^{65}Cu(^{16}O,p2nγ),(^{19}F,α2nγ) 1979He18

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Ameenah R. Farhan, Balraj Singh	NDS 110, 1917 (2009)	30-Jun-2009

Includes reactions: ^{64}Ni(^{16}O,2nγ); ^{68}Zn(^{12}C,2nγ).

1979He18 (also 1979He07,1978He22): ^{65}Cu(^{16}O,p2nγ) E=42-58 MeV; ^{65}Cu(^{19}F,α2nγ) E=55 MeV; ^{64}Ni(^{16}O,2nγ) E=47 MeV; ^{68}Zn(^{12}C,2nγ) E=30-36 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$ and half lives by recoil-distance Doppler shift (RDDS) and DSAM methods.

^{78}Kr Levels

E(level)†	J$^\pi$&	$T_{1/2}$	E(level)†	J$^\pi$&	$T_{1/2}$
0.0[a]	0$^+$		3219.89[d] *20*	(6$^-$)	
454.92[a] *9*	2$^+$	22.2# ps *14*	3288.00[c] *17*	7$^-$	2.01# ps *21*
1119.45[a] *13*	4$^+$	2.50# ps *21*	3770.6[b] *3*	(8$^+$)	
1147.72[b] *11*	2$^+$	4.02# ps *35*	3918.69[d] *22*	(8$^-$)	0.83# ps *21*
1564.58[b] *14*	3$^+$	4.44# ps *35*	4028.40[c] *20*	(9$^-$)	0.76# ps *7*
1872.64[b] *15*	4$^+$	1.32# ps *21*	4105.4[a] *11*	10$^+$	<0.35‡ ps
1977.85[a] *17*	6$^+$	0.62@ ps *10*	4251.3[b] *11*	(9$^+$)	
2299.55[b] *15*	5$^+$	1.25# ps *28*	4808.80[d] *24*	(10$^-$)	≤1.0# ps
2398.0[c] *10*	3$^-$		4858.4?[b] *4*	(10$^+$)	
2731.35[b] *25*	(6$^+$)	1.4‡ ps *7*	4965.5[c] *3*	(11$^-$)	0.25‡ ps *8*
2749.03[c] *16*	5$^-$	1.52# ps *21*	5217.4[a] *15*	(12$^+$)	
2763.8[d] *4*	(4$^-$)		6086.9[c] *9*	(13$^-$)	0.22‡ ps *10*
2993.36[a] *20*	8$^+$	0.31‡ ps *4*	6480.1[a] *15*	(14$^+$)	0.15‡ ps *6*
3202.3[b] *4*	(7$^+$)	0.62‡ ps *+42−21*	7938.5?[a] *16*	(16$^+$)	≤0.14‡ ps

† From least-squares fitting to Eγ's.
‡ From DSAM.
# From RDDS.
@ Average of DSAM and RDDS measurements.
& As proposed by 1979He18 based on earlier J$^\pi$ assignments for low-lying levels and their $\gamma(\theta)$ data and band assignments. The assignments are the same In 'Adopted Levels', except that some are given In parentheses there.
[a] Band(A): g.s. band.
[b] Band(B): γ band.
[c] Band(C): 3$^-$ band.
[d] Band(D): 4$^-$ band.

$\gamma(^{78}Kr)$

Eγ	Iγ†	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.#	Comments
416.9‡ *1*		1564.58	3$^+$	1147.72	2$^+$		
454.9 *1*	100	454.92	2$^+$	0.0	0$^+$	E2	A_2=+0.210 *4*, A_4=−0.068 *5*.
456‡&		3219.89	(6$^-$)	2763.8	(4$^-$)		
488&	<1.0	3219.89	(6$^-$)	2731.35	(6$^+$)		
538.9 *1*	5.7 *3*	3288.00	7$^-$	2749.03	5$^-$	E2	A_2=+0.28 *3*, A_4=−0.07 *5*.
664.5 *1*	72.7 *22*	1119.45	4$^+$	454.92	2$^+$	E2	A_2=+0.253 *5*, A_4=−0.060 *7*.
692.8 *1*	7.1 *3*	1147.72	2$^+$	454.92	2$^+$	D+Q	A_2=+0.07 *3*, A_4=−0.01 *4*.
698.8 *1*	8.5 *4*	3918.69	(8$^-$)	3219.89	(6$^-$)	E2	A_2=+0.39 *6*, A_4=−0.14 *8*.

