Energy levels and branching ratios [98Bh11].

$^{57}_{29}$Cu

E^* [keV]	$2J^\pi$	$2J^\pi$ (^{7}Li,^{8}He)	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage E_f^*: 0.0 $2J_f^\pi$: 3–
0.0	3^-		196.3(7) ms		
1028(4)	5^-	⟨5–⟩		87St04 85Sh03	100
1106(4)	1^-	⟨1–⟩		87St04 85Sh03	100
2398(10)	5^-				100
2520(25)		⟨5–,7–⟩		87St04 85Sh03	
3280(50)					
3510(25)		⟨9+⟩		87St04 85Sh03	
5350(50)					
5710(25)		⟨5+⟩		87St04 85Sh03	

Additional data on this isotope can be found in [02Jo09].

Energy levels and branching ratios [97Bh02, 99Si10].

$^{58}_{29}$Cu

E^* [keV]	J^π	T	L (τ,t)	I_t (τ,t)	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage E_f^*: J_f^π:	0.0 1^+	202.6 0^+	443.7 ⟨3^+⟩	1051 ⟨1^+⟩	1549 ⟨4^+⟩
0.0	1^+		⟨0+2⟩	46	3.20(1) s	73Ru03						
202.6(3)*	0^+	1	0	143		67Co11		100				
443.7(2)	3^+		⟨2+4⟩	32		73Ru03		100				
1051.0(3)	⟨1^+⟩		⟨0+2⟩	107	79(+20-13) fs	73Ru03			100			
1427.8(3)	2^+		2	36	>670 fs	73Ru03		100				
1549.1(3)	4^+		⟨4⟩	18	>350 fs	73Ru03				100		
1647.4(2)	⟨3^+⟩				>910 fs			100				
1651.6(3)	2^+	1	2	79	35(7) fs	73Ru03				95	5(2)	
2064.7(4)	5^+			14		01Ru11				64(2)		28(1)
2070(20)												
2170(20)				11		73Ru03						
2250				11		03Li38						
2690(20)	4^+		4	28		73Ru03						
2751				28		03Li38						
2816				28		03Li38						
2919.9(5)	5^+					01Ru11				100		
2931	5^+		⟨4+6⟩	82		02Ru09						
3230(20)				19		73Ru03						
3281				19		03Li38						
3420.4(5)	7^+					02Ru09						
3460	1^+					03Ha43						
3511.9(7)						03Li38						
3570(20)				46		73Ru03						
3678	1^+					03Ha43						
3740(20)				85		73Ru03						
3820(20)				19		73Ru03						

(continued) **$^{58}_{29}$Cu**

E^* [keV]	J^π	T	L (τ,t)	I_t (τ,t)	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage				
							E_f^*:	0.0	202.6	443.7	1051	1549
							J_f^π:	1^+	0^+	$\langle 3^+\rangle$	$\langle 1^+\rangle$	$\langle 4^+\rangle$
3890(20)				21		73Ru03						
4065.0(7)	$\langle 7^+\rangle$											
4210(20)				36		73Ru03						
4440.8(6)	8^+					02Ru09						
5190(2)												
5347.2(9)	$\langle 9^+\rangle$											
5574.3(8)	$\langle 9^+\rangle$											
6386.5(10)	10^+					02Ru09						
6586(2)												
6793(1)	$\langle 9\rangle$											
7391(2)	$\langle 11^+\rangle$											
8126(1)	$\langle 11\rangle$					02Ru09						
8226(2)	$\langle 9^+\rangle$											
8487(2)	$\langle 12^+\rangle$											
8880(2)												
8915(2)	$\langle 9^+\rangle$											
9679(3)												
9745(2)	$\langle 11^+\rangle$				0.38(4) ps							
9804(2)	$\langle 12\rangle$											
10775(2)												
10943(2)	$\langle 13^+\rangle$				0.104(14) ps							
11553(4)												
11842(3)												
12519(2)	$\langle 15^+\rangle$				0.035(7) ps							
13128(3)												
14474(2)	$\langle 17^+\rangle$											
14881(4)												
16816(3)	$\langle 19^+\rangle$											
19564(4)	$\langle 21^+\rangle$											
22745(5)	$\langle 23^+\rangle$											
				73Ru03		Ref.						

Additional data on this isotope can be found in [03Li38, 02Ru09, 02Fu07, 01Ru11, 01Ru02, 99Ru01, 94Ak02, 73Ru03, 72Be38, 67Co11].

* $\sigma(\theta)$ of the (p,n) reaction for this level is similar to that of $J^\pi=0^+$ ^{54}Co.

I_t is an approximate yield of tritium in counts per channel from the (τ,t) reaction at 32° measured in [73Ru03], see also [94Ak02, 72Be38] and data from the spin-isospin reaction (p,n) [67Co11].

Energy levels and branching ratios [97Bh02, 99Si10]. Part 2 $^{58}_{29}$Cu

E^*	J^π		Branching ratios in percentage									
		E_f^*:	1647	2065	2920	3420.4	3511.9	4065.0	4440.8	5190	5347.2	5574.3
[keV]		J_f^π:	$\langle 3^+\rangle$	$\langle 5^+\rangle$	$\langle 5^+\rangle$	$\langle 7^+\rangle$		$\langle 7^+\rangle$	$\langle 8^+\rangle$		$\langle 9^+\rangle$	$\langle 9^+\rangle$
2064.7(4)	5^+		8(1)									
3420.4(5)	7^+			93(3)	7(1)							
3511.9(7)					100							
4065.0(7)	$\langle 7^+\rangle$			62(4)	38(4)							
4440.8(6)	8^+					100						
5190(2)				100								
5347.2(9)	$\langle 9^+\rangle$					81(5)			19(2)			
5574.3(8)	$\langle 9^+\rangle$							100				
6386.5(10)	10^+								83(7)		17(3)	
6586(2)							67(33)			33(33)		
6793(1)	$\langle 9\rangle$										100	
7391(2)	$\langle 11^+\rangle$										100	
8226(2)	$\langle 9^+\rangle$									33(17)		67(17)
9745(2)	$\langle 11^+\rangle$											18(3)

Energy levels and branching ratios [97Bh02, 99Si10]. Part 3 $^{58}_{29}$Cu

E^*	J^π		Branching ratios in percentage									
		E_f^*:	6386.5	6586	6793	7391	8127	8226	8487	8880	8915	9745
[keV]		J_f^π:	$\langle 10^+\rangle$		$\langle 9\rangle$	$\langle 11^+\rangle$	$\langle 11\rangle$	$\langle 9^+\rangle$	$\langle 12^+\rangle$		$\langle 9^+\rangle$	$\langle 11^+\rangle$
8126(1)	$\langle 11\rangle$		100									
8487(2)	$\langle 12^+\rangle$		100									
8880(2)					44(11)	56(11)						
8915(2)	$\langle 9^+\rangle$			x								
9679(3)						100						
9745(2)	$\langle 11^+\rangle$							15(3)			67(3)	
9804(2)	$\langle 12\rangle$						67(8)		33(8)			
10775(2)										100		
10943(2)	$\langle 13^+\rangle$											100
11553(4)									100			

Energy levels and branching ratios [97Bh02, 99Si10]. Part 4 $^{58}_{29}$Cu

E^*	J^π		Branching ratios in percentage								
		E_f^*:	9804	10775	10943	11842	12519	14474	16816	19564
[keV]		J_f^π:	$\langle 12\rangle$		$\langle 13^+\rangle$		$\langle 15^+\rangle$	$\langle 17^+\rangle$	$\langle 19^+\rangle$	$\langle 21^+\rangle$
11842(3)			100							
12519(2)	$\langle 15^+\rangle$				100					
13128(3)				100						

(continued) **$^{58}_{29}$Cu**

E^*	J^π	Branching ratios in percentage							
	E_f^*:	9804	10775	10943	11842	12519	14474	16816	19564
[keV]	J_f^π:	⟨12⟩		⟨13$^+$⟩		⟨15$^+$⟩	⟨17$^+$⟩	⟨19$^+$⟩	⟨21$^+$⟩
14474(2)	⟨17$^+$⟩					100			
14881(4)					100				
16816(3)	⟨19$^+$⟩						100		
19564(4)	⟨21$^+$⟩							100	
22745(5)	⟨23$^+$⟩								100

Energy levels and branching ratios [02Ba42]. **$^{59}_{29}$Cu**

E^*	$2J^\pi$	T	L	C^2S'	σ (d,n)	L	C^2S'	L	C^2S'	C^2S'	C^2S'	σ (τ,d)	$T_{1/2}$ or	Ref.
[keV]				(d,n)	μb/sr		(τ,d)		(α,t)	(τ,d)	(τ,d)	μb/sr	Γ_{cm}	
0.0	3$^-$		1	1.85	13100	1	1.95	1	1.0	1.89	2.70	15100	81.5(5) s	73Bo02
491.1(1)	1$^-$		1	0.84	6900	1	0.80	1	0.35	0.59	1.10	6900	0.6(2) ps	73Bo02
914.01(9)	5$^-$		3	2.5	2300	3	2.32	3	3.4	2.85	3.20	2180	>1.1 ps	73Bo02
1398.6(1)	7$^-$		3	0.28	1000	3	0.41	3	≈1.5	0.31	0.56	390	0.4(2) ps	69Ok01
1865.2(1)	7$^-$		3	0.06										73Bo02
1987.8(2)	5$^{\langle+\rangle}$			<0.1										73Bo02
2266.3(2)	3$^+$					2	0.09				0.12	380	0.2(1) ps	76Br36
2318.1(6)	1$^-$,5$^-$		1	0.36	2700									69Ok01
2323.9(2)	3					1	0.17			0.29	0.24	1660	25(4) fs	76Br36
2360	3$^+$,5$^+$							2	0.22					70Ro22
2390.9(2)	9$^-$													
2587.7(2)	11$^{\langle-\rangle}$													
2664.5(2)	⟨9$^-$⟩													
2706.0(2)	5$^{\langle-\rangle}$		3	0.06				3	≈0.4					73Bo02
2715.0(1)	7$^{\langle-\rangle}$					3	0.12			0.15	0.16	140		76Br36
2928(2)	5$^{\langle-\rangle}$													
2993(2)	⟨7$^-$⟩													
3025(1)	5$^{\langle-\rangle}$													
3042.7(2)	9$^+$		4	2.4	900	4	3.19	4	2.7	3.96	4.41	1760	0.8(4) ps	73Bo02
3114.1(5)	5$^-$		1	0.19	2100								14(8) fs	73Bo02
3121.6(8)														
3129.7(2)	3$^-$					1	0.23			0.32	0.32	2350	6.9(28) fs	76Br36
3309(2)	7$^{\langle-\rangle}$													
3309	7$^+$,9$^+$					⟨4⟩	0.23				0.32	100		76Br36
3329.5(2)	⟨11$^-$⟩													
3434(4)	5							⟨2,3⟩	0.1+0.4					
3437	7$^+$,9$^+$					⟨4⟩	0.14				0.20	90		76Br36
3438(4)	⟨1⟩													
3447.8(2)	⟨13⟩$^-$													
3551(1)	5$^-$					3	0.22	3	≈1.7		0.31	390	<10 fs	76Br36
3573.9(8)	5,7													

