	5.9	1987.75	5/2	0.0	3/2⁻			A_2=−0.67 *2*, A_4=+0.12 *3*.
2078	1.5	2992.0	(7/2⁻)	913.98	5/2⁻			A_2=−0.21 *9*, A_4=+0.09 *14*.
2207[‡] *1*		3121.7		913.98	5/2⁻			
2214[‡] *2*		3129.2		913.98	5/2⁻			
2267	1.7	2266.7	3/2⁺	0.0	3/2⁻			
2631[‡] *1*		3121.7		491.39	1/2⁻			
2638[‡] *1*		3129.2		491.39	1/2⁻			
2666[‡] *1*		3579.9		913.98	5/2⁻			
2714.6 *2*	3.0	2714.97	7/2⁻	0.0	3/2⁻			A_2=−0.19 *5*?, A_4=+0.02 *6*.
2823[‡] *2*		3737.1		913.98	5/2⁻			
2895[‡] *2*		4293.7		1398.69	7/2⁻			

Continued on next page (footnotes at end of table)

^{58}Ni(^{3}He,pnγ) 1989Ju02,1989Sc28 (continued)

γ(^{59}Cu) (continued)

† From 1989Ju02.

‡ Placement from 1989Sc28; absent in higher E(^{3}He) data of 1989Ju02. 1989Sc28 list Eγ and uncertainty referring some γ from (p,γ), evaluator assume these are from their measurement.

Relative photon intensity from 1989Ju02 (for E(^{3}He)=23.1 MeV), authors note ΔIγ=1-30%.

@ From coincidence spectrum (1989Ju02).

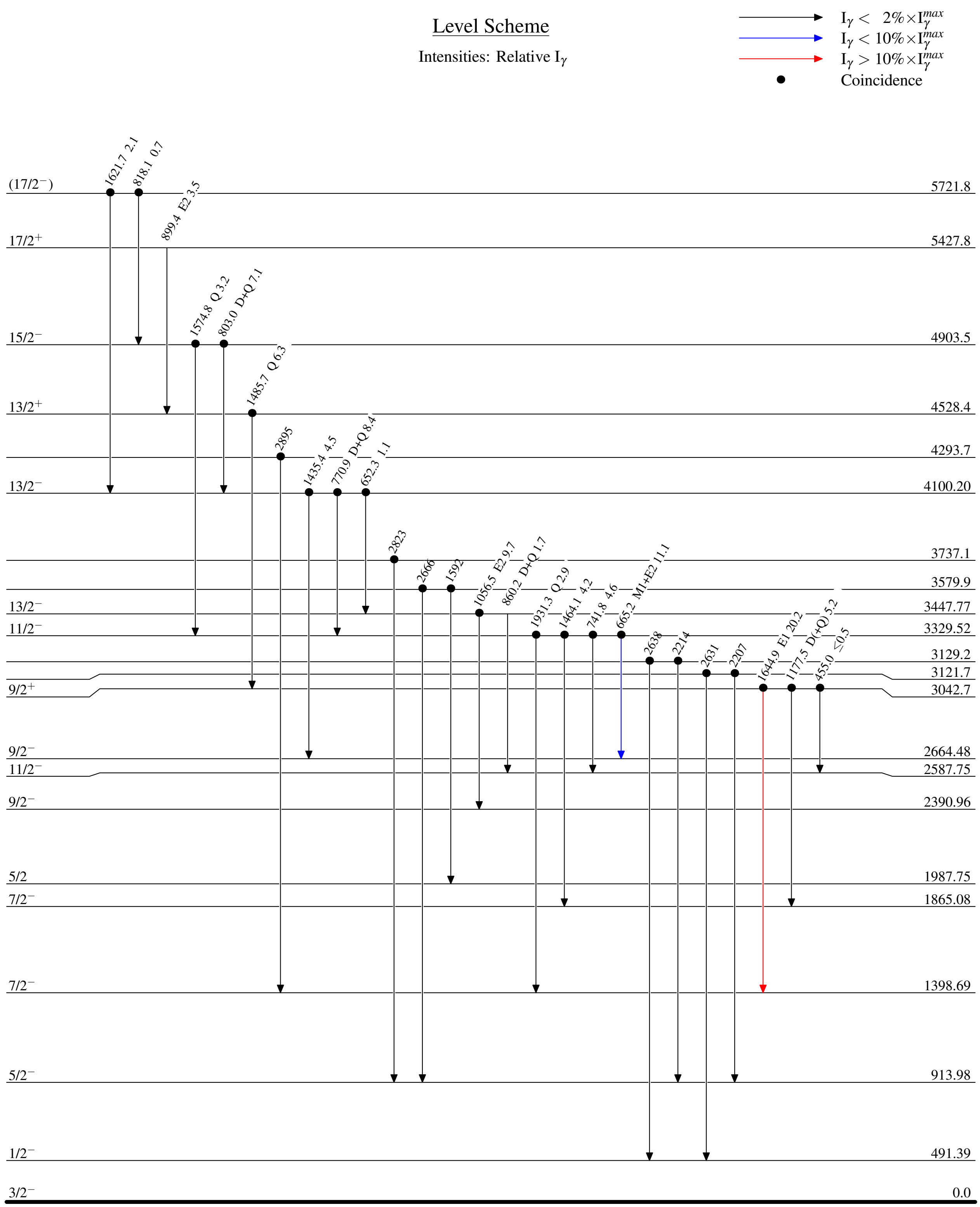
& Based on α(K)exp and/or $\gamma(\theta)$ data of 1989Ju02; from $\gamma(\theta)$ alone if $\Delta\pi$ not specified.