Continued on next page (footnotes at end of table)

^{65}Cu(^{16}O,p2nγ),(^{19}F,α2nγ) 1979He18 (continued)

γ(^{78}Kr) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
716	0.3 *2*	3918.69	(8$^-$)	3202.3	(7$^+$)		
724.9 *1*	7.2 *3*	1872.64	4$^+$	1147.72	2$^+$	(E2)	A_2=+0.23 *4*, A_4=−0.02 *6*.
735.0 *1*	5.2 *3*	2299.55	5$^+$	1564.58	3$^+$	(E2)	A_2=+0.25 *3*, A_4=−0.03 *5*.
740.4 *1*	6.7 *4*	4028.40	(9$^-$)	3288.00	7$^-$	E2	A_2=+0.24 *2*, A_4=−0.02 *3*.
753[‡]&		2731.35	(6$^+$)	1977.85	6$^+$		
753.3[‡] *3*	4.5 *3*	1872.64	4$^+$	1119.45	4$^+$	D+Q	A_2=+0.059 *4* (1979He18).
858.5 *2*	55.6 *16*	1977.85	6$^+$	1119.45	4$^+$	E2	A_2=+0.243 *8*, A_4=−0.062 *11*.
858.7[‡] *2*		2731.35	(6$^+$)	1872.64	4$^+$		
890.1 *1*	4.6 *6*	4808.80	(10$^-$)	3918.69	(8$^-$)	(E2)	A_2=+0.31 *7*, A_4=+0.07 *12*.
902.7 *3*		3202.3	(7$^+$)	2299.55	5$^+$	E2	A_2=+0.23 *5*, A_4=−0.12 *8*.
920.5 *2*	2.5 *2*	3219.89	(6$^-$)	2299.55	5$^+$	D	A_2=−0.21 *15*, A_4=+0.09 *20*.
925	0.5 *3*	3918.69	(8$^-$)	2993.36	8$^+$		
937.1 *2*	4.5 *4*	4965.5	(11$^-$)	4028.40	(9$^-$)	(E2)	A_2=+0.23 *6*, A_4=+0.07 *10*.
1015.5 *1*	28.1 *8*	2993.36	8$^+$	1977.85	6$^+$	E2	A_2=+0.23 *1*, A_4=−0.087 *15*.
1035	0.8 *2*	4028.40	(9$^-$)	2993.36	8$^+$		
1039.2 *1*	<7.6	3770.6	(8$^+$)	2731.35	(6$^+$)		
1049	2.8 *2*	4251.3	(9$^+$)	3202.3	(7$^+$)		
1087.8[&] *2*	1.3 *3*	4858.4?	(10$^+$)	3770.6	(8$^+$)		this γ placed from a 3064 level In 1982An06.
1109.6 *3*	14.4 *5*	1564.58	3$^+$	454.92	2$^+$	D+Q	A_2=+0.04 *3*, A_4=+0.16 *5*. E_γ: 1109.6γ and 1112γ are not fully resolved.
1112[@] *1*	16.4[@] *10*	4105.4	10$^+$	2993.36	8$^+$	(E2)	A_2=+0.33 *6*, A_4=−0.11 *9* for doublet.
1112[@] *1*	16.4[@] *10*	5217.4	(12$^+$)	4105.4	10$^+$		
1121.4 *8*		6086.9	(13$^-$)	4965.5	(11$^-$)		
1147.8 *2*	3.8 *2*	1147.72	2$^+$	0.0	0$^+$	(E2)	A_2=+0.12 *7*, A_4=−0.05 *10*.
1180.1 *2*	2.2 *2*	2299.55	5$^+$	1119.45	4$^+$	D+Q	A_2=+0.42 *10*, A_4=+0.12 *15*.
1199.2 *3*	2.5 *3*	2763.8	(4$^-$)	1564.58	3$^+$		A_2=+0.30 *15*, A_4=−0.24 *23*.
1241.9 *2*	1.6 *2*	3219.89	(6$^-$)	1977.85	6$^+$		A_2=+0.43 *10*, A_4=−0.18 *15*.
1262.7 *3*		6480.1	(14$^+$)	5217.4	(12$^+$)		
1310.2 *1*	6.7 *4*	3288.00	7$^-$	1977.85	6$^+$	D	A_2=−0.30 *4*, A_4=0.00 *6*.
(1418)		1872.64	4$^+$	454.92	2$^+$		
1458.4[&] *4*		7938.5?	(16$^+$)	6480.1	(14$^+$)		
1629.5 *1*	8.7 *3*	2749.03	5$^-$	1119.45	4$^+$	D	A_2=−0.22 *3*, A_4=+0.02 *4*.
1644.0	0.7 *2*	2763.8	(4$^-$)	1119.45	4$^+$		
1943.1		2398.0	3$^-$	454.92	2$^+$		1980Ro02 place this transition from a 3063 level.