(continued) **$^{59}_{29}$Cu**

E^* [keV]	$2J^\pi$	T	L	C^2S' (d,n)	σ (d,n) μb/sr	L	C^2S' (τ,d)	L	C^2S' (α,t)	C^2S' (τ,d)	C^2S' (τ,d)	σ (τ,d) μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.
3578.1(6)	3^-–7^-													
3580.3(1)	5^+		2	0.60	4100	2	0.56			1.05	0.78	3610	1.7(10) ps	73Bo02
3615(1)	3^-					1	0.10				0.14	640	<24 fs	76Br36
3654(10)	1^-,3^-					1	0.03				0.04	260		76Br36
3699(4)	7^-					3	0.17	⟨4,3⟩	0.1+0.4		0.24	230		76Br36
3729(2)	3,5									⟨0.12⟩				
3742(2)	3^-		1	0.11		1	0.13			0.12	0.18	1160		73Bo02
3757.7(9)	5^+–9^-													
3886(2)*	3^-		1	0.51	7200	1	0.30			0.45	0.41	2690		73Bo02
3905.2(18)	3^-			[1.12]		1	0.22	⟨2+1⟩	0.2+0.6		0.31	2020		69Ok01
3930.0(24)	5^+													
4000(2)	$\langle 1\rangle^-$		1	0.30		1				0.25		2300		73Bo02
4051.0(10)	1^-,3^-					1						270		76Br36
4072(3)	3^-–7^-													
4100.3(2)	$\langle 13^-\rangle$													
4108.0(10)	3^-									0.14		1610		76Br36
4154												70		76Br36
4183(4)	$5,9^{\langle -\rangle}$													
4207.0(18)	$5,7^{\langle -\rangle}$											70		76Br36
4213(9)	7^+,9^+					4	0.09				0.41	230		76Ga19
4258(2)														
4267(7)	1^-,3^-					1	0.08			0.05				76Ga19
4295.2(20)														
4301.3(15)	$5^{\langle -\rangle}$		3	1.76										73Bo02
4307(4)*	$5^{\langle -\rangle}$	3		incl		3	1.30			1.05	1.8	1880		76Ga19
4348.9(10)*	$\langle 1\rangle^-$	3	1	0.35	2400	1	0.32			0.30	0.44	1780		73Bo02
4409.9(24)														
4441.0(24)	7^+													
4465(4)	5^+–9^-					4	0.07							76Ga19
4500.0(7)	$\langle 1\rangle^-$					1	0.03						8(1) fs	76Ga19
4528.3(3)	$\langle 13^+\rangle$													
4530.0(10)	$\langle 7\rangle^+$					4	0.20			0.09				76Ga19
4622.2(7)														
4699(4)	$\langle 3\rangle$													
4711.2(22)	$\langle 1\rangle^-$					1	0.05							76Ga19
4770.2(5)*	3^-		1	0.08	600	1	0.05						3.5 fs	73Bo02
4810	7^+,9^+		4	0.09										93InZZ
4817.8(4)	3^-					1	0.17			0.12			50 eV	76Ga19
4903.6(2)	$\langle 15^-\rangle$													
4914.2(21)	5^+–9^-													
4931.4(22)	7^+,9^+					4	0.05							76Ga19
4972.7(22)	3^+,5^+					2	0.02							76Ga19
5042.5(22)														
5053.7(10)	$\langle 5\rangle^-$					3	0.14			0.08				76Ga19
5105.7(9)	1^-–5^-													76Ga19

(continued) **$^{59}_{29}$Cu**

E^* [keV]	$2J^\pi$	T	L	C^2S' (d,n)	σ (d,n) μb/sr	L	C^2S' (τ,d)	L	C^2S' (α,t)	C^2S' (τ,d)	C^2S' (τ,d)	σ (τ,d) μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.
5218.7(6)	9												10(1) fs	
5231.0(4)*	1^-		1	0.21	1700	1	0.21			0.18			100 eV	69Ok01
5255.0(10)														
5264(3)	3^-					1	0.02							76Ga19
5306(3)	$\langle 1\rangle^-$					1	0.04							76Ga19
5427.5(3)	$\langle 17^+\rangle$													
5431(4)														
5443.6(9)	$\langle 3\rangle^+$					2	0.02							76Ga19
5474.0(9)														
5482(4)	$\langle 5\rangle^-$					3	0.03							76Ga19
5522.3(4)	5													
5542(3)	1^-–5^-													
5550.0(6)	5													
5584(4)														
5589(4)														
5596(3)	$\langle 1^+\rangle$													
5600.8(7)	$\langle 3\rangle$													
5608(4)	$\langle 1\rangle^-$					1	0.08							76Ga19
5620(4)	$7^{\langle -\rangle}$		3	0.17										93InZZ
5645.0(8)	$\langle 3\rangle^-$													
5657(4)	5^-					3	0.22							76Ga19
5694(4)										0.14				
5711(4)	5^-													
5719(4)	$3,5^{\langle -\rangle}$					3	0.08							76Ga19
5721.95(23)	$\langle 17^-\rangle$													
5777.5(16)														
5801(4)														
5822(4)														
5832.7(10)														
5839(3)	5^+													
5846(3)	$\langle 1^-\rangle$													
5854.2(18)	5^-					3	0.39			0.15				76Ga19
5880.7(7)	$3^-,5^-$													
5897(4)	$7^{\langle -\rangle}$													
5914(4)	5													
5923(9)	$1^-,3^-$					1	0.03							76Ga19
5931.0(9)	5													
5941(4)	3,5													
5950(9)	$\langle 9\rangle^+$		4	0.39		4	0.27							93InZZ
5958.4(6)										0.12				
5968(4)														
5971(4)														
6033(4)	$1^-,3^-$					1	0.06							76Ga19
6039(4)	$3^{\langle +\rangle}$													
6076(4)	3													

(continued) **$^{59}_{29}$Cu**

E^* [keV]	$2J^\pi$	T	L	C^2S' (d,n)	σ (d,n) μb/sr	L	C^2S' (τ,d)	L	C^2S' (α,t)	C^2S' (τ,d)	C^2S' (τ,d)	σ (τ,d) μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.
6086(3)	$\langle 1^+ \rangle$													
6091.8(7)	3													
6103(3)	$\langle 5^+ \rangle$													
6127.5(14)	3^-					1	0.12							76Ga19
6197(4)	$\langle 3^- \rangle$													
6201(4)	3									0.41				
6206(4)	9^+		4	0.65		4	0.91							93InZZ
6210(30)	$\langle 5^-,7^- \rangle$													
6229(3)	$\langle 1^- \rangle$													
6236.7(9)	3^-					1	0.03							76Ga19
6296(3)	$\langle 1^- \rangle$													
6304.1(10)	$3^{\langle - \rangle}$													
6310(9)	$\langle 9 \rangle^+$					4	0.39			0.20				76Ga19
6323.9(24)	$\langle 5 \rangle$												20(10) eV	
6326(4)	$\langle 3^- \rangle$													
6336(4)	$\langle 5^+ \rangle$												20(10) eV	
6344.2(12)	$\langle 3^-,5^- \rangle$													
6365(3)	$\langle 3^+ \rangle$												60(12) eV	
6365.5(9)	3^-					1	0.05							76Ga19
6381(4)														
6396(4)														
6404(4)														
6410(4)														
6419.0(25)	$3^{\langle - \rangle}$												90(18) eV	
6444(4)														
6451(4)														
6457(4)	5													
6461(4)	$3^{\langle - \rangle}$													
6470(4)	$3,5^{\langle - \rangle}$					3	0.04							76Ga19
6481(4)														
6487(4)														
6493(4)	$7^{\langle - \rangle}$													
6519(6)	$5^-,7^-$					3	0.42			$\langle 0.21 \rangle$				76Ga19
6530.2(25)	$\langle 3^- \rangle$													
6559(4)														
6598(9)	$5^-,7^-$					3	0.12							76Ga19
6611.2(5)	$\langle 19^- \rangle$													
6624.9(22)	$3^{\langle + \rangle}$												45(5) eV	
6632(9)	$7^+,9^+$					4	0.10							76Ga19
6644.0(25)	$\langle 3^- \rangle$												60(12) eV	
6661.0(13)	$7^+,9^+$					4	0.04							76Ga19
6690.5(14)														
6691.1(7)	$\langle 17^+ \rangle$													
6708.3(7)	$3^{\langle - \rangle}$													
6727.4(6)	$\langle 3^-,5^- \rangle$													

(continued) **$^{59}_{29}$Cu**

E^* [keV]	$2J^\pi$	T	L	C^2S' (d,n)	σ (d,n) μb/sr	L	C^2S' (τ,d)	L	C^2S' (α,t)	C^2S' (τ,d)	C^2S' (τ,d)	σ (τ,d) μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.
6745.9(6)	$5^{\langle+\rangle}$					[3]	0.22						140(41) eV	76Ga19
6760(4)	$\langle3^-\rangle$					[3]	0.03							76Ga19
6798.5(8)	$\langle19^+\rangle$													
6810.1(21)	$3^{\langle-\rangle}$												110(11) eV	
6833.9(21)	9^+					4	1.00			0.39			11.2(4) eV	76Ga19
6842.3(7)	3													
6864.9(21)	$\langle3^-\rangle$												85(8) eV	
6877.1(21)	$\langle5^+\rangle$												70(4) eV	
6885(4)	$\langle3^-,5\rangle$													
6894(4)	$5^{\langle-\rangle}$													
6902.9(5)	9^+		4	1.73		4	1.70			0.70			35(2) eV	93InZZ
6921.5(21)	$\langle5^+\rangle$												230 eV	
6939(4)	$3^{\langle-\rangle}$													
6940(30)	$5^-,7^-$													
6946.1(9)	$\langle3\rangle^-$					1	0.12							76Ga19
6959(4)	$\langle3\rangle$													
6967.7(21)	$\langle3,5\rangle$													
7013.7(10)														
7027.7(9)	$\langle3^-\rangle$												82(8) eV	
7044.8(10)						4	0.05							76Ga19
7116(9)						2	0.21			0.13				76Ga19
7136.8(10)	$\langle5^+\rangle$		2	0.15		2	0.07			$\langle0.12\rangle$				73Bo02
7180	$7^+,9^+$		4	0.23		2	0.10							73Bo02
7197(4)	$\langle3\rangle$													
7251(4)	$\langle3^-,5\rangle$					[1]	0.12							76Ga19
7299(4)	$\langle3^+\rangle$					[1]	0.09							76Ga19
7332(4)	3													
7348(4)	$3^{\langle-\rangle}$													
7353.5(6)	$\langle19^+\rangle$													
7358(9)						2	0.06							76Ga19
7391.6(14)	5^+					2	0.23			$\langle0.13\rangle$				76Ga19
7407(4)														
7444(4)	$\langle3\rangle^+$					2	0.09							76Ga19
7445.8(7)	$\langle21^-\rangle$													
7450	$7^+,9^+$		3+4	0.2+0.3										93InZZ
7471.1(14)														
7474.2(22)	$\langle1^-\rangle$													
7503(4)														
7518.2(21)	$\langle5^-\rangle$												51(11) eV	
7523(4)						2	0.12							76Ga19
7536.4(21)	$\langle3^-\rangle$												0.35(4) keV	
7650(4)	$5^{\langle+\rangle}$					2	0.10							76Ga19
7697(4)	$\langle5\rangle$					4	0.22							76Ga19
7725(9)						2	0.04							76Ga19
7730	$7^+,9^+$		4+2	0.4+0.1										93InZZ

(continued) **$^{59}_{29}$Cu**

E^* [keV]	$2J^\pi$	T	L	C^2S' (d,n)	σ (d,n) μb/sr	L	C^2S' (τ,d)	L	C^2S' (α,t)	C^2S' (τ,d)	C^2S' (τ,d)	σ (τ,d) μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.
7773(9)			⟨3⟩	0.17										76Ga19
7793(9)			⟨3⟩	0.14										76Ga19
7793.9(8)	⟨17$^+$⟩													
7810(30)														
7828.1(6)	⟨17$^+$⟩													
7920(30)	3$^+$,5$^+$		2	0.01		2	0.09							73Bo02
7940	7$^+$,9$^+$		4	0.32		4	0.17							93InZZ
8013(4)	⟨3⟩													
8077(4)	3$^{\langle-\rangle}$,5													
8117.3(6)	⟨21$^+$⟩													
8123(9)	[5$^+$]					2	0.13			0.09				76Ga19
8154.5(6)	⟨19$^+$⟩													
8193(6)	⟨5⟩$^+$		2	0.21		2	0.22			0.12				73Bo02
8223(4)	3$^{\langle-\rangle}$,5									0.11				
8230	7$^+$,9$^+$		4	0.50										93InZZ
8258(3)	⟨5⟩$^+$					2	0.23							76Ga19
8390(30)														
8550(8)	7$^+$,9$^+$		4	0.42		4	0.22			0.13				93InZZ
8659.0(8)	⟨21$^+$⟩													
8729.0(7)	⟨21$^+$⟩													
8814.9(8)	⟨23$^-$⟩													
8944.4(7)	⟨23$^+$⟩													
9060	X$^+$		4+2	0.2+0.04										93InZZ
9280	X$^+$		4+2	0.3+0.07		4				0.12				93InZZ
9457.3(7)	⟨23$^+$⟩													
9673.7(9)	⟨25$^+$⟩													
9780	X$^+$		4+2	0.1+0.07										93InZZ
10130	X$^+$		4+2	0.1+0.08										93InZZ
10144.6(8)	⟨21$^+$⟩													
10278.5(9)	⟨25$^+$⟩													
10364.2(7)	⟨21$^+$⟩													
10500	X$^+$		4+2	0.1+0.08										93InZZ
10606.6(10)	⟨27$^+$⟩													
11100														
11213.7(10)	⟨27$^+$⟩													
11921.5(6)	⟨25$^+$⟩													
12041.6(8)	⟨25$^+$⟩													
12249.6(11)	⟨29$^+$⟩													
13355.1(10)	⟨29$^+$⟩													
13360.0(12)	⟨31$^+$⟩													
14585.5(13)	⟨33$^+$⟩													
14955.1(14)	⟨33$^+$⟩													
16032.1(16)	⟨35$^+$⟩													
16855.1(17)	⟨37$^+$⟩													
19097.2(20)	⟨41$^+$⟩													

(continued) **$^{59}_{29}$Cu**

E^* [keV]	$2J^\pi$	T	L	C^2S' (d,n)	σ (d,n) μb/sr	L	C^2S' (τ,d)	L	C^2S' (α,t)	C^2S' (τ,d)	C^2S' (τ,d)	σ (τ,d) μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.
21708.2(22)	$\langle 45^+ \rangle$													
24712.3(25)	$\langle 49^+ \rangle$													
27900													7.0(10) MeV	
28137(3)	$\langle 53^+ \rangle$													
31964(3)	$\langle 57^+ \rangle$													
				69Ok01	69Ok01		76Ga19		70Ro22		76Br36	76Br36		Ref.
				73Bo02										Ref.