[a] From $\gamma(\theta)$ (1989Ju02).

$^{58}Ni(^{3}He,pn\gamma)$ 1989Ju02,1989Sc28

Level Scheme

Intensities: Relative I_γ



$^{59}_{29}Cu_{30}$

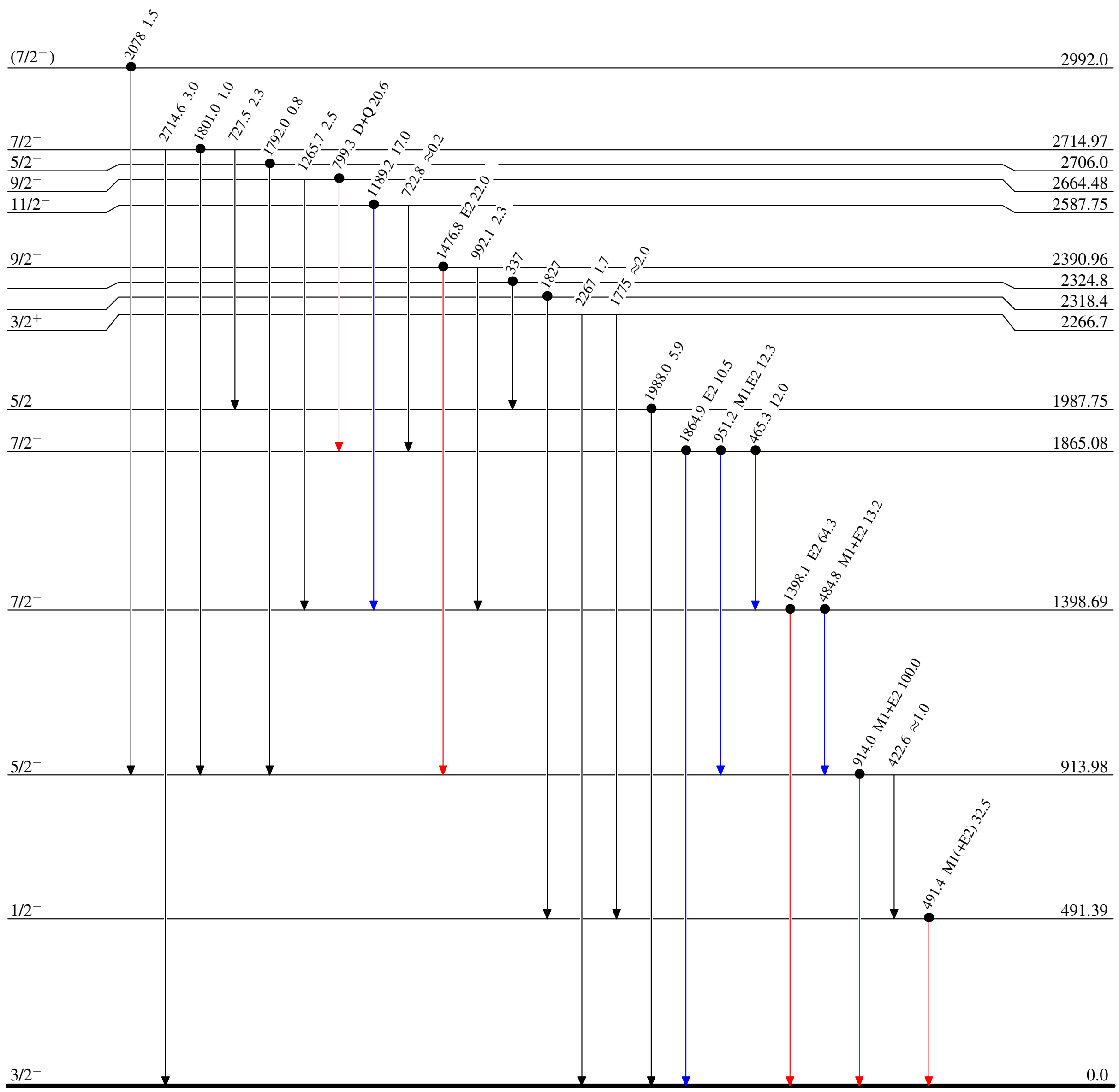
^{58}Ni(^{3}He,pnγ) 1989Ju02,1989Sc28

Level Scheme (continued)