[†] From ^{65}Cu(^{16}O,p2nγ) reaction at E=58 MeV (angle not specified but may be 90° as listed by 1979He18 for determination of Eγ's).
[‡] Doublet.
[#] From $\gamma(\theta)$ and RUL (for E2 and M2 transitions).
[@] Multiply placed with undivided intensity.
[&] Placement of transition in the level scheme is uncertain.

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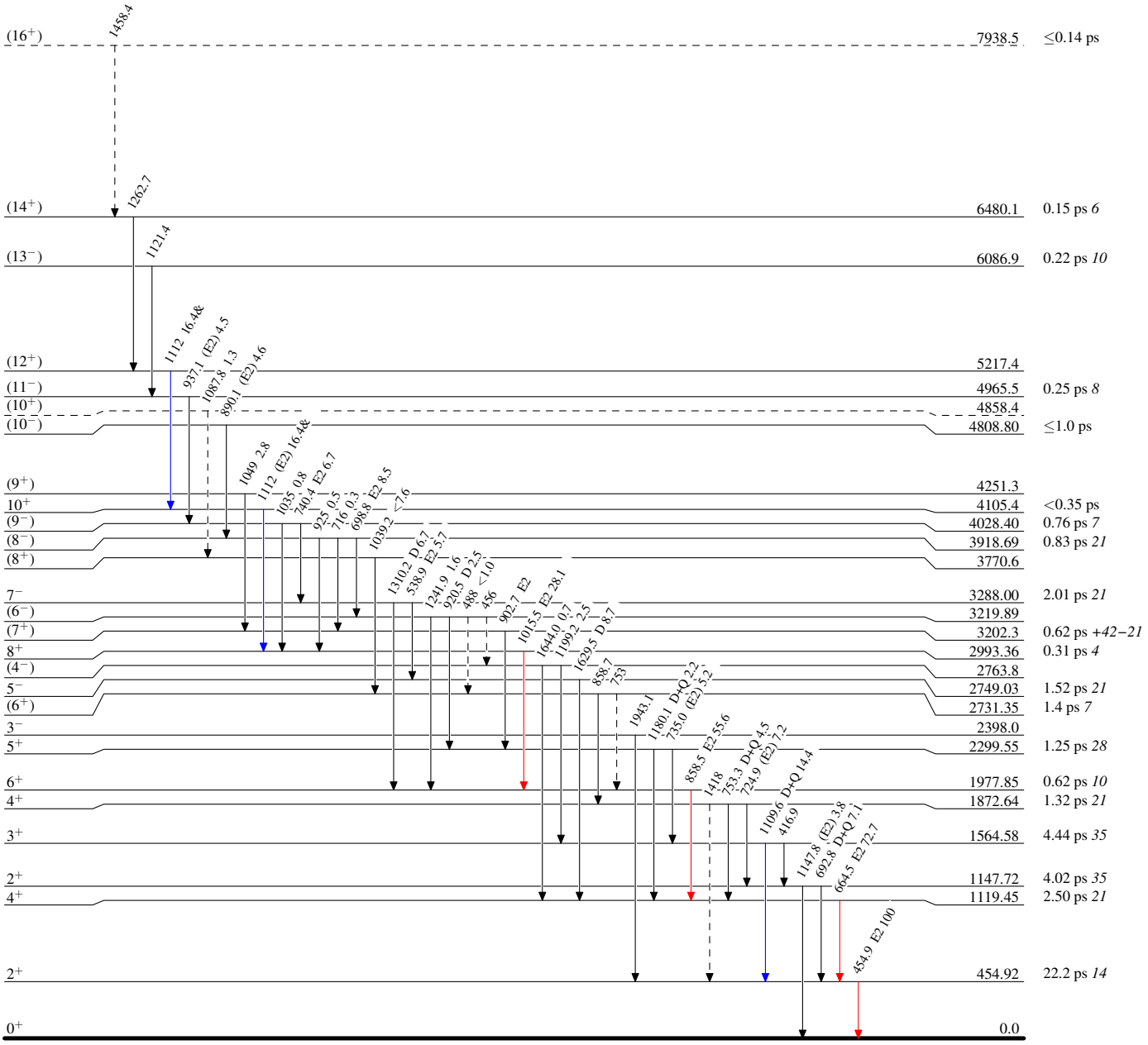
Level Scheme