Additional data on this isotope can be found in [02Ru06, 02An34, 02An20, 00An32, 94Ho31, 90Br25, 68OkZY].

* Possible analogs of the low-lying ^{59}Ni states [02Ba42].

In the first two columns results of measurements of one-proton transfer (d,n) and (τ,d) reactions are presented as they are given in the evaluation [02Ba42] (mainly from [73Bo02] and [76Ga19]); results of the individual measurements of the (α,t) [70Ro22] and (τ,d) [76Bi07, 76Br36] proton transfer reactions are presented in three other columns, cross sections σ (d,n) and σ (τ,d) are from [69Ok01] and [76Br36]; comparison of data can be found in [76Bi07].

Energy levels and branching ratios [02Ba42]. Part 2 **$^{59}_{29}$Cu**

E^*	$2J^\pi$		Branching ratios in percentage									
		E^*_f:	0.0	491	914	1399	1865	1987.8	2266.3	2318.1	2323.9	2391
[keV]		$2J^\pi_f$:	3^-	1^-	5^-	7^-	7^-	$5^{\langle+\rangle}$	3^+		3	9^-
491.1(1)	1^-		100									
914.01(9)	5^-		99	≈1								
1398.6(1)	7^-		88(2)		12(1)							
1865.2(1)	7^-		30(1)		55(1)	15(1)						
1987.8(2)	$5^{\langle+\rangle}$		100									
2266.3(2)	3^+		52(1)	48(1)								
2318.1(6)	1^-,5^-		83(1)	17(1)								
2323.9(2)	3		90(1)		10(1)			x				
2390.9(2)	9^-				90	9.5						
2587.7(2)	$11^{\langle-\rangle}$					99	≈1.2					
2664.5(2)	$\langle 9^- \rangle$					11	89					
2706.0(2)	$5^{\langle-\rangle}$			27(1)	59(1)	14(1)						
2715.0(1)	$7^{\langle-\rangle}$		37(1)		28(1)	20(1)		15(1)				
2928(2)	$5^{\langle-\rangle}$		34(1)	10(1)	45(1)			11(1)				
2993(2)	$\langle 7^- \rangle$		37(1)		58(1)			5(1)				
3025(1)	$5^{\langle-\rangle}$		45(1)	40(1)	15(1)							
3042.7(2)	9^+		1(1)		3(1)	75(1)	20(1)					
3114.1(5)	5^-		72(1)	28(1)								
3121.6(8)				x	x							
3129.7(2)	3^-		29(1)	35(1)	36(1)							
3309(2)	$7^{\langle-\rangle}$		25(1)		45(1)	30(1)						

(continued) **$^{59}_{29}$Cu**

E^*	$2J^\pi$					Branching ratios in percentage						
		E_f^*:	0.0	491	914	1399	1865	1987.8	2266.3	2318.1	2323.9	2391
[keV]		$2J_f^\pi$:	3^-	1^-	5^-	7^-	7^-	$5^{\langle+\rangle}$	3^+		3	9^-
3329.5(2)	$\langle 11^-\rangle$					13	19					
3434(4)	5		30(1)		70(1)							
3438(4)	$\langle 1\rangle$		100									
3447.8(2)	$\langle 13\rangle^-$											85
3551(1)	5^-		35(1)		65(1)							
3573.9(8)	5,7				70(1)	30(1)						
3578.1(6)	3^-–7^-		34(1)		33(1)		33(1)					
3580.3(1)	5^+		5		34	14	11	10	23			
3615(1)	3^-		35(1)	65(1)								
3699(4)	7^-				100							
3729(2)	3,5					24(1)		33(1)			43(1)	
3742(2)	3^-		11(2)	40(5)	39(4)			10(3)				
3757.7(9)	5^+–9^-				60(1)	40(1)						
3886(2)*	3^-		60(7)	27(5)				13(1)				
3905.2(18)	3^-		55(6)	17(4)	17(4)			11(2)				
3930.0(24)	5^+				25(1)	75(1)						
4000(2)	$\langle 1\rangle^-$		15(2)	41(4)							44(3)	
4051.0(10)	1^-,3^-		56	25							10	
4072(3)	3^-–7^-				25(1)			75(1)				
4108.0(10)	3^-		5(1)	24(5)	71(8)							
4183(4)	$5,9^{\langle-\rangle}$					40(1)						
4207.0(18)	$5,7^{\langle-\rangle}$		24(1)		28(1)	22(1)					26(1)	
4295.2(20)			100									
4301.3(15)	$5^{\langle-\rangle}$		9(2)		36(1)	55(1)						
4307(4)*	$5^{\langle-\rangle}$				100							
4348.9(10)*	$\langle 1\rangle^-$		6(1)	16(1)					17(1)	9(1)	27(1)	
4441.0(24)	7^+				50(1)	50(1)						
4465(4)	5^+–9^-				100							
4500.0(7)	$\langle 1\rangle^-$		100									
4530.0(10)	$\langle 7\rangle^+$				100							
4622.2(7)			100									
4699(4)	$\langle 3\rangle$		63(1)	21(1)							16(1)	
4770.2(5)*	3^-		3(1)	36(1)	19(1)		3(1)	11(1)	8(1)	7(1)		
4817.8(4)	3^-		27(1)	55(1)	5(1)			7(1)	2(1)		3(1)	
4914.2(21)	5^+–9^-				100							
5053.7(10)	$\langle 5\rangle^-$		30(1)		15(1)			36(1)				
5105.7(9)	1^-–5^-		x	x	x							
5218.7(6)	9					74	12.3					
5231.0(4)*	1^-		86(1)	6(1)					6(1)			
5255.0(10)			100									
5264(3)	3^-		35(3)	18(3)	4(3)			1	<1	4(3)	7(3)	
5306(3)	$\langle 1\rangle^-$		9(3)								66(3)	
5443.6(9)	$\langle 3\rangle^+$		11(2)	18(3)	14(2)			23(3)	5(1)		12(2)	
5474.0(9)			x									
5482(4)	$\langle 5\rangle^-$			30(5)	4.0(6)	3.0(5)	9(2)	6(1)	16(2)		15(2)	

(continued) **$^{59}_{29}$Cu**

E^*	$2J^\pi$		Branching ratios in percentage									
		E_f^*:	0.0	491	914	1399	1865	1987.8	2266.3	2318.1	2323.9	2391
[keV]		$2J_f^\pi$:	3^-	1^-	5^-	7^-	7^-	$5^{\langle+\rangle}$	3^+		3	9^-
5522.3(4)	5		89(1)		6(1)	4(1)						
5550.0(6)	5		37(1)				23(1)		17(1)			
5600.8(7)	$\langle 3\rangle$		50(1)	13(1)	3(1)				11(1)	10(1)		
5620(4)	$7^{\langle-\rangle}$		47(3)			2		4(3)				
5645.0(8)	$\langle 3\rangle^-$		30(1)	12(1)	18(1)	4(1)	2(1)	2(1)	10(1)		7(1)	3(1)
5657(4)	5^-				60(5)	19.9(5)	1.4(5)	2.3(5)	3.7(5)	1.4(5)		
5694(4)			x									
5711(4)	5^-		56(1)		7(1)	10(1)			7(1)			
5719(4)	$3,5^{\langle-\rangle}$		13(1)	3(1)				35(1)		15(1)	22(1)	
5777.5(16)			100									
5832.7(10)			100									
5854.2(18)	5^-		x									
5880.7(7)	$3^-,5^-$		72(1)		6(1)			4(1)		13(1)		
5897(4)	$7^{\langle-\rangle}$					88(1)		6(1)				
5931.0(9)	5		x									
5941(4)	3,5		x						x	x		
5958.4(6)			x									
5968(4)			x		x	x						
5971(4)			x		x	x						
6039(4)	$3^{\langle+\rangle}$		46(1)	12(1)	9(1)			8(1)	7(1)		9(1)	
6076(4)	3			x								
6091.8(7)	3		70(1)	15(1)							11.0(10)	
6127.5(14)	3^-		x	x								
6197(4)	$\langle 3^-\rangle$			39(1)					8(1)		23(1)	
6201(4)	3		5(1)	13(1)	6(1)			21(1)	5(1)		18(1)	
6206(4)	9^+							4(1)				
6236.7(9)	3^-		34(1)	28(1)		14(1)		4(1)	7(1)			
6304.1(10)	$3^{\langle-\rangle}$		9(1)	22(1)			5(1)	18(1)	4(1)		5(1)	
6323.9(24)	$\langle 5\rangle$		8(1)	13(1)	5(1)	9(1)	45(1)		4(1)	11(1)		
6326(4)	$\langle 3^-\rangle$		65(1)	5(1)			12(1)		12(1)	6(1)		
6344.2(12)	$\langle 3^-,5^-\rangle$		7(1)	7(1)	46(1)				18(1)			
6365.5(9)	3^-		35(1)	40(1)	14(1)							
6410(4)			x					x				
6419.0(25)	$3^{\langle-\rangle}$		18	20	19				23		19	
6451(4)			x									
6457(4)	5		7(1)		39(1)	4(1)		4(1)			6(1)	
6461(4)	$3^{\langle-\rangle}$		5(1)	14(1)	26(1)			3(1)	6(1)	12(1)	12(1)	
6470(4)	$3,5^{\langle-\rangle}$			x	x				x	x		
6493(4)	$7^{\langle-\rangle}$				3(1)	5(1)	9(1)	0(1)				
6530.2(25)	$\langle 3^-\rangle$		x									
6559(4)			x									
6624.9(22)	$3^{\langle+\rangle}$		74(1)	4(1)						5(1)	5(1)	
6644.0(25)	$\langle 3^-\rangle$		x									
6661.0(13)	$7^+,9^+$		x									
6690.5(14)			x									