Intensities: Relative I_γ

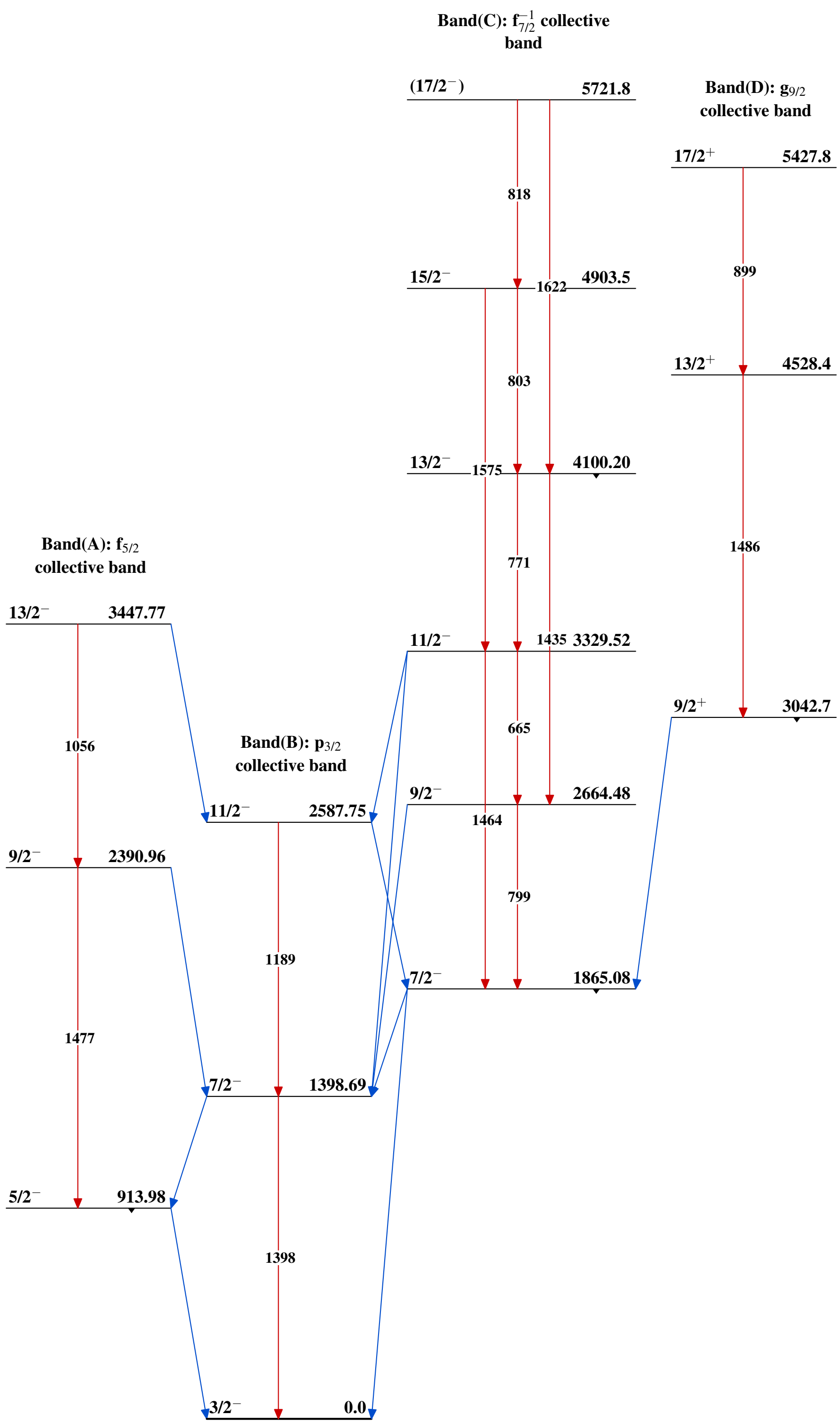
Legend

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



$^{59}_{29}Cu_{30}$

$^{58}Ni(^{3}He,pn\gamma)$ 1989Ju02,1989Sc28



$^{59}_{29}Cu_{30}$