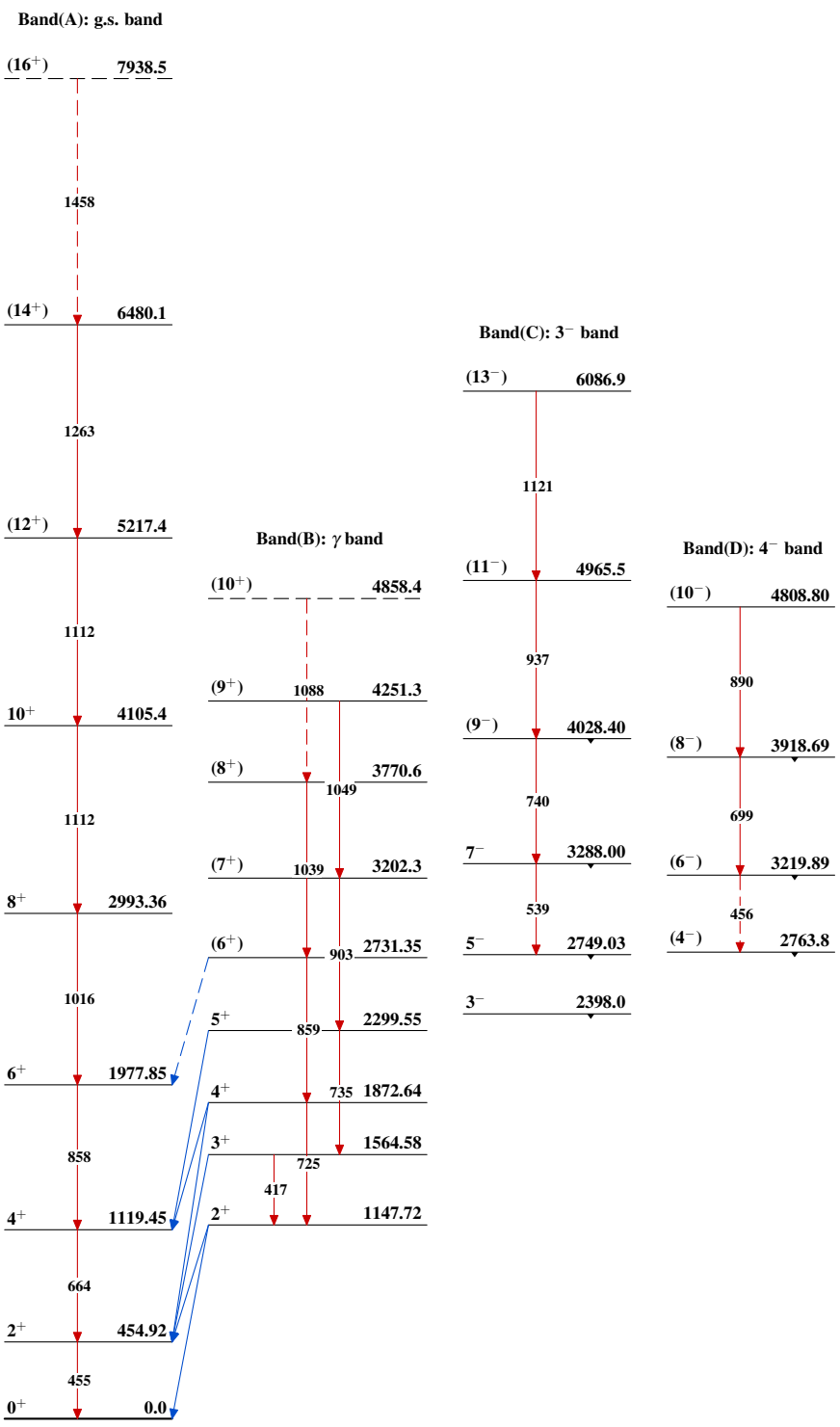
Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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



$^{78}_{36}Kr_{42}$

$^{65}Cu(^{16}O,p2n\gamma),(^{19}F,\alpha 2n\gamma)$ 1979He18



$^{78}_{36}Kr_{42}$