(continued) **$^{59}_{29}$Cu**

E^*	$2J^\pi$		Branching ratios in percentage									
		E_f^*:	0.0	491	914	1399	1865	1987.8	2266.3	2318.1	2323.9	2391
[keV]		$2J_f^\pi$:	3^-	1^-	5^-	7^-	7^-	$5^{\langle+\rangle}$	3^+		3	9^-
6708.3(7)	$3^{\langle-\rangle}$		37(1)	49(1)					3(1)	1(1)	2(1)	
6727.4(6)	$\langle 3^-,5^-\rangle$		x	83(1)		3(1)					3(1)	
6745.9(6)	$5^{\langle+\rangle}$		88(1)			4(1)				3(1)		
6760(4)	$\langle 3^-\rangle$		88			7		5				
6810.1(21)	$3^{\langle-\rangle}$		6(1)	28(6)				16(3)				
6833.9(21)	9^+					20(1)						
6842.3(7)	3		56(1)	31(1)	5(1)				3(1)		4(1)	
6864.9(21)	$\langle 3^-\rangle$		10(1)	76(15)	8(2)				6(1)			
6877.1(21)	$\langle 5^+\rangle$		19(1)		31(1)	13(1)					8(1)	
6885(4)	$\langle 3^-,5\rangle$		13(2)		21(2)	20(2)	9(2)	11(2)	10(2)		7(1)	
6894(4)	$5^{\langle-\rangle}$		11(1)		11(1)	20(1)		14(1)	13(1)		11(1)	
6902.9(5)	9^+				3(1)	3(1)	1(1)					
6921.5(21)	$\langle 5^+\rangle$				38(1)			46(1)				
6939(4)	$3^{\langle-\rangle}$		8(1)	13(1)	9(1)		6(1)		22(1)	4(1)	10(1)	
6946.1(9)	$\langle 3\rangle^-$		46(1)	11(1)					24(1)	13(1)	7(1)	
6959(4)	$\langle 3\rangle$		x						x			
6967.7(21)	$\langle 3,5\rangle$		58(1)		24(1)			6(1)	6(1)			
7013.7(10)			x									
7027.7(9)	$\langle 3^-\rangle$		x									
7044.8(10)			x									
7136.8(10)	$\langle 5^+\rangle$		x									
7197(4)	$\langle 3\rangle$			76	24							
7251(4)	$\langle 3^-,5\rangle$		51		13	16			10			
7299(4)	$\langle 3^+\rangle$		55(1)		6(1)	3.5		5(1)	5(1)			
7332(4)	3		100									
7348(4)	$3^{\langle-\rangle}$		68(1)		12(1)							
7391.6(14)	5^+		7(1)				8(1)	13(1)				
7407(4)			100									
7444(4)	$\langle 3\rangle^+$		70(1)									
7471.1(14)			x									
7503(4)			x									
7518.2(21)	$\langle 5^-\rangle$		30(1)			70(1)						
7523(4)			x									
7536.4(21)	$\langle 3^-\rangle$		25(1)	55(1)	20(1)							
7650(4)	$5^{\langle+\rangle}$		60(1)			40(1)						
7697(4)	$\langle 5\rangle$		46(1)			22(1)	21(1)	12(1)				
8013(4)	$\langle 3\rangle$		67(1)	33(1)								
8077(4)	$3^{\langle-\rangle},5$		100									
8223(4)	$3^{\langle-\rangle},5$		100									
8258(3)	$\langle 5\rangle^+$		100									

Energy levels and branching ratios [02Ba42]. Part 3 **$^{59}_{29}$Cu**

E^*	$2J^\pi$		Branching ratios in percentage									
		E_f^*:	2587.7	2664.5	2706.0	2715.0	2928.2	2992.9	3024.8	3042.7	3114.1	3121.6
[keV]		$2J_f^\pi$:	$11^{\langle-\rangle}$	$\langle 9^-\rangle$	$5^{\langle-\rangle}$	$7^{\langle-\rangle}$	$5^{\langle-\rangle}$	$\langle 7^-\rangle$	$5^{\langle-\rangle}$	9^+	5^-	
3042.7(2)	9^+		1.4									
3329.5(2)	$\langle 11^-\rangle$		20	49								
3447.8(2)	$\langle 13\rangle^-$		14.9									
3580.3(1)	5^+									3		
4051.0(10)	1^-,3^-								9			
4100.3(2)	$\langle 13^-\rangle$			32								
4183(4)	$5,9^{\langle-\rangle}$				60(1)							
4348.9(10)*	$\langle 1\rangle^-$								8(1)			
4528.3(3)	$\langle 13^+\rangle$		x							x		
4770.2(5)*	3^-				2(1)	1(1)	2(1)					
4903.6(2)	$\langle 15^-\rangle$		x									
5053.7(10)	$\langle 5\rangle^-$					3(1)	7(1)				9(1)	
5218.7(6)	9			2.2		2.1				4.4		
5231.0(4)*	1^-								1(1)			
5264(3)	3^-				7(3)		7(3)				12(3)	
5306(3)	$\langle 1\rangle^-$								7(3)			
5443.6(9)	$\langle 3\rangle^+$					2.0(3)	2.0(3)	10(1)	3.0(5)			
5482(4)	$\langle 5\rangle^-$								5.0(8)	3.0(5)	5.0(8)	
5522.3(4)	5					1(1)						
5550.0(6)	5						7(1)				4(1)	
5600.8(7)	$\langle 3\rangle$								13.0(10)			
5620(4)	$7^{\langle-\rangle}$			19(3)	11(3)	2	1			3(3)		
5645.0(8)	$\langle 3\rangle^-$							7(1)				3(1)
5657(4)	5^-					5.6(5)	0.9(5)		0.5(5)			
5711(4)	5^-					4.0(10)					4.0(10)	
5719(4)	$3,5^{\langle-\rangle}$						7(1)		5(1)			
5880.7(7)	3^-,5^-					3(1)						
5897(4)	$7^{\langle-\rangle}$										6(1)	
5914(4)	5								100			
6039(4)	$3^{\langle+\rangle}$					2(1)	2(1)					
6091.8(7)	3								3.0(10)			
6197(4)	$\langle 3^-\rangle$					8(1)						
6201(4)	3				4(1)		4(1)		5(1)		13(1)	
6206(4)	9^+		6(1)			3(1)				84(1)	3(1)	
6236.7(9)	3^-								4(1)			
6304.1(10)	$3^{\langle-\rangle}$					2(1)	5(1)	20(1)				8(1)
6323.9(24)	$\langle 5\rangle$					5(1)						
6344.2(12)	$\langle 3^-,5^-\rangle$					7.0(10)		3.0(10)	1.0(10)			
6365.5(9)	3^-					3.0(10)						
6457(4)	5				12(1)		1(1)	3(1)			2(1)	
6461(4)	$3^{\langle-\rangle}$				7(1)				3(1)			
6470(4)	$3,5^{\langle-\rangle}$				x							
6493(4)	$7^{\langle-\rangle}$			2(1)	6(1)	16(1)	7(1)			2(1)	1(1)	
6624.9(22)	$3^{\langle+\rangle}$						2(1)					
6708.3(7)	$3^{\langle-\rangle}$						3(1)					

(continued) **$^{59}_{29}$Cu**

E^*	$2J^\pi$					Branching ratios in percentage						
		E_f^*:	2587.7	2664.5	2706.0	2715.0	2928.2	2992.9	3024.8	3042.7	3114.1	3121.6
[keV]		$2J_f^\pi$:	$11^{\langle-\rangle}$	$\langle 9^-\rangle$	$5^{\langle-\rangle}$	$7^{\langle-\rangle}$	$5^{\langle-\rangle}$	$\langle 7^-\rangle$	$5^{\langle-\rangle}$	9^+	5^-	
6727.4(6)	$\langle 3^-,5^-\rangle$					3(1)						
6810.1(21)	$3^{\langle-\rangle}$						50(10)					
6833.9(21)	9^+		12(1)			1(1)				65(1)		
6877.1(21)	$\langle 5^+\rangle$				6(1)			14(1)			4(1)	
6885(4)	$\langle 3^-,5\rangle$				5(1)							
6894(4)	$5^{\langle-\rangle}$				5(1)	6(1)					4(1)	
6902.9(5)	9^+		6.6(10)			2.6(10)				74.5(10)		
6939(4)	$3^{\langle-\rangle}$					8(1)		5(1)				
7251(4)	$\langle 3^-,5\rangle$			x	12							
7299(4)	$\langle 3^+\rangle$				9		11					

Energy levels and branching ratios [02Ba42]. Part 4 **$^{59}_{29}$Cu**

E^*	$2J^\pi$					Branching ratios in percentage						
		E_f^*:	3129.7	3309.0	3329.5	3434	3437	3438	3447.8	3550.6	3573.9	3578.1
[keV]		$2J_f^\pi$:	3^-	$7^{\langle-\rangle}$	$\langle 11^-\rangle$	5	$\langle 7^+,9^+\rangle$	$\langle 1\rangle$	$\langle 13\rangle^-$	5^-	5,7	
4100.3(2)	$\langle 13^-\rangle$				60				8			
4348.9(10)*	$\langle 1\rangle^-$		17(1)									
4770.2(5)*	3^-		2(1)					4(1)				
4817.8(4)	3^-							1.0(10)	<1.0			
4903.6(2)	$\langle 15^-\rangle$				31							
5218.7(6)	9			≈5.1								
5231.0(4)*	1^-							1.0(10)				
5264(3)	3^-					1		1				
5306(3)	$\langle 1\rangle^-$		10(3)					4(3)				
5482(4)	$\langle 5\rangle^-$											4.0(6)
5550.0(6)	5					1.0(10)		3.0(10)				
5657(4)	5^-									0.5(5)		1.4(5)
5711(4)	5^-					4.0(10)						6.0(10)
6039(4)	$3^{\langle+\rangle}$									<1.0		4.0(10)
6091.8(7)	3											1.0(10)
6197(4)	$\langle 3^-\rangle$											22.0(10)
6201(4)	3							6(1)				
6236.7(9)	3^-											9(1)
6344.2(12)	$\langle 3^-,5^-\rangle$									8.0(10)		
6457(4)	5		1(1)			2(1)		1(1)		2(1)	7(1)	
6461(4)	$3^{\langle-\rangle}$		7(1)									5(1)
6493(4)	$7^{\langle-\rangle}$			14(1)		6(1)				2(1)	4(1)	
6624.9(22)	$3^{\langle+\rangle}$					6(1)					5(1)	
6708.3(7)	$3^{\langle-\rangle}$		3(1)				3(1)					
6727.4(6)	$\langle 3^-,5^-\rangle$											4(1)
6745.9(6)	$5^{\langle+\rangle}$										2(1)	

(continued) **$^{59}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage									
	E_f^*:	3129.7	3309.0	3329.5	3434	3437	3438	3447.8	3550.6	3573.9	3578.1
[keV]	$2J_f^\pi$:	3^-	$7^{\langle-\rangle}$	$\langle11^-\rangle$	5	$\langle7^+,9^+\rangle$	$\langle1\rangle$	$\langle13\rangle^-$	5^-	5,7	
6877.1(21)	$\langle5^+\rangle$										4(1)
6894(4)	$5^{\langle-\rangle}$								6(1)		
6921.5(21)	$\langle5^+\rangle$										15.8(10)
6967.7(21)	$\langle3,5\rangle$	2.0(10)									3.9(10)
7299(4)	$\langle3^+\rangle$	6.1(8)									
7348(4)	$3^{\langle-\rangle}$										20.0(10)
7391.6(14)	5^+									72.0(10)	
7444(4)	$\langle3\rangle^+$										15.0(10)

Energy levels and branching ratios [02Ba42]. Part 5 **$^{59}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage									
	E_f^*:	3580.3	3615.0	3699	3728.9	3741.8	3757.7	3885.5	3905.2	3930.0	4072
[keV]	$2J_f^\pi$:	5^+	3^-	7^-	3,5	3^-		3^-	3^-	5^+	
4770.2(5)*	3^-					2.0(10)					
5264(3)	3^-		<1						3		
5306(3)	$\langle1\rangle^-$		2.0						2.0		
5550.0(6)	5		5.0(10)			3.0(10)					
5645.0(8)	$\langle3\rangle^-$			2(1)							
5657(4)	5^-		2.3(5)								
5711(4)	5^-					2.0(10)					
5880.7(7)	$3^-,5^-$			1(1)							
6039(4)	$3^{\langle+\rangle}$			1.0(10)							
6304.1(10)	$3^{\langle-\rangle}$		2(1)								
6344.2(12)	$\langle3^-,5^-\rangle$	3.0(10)		<1.0							
6365.5(9)	3^-	8.0(10)									
6457(4)	5			5(1)							
6461(4)	$3^{\langle-\rangle}$		2(1)								
6493(4)	$7^{\langle-\rangle}$			4(1)				2(1)	1(1)	1(1)	2(1)
6727.4(6)	$\langle3^-,5^-\rangle$							2(1)	2(1)		
6745.9(6)	$5^{\langle+\rangle}$							2(1)			
6902.9(5)	9^+						1.5(10)				
6939(4)	$3^{\langle-\rangle}$				16(1)						
7444(4)	$\langle3\rangle^+$		15.0(10)								

Energy levels and branching ratios [02Ba42]. Part 6 **$^{59}_{29}$Cu**

E^*	$2J^\pi$					Branching ratios in percentage							
		E_f^*:	4100.3	4183	4207.0	4301.3	4307	4441.0	4465	4528.3	4903.6	4914.2	
[keV]		$2J_f^\pi$:	$\langle 13^- \rangle$	$5,9^{\langle - \rangle}$	$5,7^{\langle - \rangle}$	$5^{\langle - \rangle}$	$5^{\langle - \rangle}$	7^+		$\langle 13^+ \rangle$	$\langle 15^- \rangle$		
4903.6(2)	$\langle 15^- \rangle$		69										
5427.5(3)	$\langle 17^+ \rangle$									x	x		
5620(4)	$7^{\langle - \rangle}$			11(3)									
5721.95(23)	$\langle 17^- \rangle$		75								25		
6457(4)	5					5.5(10)							
6493(4)	$7^{\langle - \rangle}$			4(1)	5(1)	1(1)	1(1)						
6611.2(5)	$\langle 19^- \rangle$										x		
6691.1(7)	$\langle 17^+ \rangle$										x		
6833.9(21)	9^+											1.8(10)	
6885(4)	$\langle 3^-,5 \rangle$					4(1)							
6902.9(5)	9^+							1.9(10)	0.9(10)	1.0(10)		1.8(10)	
7793.9(8)	$\langle 17^+ \rangle$										x		
7828.1(6)	$\langle 17^+ \rangle$										x		

Energy levels and branching ratios [02Ba42]. Part 7 **$^{59}_{29}$Cu**

E^*	$2J^\pi$					Branching ratios in percentage						
		E_f^*:	5218.7	5427.5	5721.9	6611.2	6690.5	6691.1	6798.5	7353.5	7444	7445.8
[keV]		$2J_f^\pi$:	9	$\langle 17^+ \rangle$	$\langle 17^- \rangle$	$\langle 19^- \rangle$		$\langle 17^+ \rangle$	$\langle 19^+ \rangle$	$\langle 19^+ \rangle$	$\langle 3 \rangle^+$	$\langle 21^- \rangle$
6611.2(5)	$\langle 19^- \rangle$				x							
6798.5(8)	$\langle 19^+ \rangle$			x								
6902.9(5)	9^+		2.2(3)									
7353.5(6)	$\langle 19^+ \rangle$			x	x			x	x			
7445.8(7)	$\langle 21^- \rangle$				x	x						
7793.9(8)	$\langle 17^+ \rangle$				x							
7828.1(6)	$\langle 17^+ \rangle$			x	x							
8117.3(6)	$\langle 21^+ \rangle$					x	x			x		
8154.5(6)	$\langle 19^+ \rangle$			x	x							
8659.0(8)	$\langle 21^+ \rangle$			x								
8729.0(7)	$\langle 21^+ \rangle$			x		x						
8814.9(8)	$\langle 23^- \rangle$					x					x	
8944.4(7)	$\langle 23^+ \rangle$									x		x
10144.6(8)	$\langle 21^+ \rangle$			x								
10364.2(7)	$\langle 21^+ \rangle$			x		x						

Energy levels and branching ratios [02Ba42]. Part 8 **$^{59}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage									
	E_f^*:	7793.9	7828.1	8117.3	8154.5	8659.0	8729.0	8814.9	8944.4	9457.3	9673.7
[keV]	$2J_f^\pi$:	$\langle 17^+\rangle$	$\langle 17^+\rangle$	$\langle 21^+\rangle$	$\langle 19^+\rangle$	$\langle 21^+\rangle$	$\langle 21^+\rangle$	$\langle 23^-\rangle$	$\langle 23^+\rangle$	$\langle 23^+\rangle$	$\langle 25^+\rangle$
8154.5(6)	$\langle 19^+\rangle$	x	x								
8729.0(7)	$\langle 21^+\rangle$				x						
8944.4(7)	$\langle 23^+\rangle$			x							
9457.3(7)	$\langle 23^+\rangle$				x		x				
9673.7(9)	$\langle 25^+\rangle$			x					x		
10278.5(9)	$\langle 25^+\rangle$						x			x	
10606.6(10)	$\langle 27^+\rangle$								x		x
11213.7(10)	$\langle 27^+\rangle$									x	
11921.5(6)	$\langle 25^+\rangle$			x		x		x		x	
12041.6(8)	$\langle 25^+\rangle$			x						x	

Energy levels and branching ratios [02Ba42]. Part 9 **$^{59}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage									
	E_f^*:	10145	10278	10364	11214	11921	12042	12250	13355	13360	14955
[keV]	$2J_f^\pi$:	$\langle 21^+\rangle$	$\langle 25^+\rangle$	$\langle 21^+\rangle$	$\langle 27^+\rangle$	$\langle 25^+\rangle$	$\langle 25^+\rangle$	$\langle 29^+\rangle$	$\langle 29^+\rangle$	$\langle 31^+\rangle$	$\langle 33^+\rangle$
11213.7(10)	$\langle 27^+\rangle$		x								
11921.5(6)	$\langle 25^+\rangle$	x		x							
12249.6(11)	$\langle 29^+\rangle$		x		x						
13355.1(10)	$\langle 29^+\rangle$					x	x				
13360.0(12)	$\langle 31^+\rangle$				x			x			
14585.5(13)	$\langle 33^+\rangle$							x		x	
14955.1(14)	$\langle 33^+\rangle$								x		
16032.1(16)	$\langle 35^+\rangle$									x	
16855.1(17)	$\langle 37^+\rangle$										x

Energy levels and branching ratios [02Ba42]. Part 10 **$^{59}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage				
	E_f^*:	16855	19097	21708	24712	28137
[keV]	$2J_f^\pi$:	$\langle 37^+\rangle$	$\langle 41^+\rangle$	$\langle 45^+\rangle$	$\langle 49^+\rangle$	$\langle 53^+\rangle$
19097.2(20)	$\langle 41^+\rangle$	x				
21708.2(22)	$\langle 45^+\rangle$		x			
24712.3(25)	$\langle 49^+\rangle$			x		
28137(3)	$\langle 53^+\rangle$				x	
31964(3)	$\langle 57^+\rangle$					x

Energy levels and branching ratios [03Tu08]. **$^{60}_{29}$Cu**

E^*	J^π	T	L	σ (τ,p)	L	I_t	J^π	I_d	$T_{1/2}$ or	Ref.	Branching ratios in percentage				
											E_f^*: 0.0	62.2	287	336	365
[keV]			(τ,p)	μb/sr	(τ,t)	(τ,t)	(α,d)	(α,d)	Γ_{cm}		J_f^π: 2+	1+	2+		$\langle 1+\rangle$
0.0	2^+		2	55	2	88	2+	18	23.7(4) m	68Yo01					
62.2(2)	1^+		0+2	200	$\langle 1\rangle$	56			2.00(10) ns	68Yo01	100				
287.2(2)	2^+		2	32	2	18				68Yo01	30(3)	70(3)			
335.8(3)						29						100			
364.6(3)	$\langle 1^+\rangle$		0+2	66	$\langle 2\rangle$	12				68Yo01	100				
453.8(2)	$\langle 3^+\rangle$		$\langle 2+4\rangle$	89	4	65		43		68Yo01	99.0(5)		1.0(5)		
557.5(2)	$\langle 4^+\rangle$		$\langle 4\rangle$	22	4	29				68Yo01	58(4)		11.05(10)	x	
571(1)											x		x	x	
587(5)	$\langle 3^+\rangle$		$\langle 2+4\rangle$	38	2	29				68Yo01					
600(1)											100				
670.2(3)	1^+		$\langle 0+2\rangle$	230	$\langle 2\rangle$	118				73Ru03	88			12(2)	
781.0(2)	$\langle 3^+\rangle$				4	47				78Zi01	55(6)				
904(1)					4	112				78Zi01	100				
914.5(2)															
947(1)					$\langle 1\rangle$	65				78Zi01	x				
975(1)															
1007(1)															
1249(1)														100	
1333(10)					$\langle 1\rangle$	15				78Zi01					
1368(1)													100		
1421.5(3)											x				
1427(1)					4	26				78Zi01	100				
1492(10)					4	12				78Zi01					
1505(1)															
1603.6(2)	$\langle 5^+\rangle$				6	6		117		78Zi01					
1646(10)						26				78Zi01					
1660(1)															
1668(1)															
1694(10)					4	29				78Zi01					
1768(10)					$\langle 2\rangle$	62				73Ru03					
1778.9(2)	$\langle 5^+\rangle$		$\langle 0+2\rangle$	68						68Yo01					
1791(1)											x				x
1878(1)					4	21				78Zi01					
1918(10)					$\langle 1\rangle$	35				78Zi01					
1981(10)					2	38				78Zi01					
2026.6(3)	$\langle 5^+\rangle$										x				
2035(1)															
2170(10)				57	2	≈9				78Zi01					
2197.2(2)	$\langle 6^+\rangle$		$\langle 2\rangle$							68Yo01					
2231(10)					2	29				78Zi01					
2246(1)															
2286(10)					2+4	56				78Zi01					
2349.5(3)					2+4	53				78Zi01					
2474(10)					4	32				78Zi01					
2519(1)															

(continued) **$^{60}_{29}$Cu**

E^*	J^π	T	L	σ (τ,p)	L	I_t	J^π	I_d	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
											E_f^*:	0.0	62.2	287	336	365
[keV]			(τ,p)	μb/sr	(τ,t)	(τ,t)	(α,d)	(α,d)	Γ_{cm}		J_f^π:	2+	1+	2+		$\langle 1+\rangle$
2524(1)																100
2536(15)	$\langle 0^+\rangle$	2	0	610	0	79				73Ru03			25(5)		<4	16(5)
2539(1)																
2593(10)						21										
2633(10)						12										
2658(1)																
2691.7(3)	$\langle 6^+\rangle$															
2726(10)					$\langle 2\rangle$	44				78Zi01						
2790(1)					2	29				78Zi01						
2817.1(4)	$\langle 6\rangle$															
2888(10)					$\langle 2\rangle$	≈15				78Zi01						
2915(10)			$\langle 0\rangle$	69	2+4	71				68Yo01						
2977(15)			2	180						68Yo01						
3001(10)					2	74				78Zi01						
3044(10)						59				78Zi01						
3066.6(3)																
3094(10)					$\langle 2\rangle$	62				78Zi01						
3155.5(3)	$\langle 6^-\rangle$						6–	178		94Fi01						
3162(10)					4	112				78Zi01						
3190.8(3)	$\langle 7^+\rangle$															
3282(10)						21										
3315(1)																
3344(10)					$\langle 4\rangle$	88				78Zi01						
3354.5(3)	$\langle 7^-\rangle$					62		148		94Fi01						
3452(10)										78Zi01						
3545(15)																
3575(2)																
3594(2)					2+4	82				78Zi01						
3624(2)																
3699(2)					2+4	109				78Zi01						
3772.0(3)	$\langle 7^-\rangle$															
3837(2)																
3874(15)		2	$\langle 2\rangle$	130		132		111		03Tu08						
3877(2)	$\langle 4^+\rangle$							incl				x				
≈3980																
4093(2)																
4479(2)								62		94Fi01						
4520.8(3)																
4619(20)																
4638(20)																
5188.1(3)	$\langle 9^-\rangle$							215		94Fi01						
5827(3)																
5990(30)	$\langle 9^+\rangle$						9+	301		94Fi01						
7200(200)																

(continued) **$^{60}_{29}$Cu**

E^*	J^π	T	L	σ (τ,p)	L	I_t	J^π	I_d	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
											E_f^*:	0.0	62.2	287	336	365
[keV]			(τ,p)	μb/sr	(τ,t)	(τ,t)	(α,d)	(α,d)	Γ_{cm}		J_f^π:	2+	1+	2+		$\langle 1+\rangle$
10000(200)																
			68Yo01	68Yo01	78Zi01	78Zi01	94Fi01	94Fi01		Ref.						

Additional data on this isotope can be found in [04Iz01, 73Ru03].
σ (τ,p) is a cross section of two-nucleon transfer reaction [68Yo01].
I_t is an approximate yield of tritons from the (τ,t) reaction at 20° in units counts per channel [78Zi01].
I_d is an approximate yield of deuterons from the (α,d) reaction at 20° in units counts per channel [94Fi01].
The only observed transition from the level at 3066 keV is that to the level at 557 keV.
$T_{1/2}$ and uncertainties in E^* and branching ratios are given in Supplement.

Energy levels and branching ratios [03Tu08]. Part 2 **$^{60}_{29}$Cu**

E^*	J^π											
		E_f^*:	453.8	557.5	571	600	670.2	781.0	904	914.5	947	1421.5
[keV]	(α,d)	J_f^π:	$\langle 3+\rangle$	$\langle 4+\rangle$			1+	$\langle 3+\rangle$				
557.5(2)			31(3)									
781.0(2)			45(6)									
914.5(2)			67(15)	33(15)								
947(1)			x		x							
975(1)				100								
1007(1)							100					
1421.5(3)			100									
1505(1)			100									
1603.6(2)				100								
1668(1)								100				
1778.9(2)			x	x								
2026.6(3)				100								
2035(1)							100					
2197.2(2)			x	100								
2349.5(3)				100								
2536(15)							59(5)					
3066.6(3)				100								
3315(1)						x						x
3575(2)											x	
3699(2)									x	x		

Energy levels and branching ratios [03Tu08]. Part 3 **$^{60}_{29}$Cu**

E^*	J^π		Branching ratios in percentage										
		E_f^*:	1505	1603.6	1668	1778.9	1878	2026.6	2197.2	2524	3155.5	3354.5
[keV]	(α,d)	J_f^π:		⟨5+⟩		⟨5+⟩		⟨5+⟩	⟨6+⟩		⟨6–⟩	⟨7–⟩
1878(1)			100									
2026.6(3)				x								
2246(1)				100								
2519(1)				100								
2539(1)				100								
2658(1)									100			
2691.7(3)				100								
2790(1)									100			
2817.1(4)								100				
3155.5(3)	6–			100								
3190.8(3)				100								
3315(1)						x	x	x				
3354.5(3)									100			
3575(2)				x					x	x		
3594(2)									100			
3624(2)								100				
3699(2)					x					x		
3772.0(3)											53(5)	47(5)
3837(2)									100			
3877(2)									x			
4093(2)												100
4520.8(3)											x	x
5188.1(3)												46(7)

Energy levels and branching ratios [03Tu08]. Part 4 **$^{60}_{29}$Cu**

E^*	J^π		Branching ratios in percentage	
		E_f^*:	3772.0	4093
[keV]	(α,d)	J_f^π:	⟨7–⟩	
4479(2)				100
5188.1(3)			54(7)	
5827(3)				100

Energy levels and branching ratios [99Bh04]. **$^{61}_{29}$Cu**

E^* [keV]	$2J^\pi$	L	C^2S' (d,n)	σ (d,n) μb/sr	L	C^2S' (τ,d)	σ (τ,d) μb/sr	C^2S' (τ,d)	σ (τ,d) μb/sr	σ (τ,d) μb/sr	σ (τ,d) μb/sr	$G_{\ell j}$ (τ,d)	$G_{\ell j}$ (τ,d)	$T_{1/2}$ or $\Gamma_{\rm cm}$	Ref.
0.0	3^-	1	2.76	10400	1	2.16	1700	2.64	12700	4640	990	1.79	2.40	3.33(1) h	90Se03
475.10(8)	1^-	1	1.52	6200	1	0.96	8500	1.18	6560	2340	390	0.91	1.07	0.66(9) ps	69Ok01
970.06(7)	5^-	3	3.46	1300	3	3.26	1900	2.94	710	3850	470	3.26	3.10	0.69(13) ps	67Ar05
1310.5(1)	7^-				3	0.40	380	0.56	320	1080	180	0.49	0.48	0.53(7) ps	90Se03
1394.2(1)	5^-	3	2.01	900	3	0.36	240	0.36	203			0.47	0.36	0.85(14) ps	76Br36
1660.5(1)	3^-													0.18(2) ps	
1732.6(1)	7^-													$\geq$1.4 ps	
1904.2(1)	5^-				3	0.06	50						0.06	180(19) fs	90Se03
1932.7(2)	3^-	1	0.65	3300	1	0.22	2280	0.24	1900	1940	230	0.40	0.23	87(10) fs	90Se03
1942.5(1)	7^-									500	71	0.11	0.06	1.2(4) ps	
2088.9(1)	$\langle 1\rangle^-$				1	0.06	600	0.06	428					28(4) fs	90Se03
2203.4(1)	5^-				3	0.56	420	0.48	238	1480	180	0.71	0.52	173(20) fs	90Se03
2295.1(1)	9^-													1.8(6) ps	
2336.5(2)	9^-													430(50) fs	
2358.2(1)	3^-				1	0.07	780	0.08	683	990	130	0.20	0.08	197(24) fs	90Se03
2399.0(2)	7^-				3	0.08	90	0.20	121				0.08	121(14) fs	90Se03
2472.5(2)	3^-				1	0.01	120	0.02	95				0.01	75(8) fs	90Se03
2583.7(2)														102(12) fs	
2584.6(5)	3,5													98(12) fs	
2611.7(1)	9^-													280(40) fs	
2627.1(1)	11^-													>350 fs	
2684.1(2)	3^-				1	0.04	460	0.04	169				0.04	85(12) fs	90Se03
2720.7(2)	9^+				4	2.80	1500	4.00	1300					$\geq$2.8 ps	90Se03
2728.3(2)	7^-									3460	690	3.77	3.40	0.23(3) ps	
2792.6(1)	5^-				3	0.13	110	0.12	76				0.13	116(40) fs	90Se03
2840.5(1)	1^-,3^-	1	0.21	1200	1		2300	0.22	1829						90Se03
2857.1(3)	1^-,3^-				1		incl			1220	210	0.32	0.23		90Se03
2924.2(4)	X^-													0.27(4) ps	
2932.7(2)	3^-				1	0.004	50							65(13) fs	90Se03
3001.6(2)	5													0.17(6) ps	
3015.7(2)	11^-													0.29(4) ps	
3019.3(11)	3^-				1	0.06	640	0.06	462				0.06	69(11) fs	90Se03
3037(15)															
3042															
3065.5(2)	3^-	1	0.27	1800	1	0.11	1100	0.12	787				0.12	40(6) fs	90Se03
3092.1(5)	3^-				1	0.08	810	0.10	555	1100	210	0.33	0.09	33(5) fs	90Se03
3198.6(2)															
3249(15)				1000											69Ok01
3259.8(2)	$11^{\langle -\rangle}$													0.35(5) ps	
3277.1(10)	7^+,9^+				$\langle 4\rangle$	0.14		0.20	60				0.20		90Se03
3323.1(5)															
3357(8)															
3372.7(4)	$\langle 9\rangle$														
3406(6)	3^+,5^+				2	0.64	4200	0.72	3790	5730	570	0.59	0.68		90Se03
3437(6)															

(continued) **$^{61}_{29}$Cu**

E^* [keV]	$2J^\pi$	$2T$	L	C^2S' (d,n)	σ (d,n) μb/sr	L	C^2S' (τ,d)	σ (τ,d) μb/sr	C^2S' (τ,d)	σ (τ,d) μb/sr	σ (τ,d) μb/sr	σ (τ,d) μb/sr	$G_{\ell j}$ (τ,d)	$G_{\ell j}$ (τ,d)	$T_{1/2}$ or $\Gamma_{\rm cm}$	Ref.
3454.4(4)	3^+,5^+		2	0.72	1900											69Ok01
3521.2(15)	1^-–5^-															
3547.0(3)	11^-															
3578(6)	3^+,5^+					2	0.10	680	0.18	950	1600	180	0.20	0.14		90Se03
3597(6)																
3618(6)																
3646(6)																
3653.7(8)																
3686(7)																
3706																
3730																
3739.5(5)	$\langle 11\rangle$															
3779.5(11)	$\langle 11^-\rangle$															
3790.1(10)																
3802(7)																
3844(7)	1^+		0		1400											69Ok01
3853.1(5)																
3863	1^-,3^-					1	0.13	880			330	83	0.13	0.09		90Se03
3942.8(4)	11^+															
3947																
3980.3(20)	1^-,3^-					1	0.14				430	80	0.14			90Se03
4051.8(8)																
4060																
4082.0(3)	13^+															
4132.8(8)	9^+										120	32				
4286.3(8)	13^-															
4332.1(20)																
≈4357	1^+					0	0.21				730	180	0.21			90Se03
4380.6(8)																
4467.2(8)	15^-															
4470(50)	3^+,5^+		2	0.66	2000											69Ok01
4484	5^-,7^-					3	0.45				450	78	0.45			90Se03
4589.7(5)	13^+															
4603	1^-,3^-					1	0.18				310	76	0.18			90Se03
4818.7(6)	$\langle 15^-\rangle$															
4859	5^-,7^-					3	0.30				730	13	0.30			90Se03
4991.0(11)	$\langle 15^+\rangle$															
5072	7^+,9^+					4	0.29				470	81	0.29			90Se03
5119.2(6)	17^+															
5136.3(13)																
5278	7^+,9^+					4	0.60				1440	220	0.60			90Se03
5431	7^+,9^+					4	0.74				1670	290	0.74			90Se03
5462.3(16)			0		2500											69Ok01
5580																
5701.3(16)																

(continued) **$^{61}_{29}$Cu**

E^* [keV]	$2J^\pi$	$2T$	L	C^2S' (d,n)	σ (d,n) μb/sr	L	C^2S' (τ,d)	σ (τ,d) μb/sr	C^2S' (τ,d)	σ (τ,d) μb/sr	σ (τ,d) μb/sr	σ (τ,d) μb/sr	$G_{\ell j}$ (τ,d)	$G_{\ell j}$ (τ,d)	$T_{1/2}$ or $\Gamma_{\rm cm}$	Ref.
5732	$3^+,5^+$					2	0.22				2190	310	0.22			90Se03
5855.2(12)	19^-															
6054.3(19)																
6084	1^+					0	0.21				1040	180	0.21			90Se03
6350.6(25)	3															
6361.5(25)	3															
6372.3(25)	3															
6378.2(25)	3															
6392.9(25)	3															
6441.0(25)	5															
6446.1(25)	5															
6457(4)*	$[3^-]$	$\langle 5\rangle$	1	0.37	3300	1	1.5				4540	700	1.52	1.34		90Se03
						+3	2.3									81Ki06
6520*	$[5^-]$	[5]											2.28	3.25		76Bo06
6627	$\langle 1\rangle$															
6645	$\langle 1\rangle$															
6701**	$1^-,3^-$	5	1	0.29	2600	1	1.20				1950	330	1.29	1.03		90Se03
6823.2(12)	21^+															
7192											200	37				
7388.2(16)																
7401	$5^-,7^-$					3	0.90				430	75	0.90			90Se03
7643***		$\langle 5\rangle$				1	0.44				1880	220	0.40	0.35		90Se03
						+3	0.6						0.61	0.39		90Se03
7935.2(16)	$\langle 23\rangle$															
8446	9^+															
8450	9^+															
8453	9^+															
8457	9^+															
8463	9^+															
8465	9^+															
8472	9^+															
8475	9^+															
8477	9^+															
8480	9^+															
8484	9^+															
8561***	$7^+,9^+$	$\langle 5\rangle$				4	3.32				5550	840	3.32	3.70		90Se03
9142	$\langle 5,9\rangle^+$	[5]				2	0.4				2620	340	0.43	0.78		90Se03
						+4	0.7						0.71			90Se03
9406.2(19)	$\langle 27\rangle$															
9963	$7^+,9^+$	[5]				4	2.55				4540	620	2.55	1.20		90Se03
						+2								0.47		

(continued) **$^{61}_{29}$Cu**

E^*	$2J^\pi$	$2T$	L	C^2S'	σ (d,n)	L	C^2S'	σ (τ,d)	C^2S'	σ (τ,d)	σ (τ,d)	σ (τ,d)	$G_{\ell j}$	$G_{\ell j}$	$T_{1/2}$ or	Ref.
[keV]				(d,n)	μb/sr		(τ,d)	μb/sr	(τ,d)	μb/sr	μb/sr	μb/sr	(τ,d)	(τ,d)	$\Gamma_{\rm cm}$	
					69Ok01		81Ki06		76Br36		90Se03	90Se03		90Se03		Ref.
				69Ok01				81Ki06		76Br36			90Se03			Ref.

Additional data on this isotope can be found in [04Iz01, 01Ny01, 90Se03, 69Fu06].

* Analog of $3/2^-$, ground state and $5/2^-$, 67 keV excited state in ^{61}Ni [90Se03, 81Ki06, 92Zh31].

** Probable analog of $1/2^-$, 283 keV excited state in ^{61}Ni [90Se03, 81Ki06, 92Zh31, 79Fi02].

*** Probable analog of $3/2^-$, 1100 keV, $5/2^-$, 1132 keV, $3/2^-$, 1185 keV and $9/2^+$, 2122 keV excited state in ^{61}Ni [90Se03, 81Ki06, 92Zh31].

Cross section and C^2S' of stripping (d,n) reaction are presented in the first two columns [69Ok01].

Maximum cross sections from three measurements of proton transfer (τ,d) reaction [81Ki06, 76Br36, 90Se03] are given in the center together with comparison between values $G_{\ell j}=(2J_f)C^2S/(2J_i+1)$ from [90Se03] and combined values from [81Ki06, 76Br36, 76Bo06]; average cross section over 13°-90° [90Se03] is given in Supplement.

Data for this isotope were considered in vol. LB I/18A.

Energy levels and branching ratios [99Bh04]. Part 2 **$^{61}_{29}$Cu**

E^*	$2J^\pi$	L	C^2S	Ref.	Branching ratios in percentage							
				$E_{\rm f}^*$:	0.0	475	970	1310	1394	1660	1733	1904
[keV]			(α,t)	$2J_{\rm f}^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	7^-	5^-
0.0	3^-	1	0.59	90Se03								
475.10(8)	1^-	1	0.99	69Ok01	100							
970.06(7)	5^-	3	0.86	67Ar05	99.1	0.9(1)						
1310.5(1)	7^-			90Se03	93.8(2)		6.2(2)					
1394.2(1)	5^-			76Br36	85(3)	12(1)	2.8(3)					
1660.5(1)	3^-				65(2)	14(1)	16(1)		4.6(3)			
1732.6(1)	7^-				62(3)		14(1)	22(4)	2.3(5)			
1904.2(1)	5^-			90Se03	36(2)		42(2)	22(1)				
1932.7(2)	3^-			90Se03	67(5)	25(2)	7.6(11)					
1942.5(1)	7^-				10.4(6)		60(4)	19(1)	0.5(1)		9.9(2)	
2088.9(1)	$\langle 1\rangle^-$			90Se03	68(1)	32(3)						
2203.4(1)	5^-			90Se03		23(1)	46.9(6)	19(1)			11.4(8)	
2295.1(1)	9^-						12.5(7)	34(1)	26(1)		19.9(6)	
2336.5(2)	9^-						75(2)	22(1)	1.2(2)			
2358.2(1)	3^-			90Se03	24(2)	35(1)				31(3)		
2399.0(2)	7^-			90Se03			58(3)	42(1)				
2472.5(2)	3^-			90Se03	5.6(23)	84(3)	10(1)					
2583.7(2)											82(9)	
2584.6(5)	3,5				100							
2611.7(1)	9^-							9.9(7)			59(2)	
2627.1(1)	11^-							96(4)				
2684.1(2)	3^-			90Se03	44(3)	56(3)			$\leq$3			
2720.7(2)	9^+			90Se03				55(2)			38(5)	

(continued) **$^{61}_{29}$Cu**

E^*	$2J^\pi$	L	C^2S	Ref.	Branching ratios in percentage							
				E_f^*:	0.0	475	970	1310	1394	1660	1733	1904
[keV]			(α,t)	$2J_f^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	7^-	5^-
2728.3(2)	7^-						63(8)	34(2)				
2792.6(1)	5^-			90Se03	45(1)			45(1)		10(6)		
2840.5(1)	1^-,3^-			90Se03	44.3(4)							
2857.1(3)	1^-,3^-			90Se03	80(12)	20(3)						
2924.2(4)	X^-										80(5)	
2932.7(2)	3^-			90Se03	11(3)	79(5)			10(1)			
3001.6(2)	5				60(4)				26(2)			
3015.7(2)	11^-							73(4)				
3019.3(11)	3^-			90Se03	29(4)	71(13)						
3037(15)												
3042					38	62						
3065.5(2)	3^-			90Se03	20(3)				31(3)			39(3)
3092.1(5)	3^-			90Se03	100							
3198.6(2)									28(9)		46(7)	
3249(15)				69Ok01								
3259.8(2)	$11^{\langle-\rangle}$										47(4)	
3277.1(10)	7^+,9^+			90Se03	100							
3323.1(5)								100				
3357(8)												
3372.7(4)	$\langle 9\rangle$										100	
3406(6)	3^+,5^+			90Se03								
3437(6)												
3454.4(4)	3^+,5^+			69Ok01				75(12)			20(6)	
3521.2(15)	1^-–5^-				100							
3547.0(3)	11^-											
3578(6)	3^+,5^+			90Se03								
3597(6)												
3618(6)												
3646(6)												
3653.7(8)												
3686(7)												
3706												
3730												
3739.5(5)	$\langle 11\rangle$											
3779.5(11)	$\langle 11^-\rangle$											
3790.1(10)							100					
3802(7)												
3844(7)	1^+			69Ok01								
3853.1(5)												
3863	1^-,3^-			90Se03								
3942.8(4)	11^+											
3947						x			x			
3980.3(20)	1^-,3^-			90Se03								
4051.8(8)												
4060												

(continued) **$^{61}_{29}$Cu**

E^* [keV]	$2J^\pi$	L	C^2S (α,t)	Ref.	Branching ratios in percentage							
				E_f^*:	0.0	475	970	1310	1394	1660	1733	1904
				$2J_f^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	7^-	5^-
4082.0(3)	13^+											
4132.8(8)	9^+							35(2)			65(2)	
4286.3(8)	13^-											
4332.1(20)								100				
≈4357	1^+			90Se03								
4380.6(8)												
4467.2(8)	15^-											
4470(50)	3^+,5^+			69Ok01								
4484	5^-,7^-			90Se03								
4589.7(5)	13^+											
4603	1^-,3^-			90Se03								
4818.7(6)	$\langle 15^- \rangle$											
4859	5^-,7^-			90Se03								
4991.0(11)	$\langle 15^+ \rangle$											
5072	7^+,9^+			90Se03								
5119.2(6)	17^+											
5136.3(13)												
5278	7^+,9^+			90Se03								
5431	7^+,9^+			90Se03								
5462.3(16)				69Ok01								
5580												
5701.3(16)												
5732	3^+,5^+			90Se03								
5855.2(12)	19^-											
6054.3(19)												
6084	1^+			90Se03								
6350.6(25)	3											
6361.5(25)	3											
6372.3(25)	3											
6378.2(25)	3											
6392.9(25)	3											
6441.0(25)	5											
6446.1(25)	5											
6457(4)*	$[3^-]$			90Se03								
				81Ki06								
6520*	$[5^-]$			76Bo06								
6627	$\langle 1 \rangle$											
6645	$\langle 1 \rangle$											
6701**	1^-,3^-			90Se03								
6823.2(12)	21^+											
7192												
7388.2(16)												
7401	5^-,7^-			90Se03								
7643***				90Se03								
				90Se03								

(continued) **$^{61}_{29}$Cu**

E^*	$2J^\pi$	L	C^2S	Ref.	Branching ratios in percentage							
					E_f^*:	0.0	475	970	1310	1394	1660	1733	1904
[keV]			(α,t)		$2J_f^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	7^-	5^-
7935.2(16)	$\langle 23 \rangle$												
8446	9^+												
8450	9^+												
8453	9^+												
8457	9^+												
8463	9^+												
8465	9^+												
8472	9^+												
8475	9^+												
8477	9^+												
8480	9^+												
8484	9^+												
8561***	$7^+,9^+$			90Se03									
9142	$\langle 5,9 \rangle^+$			90Se03									
				90Se03									
9406.2(19)	$\langle 27 \rangle$												
9963	$7^+,9^+$			90Se03									
				Ref.									
			67Ar05	Ref.									

Energy levels and branching ratios [99Bh04]. Part 3 **$^{61}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage										
	E_f^*:	1932.7	1942.5	2088.9	2203.4	2295.1	2336.5	2358.2	2399.0	2611.7	2627.2
[keV]	$2J_f^\pi$:	3^-	7^-	$\langle 1 \rangle^-$	5^-	9^-	9^-	3^-	7^-	9^-	11^-
2295.1(1)	9^-		7.6(4)								
2336.5(2)	9^-		1.7(8)								
2358.2(1)	3^-	11(1)									
2583.7(2)			18(3)								
2611.7(1)	9^-		30.1(5)			1.4(1)					
2627.1(1)	11^-					2.6(4)	1.6(1)				
2720.7(2)	9^+		1.4(4)						1.2(3)	4.6(7)	
2728.3(2)	7^-				≤4.1				2.8(3)		
2840.5(1)	$1^-,3^-$			56(7)							
2924.2(4)	X^-		9.7(19)			2.7(6)			≤4.6	2.5(6)	4.6(6)
3001.6(2)	5				13.5(9)						
3015.7(2)	11^-					13.4(13)	13.7(15)				
3065.5(2)	3^-							10(1)			
3198.6(2)			26(6)								
3259.8(2)	$11^{\langle - \rangle}$					13(2)				40(1)	x
3454.4(4)	$3^+,5^+$								5.1(3)		

(continued) **$^{61}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage									
	E_f^*:	1932.7	1942.5	2088.9	2203.4	2295.1	2336.5	2358.2	2399.0	2611.7	2627.2
[keV]	$2J_f^\pi$:	3^-	7^-	$\langle 1\rangle^-$	5^-	9^-	9^-	3^-	7^-	9^-	11^-
3547.0(3)	11^-				100					x	
3653.7(8)										100	
3739.5(5)	$\langle 11\rangle$					100					
3779.5(11)	$\langle 11^-\rangle$						100				
4286.3(8)	13^-					x	x				
4380.6(8)							100				
4467.2(8)	15^-										100
4818.7(6)	$\langle 15^-\rangle$										x

Energy levels and branching ratios [99Bh04]. Part 4 **$^{61}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage									
	E_f^*:	2720.7	3015.7	3259.8	3372.7	3547.0	3653.7	3942.8	4051.8	4082.0	4286.3
[keV]	$2J_f^\pi$:	9^+	11^-	$11^{\langle -\rangle}$	$\langle 9\rangle$	11^-		11^+		13^+	13^-
3853.1(5)		100									
3942.8(4)	11^+	100									
4051.8(8)				100							
4082.0(3)	13^+	75(4)	x		25(5)						
4589.7(5)	13^+	x		x		x	x	x			
4818.7(6)	$\langle 15^-\rangle$			x					x		
4991.0(11)	$\langle 15^+\rangle$									100	
5119.2(6)	17^+									x	
5136.3(13)											100
6054.3(19)										x	

Energy levels and branching ratios [99Bh04]. Part 5 **$^{61}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage									
	E_f^*:	4380.6	4467.2	4589.7	4818.7	5119.2	5136.3	5701.3	5855.2	6823.2	7935.2
[keV]	$2J_f^\pi$:		15^-	13^+	$\langle 15^-\rangle$	17^+			19^-	21^+	$\langle 23\rangle$
4589.7(5)	13^+	x									
5119.2(6)	17^+		x	x	x						
5462.3(16)								100			
5701.3(16)							100				
5855.2(12)	19^-					100					
6054.3(19)								x			
6823.2(12)	21^+					100					
7388.2(16)									100		

(continued) **$^{61}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage									
	E^*_f:	4380.6	4467.2	4589.7	4818.7	5119.2	5136.3	5701.3	5855.2	6823.2	7935.2
[keV]	$2J^\pi_f$:		15^-	13^+	$\langle 15^- \rangle$	17^+			19^-	21^+	$\langle 23 \rangle$
7935.2(16)	$\langle 23 \rangle$									100	
9406.2(19)	$\langle 27 \rangle$										100

Energy levels and branching ratios [99Si11, 00Hu18]. **$^{62}_{29}$Cu**

E^*	J^π	T	L	C^2S	L	C^2S	σ (d,t)	σ (τ,α)	σ (τ,t)	σ (d,α)	σ (τ,p)	I_d	Ref.
[keV]				(τ,d)	(d,t)	(d,t)	μb/sr	arb.u	μb/sr	μb/sr	μb/sr	(α,d)	
0.0	1^+		1	0.05(3)	1	0.09	45	62	14.3	70			67Mo07
					+3	0.44	64	incl					
40.84(3)	2^+		1	0.95(3)	1	0.60	300	51	47.6	4	51.3	4	67Mo07
243.42(4)	2^+				1+3	0.07	30	59	56.3	15	22.9		73Da28
						0.31	40	incl					73Da28
287.81(5)	2^+		1	0.38(3)	1	0.17	70	23	18.3	13			67Mo07
390.13(6)	4^+				3	0.77	90	120	21.7	12	84.1		73Da28
426.19(5)	3^+		1	0.98(3)	1	0.06	24	66	49.4	100		11	67Mo07
548.31(5)	1^+		1	0.11(3)	1	0.09	30	13	20.0	35			67Mo07
					+3	0.22	23	incl					73Da28
637.46(5)	1^+		1	0.16(3)	1	0.25	75	26	36.4	18			67Mo07
644.82(6)	$\langle 2^+ \rangle$												
674.96(8)	3^+		1+3	0.16,0.3	1	0.14	40	55	20.3	19	27.8		67Mo07
					+3	0.32	30						73Da28
698.3(1)*	3^+		1	0.44(3)	1	0.07	20	$\leq$15	14.5	1.5			67Mo07
					+3	0.14	10						73Da28
727.72(13)	2^+				1	0.22	58	21	24.2	25			73Da28
					+3	0.16	14						73Da28
755.80(15)	$\langle 2^+ \rangle$												
915.33(6)	2^+		1	0.07(3)	3	0.06	15	$\approx$10	3.8	15	37.3		67Mo07
982.71(22)	3^+				3	0.03	9	$\approx$3		28			73Da28
1023.0(2)	2^+						$\langle 5 \rangle$			10			73Da28
1051.6(3)	X^+		1+3	0.35,1.4									67Mo07
1077.2(2)	2^+		1	0.15(3)	1	0.11	82	9		6.5			67Mo07
1141.7(2)	2^+,3^+		3	0.85(20)	1	0.03	23	$\approx$8		12			67Mo07
1144.1(7)	2^+,3^+			incl		incl	incl	incl					67Mo07
1170	2^+												
1221.5(2)	X^+		1	0.04(3)									67Mo07
1248.7(1)*	4^+		1+3	0.07,0.2	3	0.13	30	20		4			67Mo07
1285.1(2)	3^+				1	0.03	16	$\approx$10		5			73Da28
1346.3(3)	$\langle 2 \rangle^+$		1+3	0.05,0.1	1	0.05	31			5			67Mo07
1354.3(5)													
1367(3)							$\approx$6			12			73Da28
1370.5(1)	5^+										56.5		

(continued) **$^{62}_{29}$Cu**

E^* [keV]	J^π	T	L (τ,d)	C^2S (τ,d)	L (d,t)	C^2S (d,t)	σ (d,t) μb/sr	σ (τ,α) arb.u	σ (τ,t) μb/sr	σ (d,α) μb/sr	σ (τ,p) μb/sr	I_d (α,d)	Ref.
1373.9(7)	1,2,3												
1395(8)	X$^{\langle+\rangle}$				$\langle3\rangle$	0.03	≈6	≈5					73Da28
1403.3(18)	2$^+$–4$^+$											12	94Fi01
1410.2(4)	X$^+$				1	0.04	23	15		5		incl	73Da28
1416.1(5)													
1427.5(3)													
1429.6(1)	1$^+$												
1433.0(5)	1$^+$,2$^+$		1	0.24(3)	1	0.04	25	incl		6			67Mo07
1485.7(2)*	4$^+$				3	0.07	13	≈11		11			73Da28
1504.9(4)													
1507.3(3)													
1511.2(22)	X$^+$				1	0.15	85	≈13		16			73Da28
1525.9(2)	1$^+$–3$^+$		1	0.31(3)	1	0.03	18	16		27			67Mo07
1568.1(2)	2$^-$,3$^-$				4	0.23	21			6			73Da28
1581.6(6)	X$^-$		2										67Mo07
1587(5)	X$^+$				1	0.06	32						73Da28
1677.6(1)	5$^+$				1	0.05	25	11		110			73Da28
					+3	0.07	13	incl					73Da28
1679.1(8)						incl							73Da28
1682.1(7)			0			incl							67Mo07
1710.5(2)	1$^+$–3$^+$				3	0.06	10	≈10					73Da28
1736.3(3)													
1745.0(4)	X$^+$		3	0.55(20)	3	0.06	10	≈14		3.5			67Mo07
1759.5(7)						incl	incl	incl					73Da28
1775(5)	1$^+$–3$^+$		1	0.07(3)	3	0.02	3	≈2		18			67Mo07
1820.3(3)	X$^+$				3	0.02	4	4		6			73Da28
1827.6(3)													
1843.0(11)	X$^+$		1	0.09(3)			weak					16	67Mo07
1916.7(2)*	$\langle5^+\rangle$				4	0.23	19	10		8			73Da28
1920*	$\langle5^+\rangle$												01Mu14
1981.4(2)	X$^+$				1	0.019	7	≈5		6			73Da28
1996(6)	X$^+$				1	0.008	3.2				313		73Da28
					+3	0.016	2.5						73Da28
2022(6)	X$^{\langle+\rangle}$				1	0.018	6.7	≈4		6			73Da28
2067.5(3)	X$^{\langle+\rangle}$					0.01	4	≈7		≈2			73Da28
2107(6)	X$^{\langle+\rangle}$		3	0.90(20)	[4]	0.10	7.4	≈10		≈3			67Mo07
2139(6)	X$^{\langle+\rangle}$			incl			weak			95			67Mo07
2145.9(3)													
2148.0(1)	6$^+$												
2154.7(3)													
2160.6(2)	3$^+$,4$^+$				3	0.09	14	≈30		17			73Da28
2176(7)	1$^+$–3$^+$				1+3	0.05	15	≈3		23			73Da28
2224(7)	X$^{\langle+\rangle}$				1+3		3			22			73Da28
2239.5(3)	X$^{\langle+\rangle}$		1+3	0.06,0.3	$\langle3\rangle$	0.03	3	8		45			67Mo07
2295.3(1)	$\langle6^-\rangle$					0.02	5	≈24		12			73Da28

(continued) **$^{62}_{29}$Cu**

E^* [keV]	J^π	T	L (τ,d)	C^2S (τ,d)	L (d,t)	C^2S (d,t)	σ (d,t) μb/sr	σ (τ,α) arb.u	σ (τ,t) μb/sr	σ (d,α) μb/sr	σ (τ,p) μb/sr	I_d (α,d)	Ref.
						0.07	10	incl					73Da28
2315(7)	X^+				3	0.05	7			7		37	73Da28
2360(7)	3^+–5^+		3	0.70(20)	3	0.10	14	15		18	85.8	incl	67Mo07
2374(7)	$X^{\langle+\rangle}$				$\langle1\rangle$	0.03	7						73Da28
2422(7)	$X^{\langle+\rangle}$				$\langle3\rangle$	0.01	2.5	≈4		20			73Da28
2444.1(3)	X^+		1+3	0.35,0.8	1	0.01	3	≈20		≈6			67Mo07
					+3	0.06	8						73Da28
2486(7)								≈6		7			73Da28
2506(8)	$X^{\langle+\rangle}$				$\langle3\rangle$	0.03	3.5	3		20			73Da28
2518.7(3)*	$\langle6^-\rangle$						2.5	≈8		≈8			73Da28
2547(8)	$X^{\langle+\rangle}$							≈8		≈7			73Da28
2565(8)							≈6			weak			73Da28
2610(8)							≈7	11		10			73Da28
2622.7(3)													
2638.6(3)							≈7	16		30			73Da28
2704(8)	$X^{\langle+\rangle}$						≈6	≈10		74			73Da28
2725(8)							4	≈7					73Da28
2740(3)													
2829(3)											63.2		
2835(9)*	$\langle7^+\rangle$				3	0.12	12	16		95			73Da28
2860(9)	X^+				1	0.06	11	16		32			73Da28
					+3	0.09	9	incl					73Da28
2876(9)	X^+				1	0.08	15						73Da28
					+3	0.07	7						73Da28
2892.2(1)	$\langle7^-\rangle$												
2920(9)	$X^{\langle+\rangle}$				$\langle1\rangle$		≈1	≈6					73Da28
2944(8)	$X^{\langle-\rangle}$				4	0.29	≈15	41		weak			73Da28
					+3	0.16	≈15	incl					73Da28
2993(9)	X^+				3	≈0.17	≈15	25					73Da28
3008(9)	$\langle1^+$–$3^+\rangle$					≈4							73Da28
3029.49(12)	$\langle7^-\rangle$												
3150(9)	$\langle3^+$–$5^+\rangle$												
3191.51(9)	$\langle6^-\rangle$											25	94Fi01
3310(10)	3^+										58.7		
3420(10)													
3434.80(11)	$\langle8^-\rangle$												
3550(10)													
3580(3)											60.6		
3627.50(12)	$\langle8^-\rangle$												
3675*													01Mu14
3979.2(1)*	$9^{\langle-\rangle}$												
4164.92(12)	$\langle9^-\rangle$												
4447.23(12)	$\langle9^-\rangle$												
4628.94(11)	$\langle7^+\rangle$												
4550***	$[0^+]$	[3]											

(continued) **$^{62}_{29}$Cu**

E^* [keV]	J^π	T	L	C^2S (τ,d)	L	C^2S (d,t)	σ (d,t) μb/sr	σ (τ,α) arb.u	σ (τ,t) μb/sr	σ (d,α) μb/sr	σ (τ,p) μb/sr	I_d (α,d)	Ref.
4746.35(15)	$\langle 9^+ \rangle$											88	94Fi01
4999.95(13)	$\langle 9^- \rangle$												
5048.29(13)												46	94Fi01
5619.59(16)													
5720	2^+												
5785(10)***	$\langle 2^+ \rangle$	[3]	1	0.09(3)									67Mo07
6008.11(15)	$\langle 11 \rangle$												
6390													
7100.82(18)	$\langle 12 \rangle$												
7619.83(18)	$\langle 12 \rangle$												
7710													
7970***	X^+		1	0.13**									76Bo06
			+3	1.4**									76Bo06
8190***	X^+		1	0.75**									76Bo06
9057													
9288													
9430													
9490													
9640													
9701													
9928													
10095													
10228													
10417													
				67Mo07		73Da28	73Da28		73Da28	73Da28	90Se12		Ref.
				76Bo06				73Da28				94Fi01	Ref.

Additional data on this isotope can be found in [01Mu14, 94Fi01, 90Se12, 72Ba31].

* New level or new spin assignment [01Mu14].

** Mean value $(2J_f + 1)S/(2J_i + 1)$ from [76Bo06].

*** Probable analogs of ^{62}Ni ground state, the first and other excitations [00Hu18, 76Bo06].

Cross sections and C^2S from (d,t) neutron transfer reaction as well as cross sections of the (τ, α), (τ,t) and (d,α) reactions are from [73Da28], cross sections σ (τ,p) of two-nucleon transfer are from [90Se12]. I_d is an approximate yield of deuterons from the (α,d) reaction at 20° in units counts per channel [94Fi01].

Data for this isotope were considered in vol. LB I/18A.

Energy levels and branching ratios [99Si11, 00Hu18]. Part 2

$^{62}_{29}$Cu

E^*	J^π	L	σ (d,t)	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
					E_f^*:	0.0	40.8	243	288	390	426	548
[keV]		(d,α)	μb/sr	Γ_{cm}	J_f^π:	1^+	2^+	2^+	2^+	4^+	3^+	1^+
0.0	1^+	0+2	945	9.67(3) m	67Mo07							
40.84(3)	2^+	⟨2⟩	incl	4.57(18) ns	67Mo07	100						
243.42(4)	2^+	2	310		73Da28	100	0.43(5)					
					73Da28							
287.81(5)	2^+	2	incl		67Mo07		100					
390.13(6)	4^+	4	850	11(1) ns	73Da28		96	3.6				
426.19(5)	3^+	4	incl	>0.16 ps	67Mo07		100					
548.31(5)	1^+	0	95	>0.17 ps	67Mo07	48(2)	47(2)	0.9	4.2(2)			
					73Da28							
637.46(5)	1^+	0	390	0.15(+28-8) ps	67Mo07	0.88(5)	90	7.73(4)	1.55(10)			
644.82(6)	⟨2^+⟩		incl			100						
674.96(8)	3^+	4			67Mo07	x	37	44		19		
					73Da28							
698.3(1)*	3^+	[2]	330		67Mo07	x	39	36			25	
					73Da28							
727.72(13)	2^+	2	incl		73Da28	x	36	54	10			
					73Da28							
755.80(15)	⟨2^+⟩					100						
915.33(6)	2^+	2	27		67Mo07	42(3)		12(1)	2.1(7)		43(4)	
982.71(22)	3^+	4			73Da28		45			35	20	
1023.0(2)	2^+	2			73Da28	≈50	≈10	≈40				
1051.6(3)	X^+				67Mo07							
1077.2(2)	2^+	2	87		67Mo07		40	x		60		
1141.7(2)	2^+,3^+	2			67Mo07		x	≈20		≈50	≈30	x
1144.1(7)	2^+,3^+				67Mo07					x		
1170	2^+											
1221.5(2)	X^+				67Mo07	100						
1248.7(1)*	4^+	⟨4⟩			67Mo07		45	≈5		≈5	35	
1285.1(2)	3^+	⟨2⟩	27		73Da28				x		x	
1346.3(3)	⟨2⟩$^+$	⟨4⟩			67Mo07		x	x				
1354.3(5)									42		16	
1367(3)					73Da28		100					
1370.5(1)	5^+			<2 ps						95	4.7	
1373.9(7)	1,2,3							x	x			
1395(8)	$X^{\langle+\rangle}$				73Da28							
1403.3(18)	2^+–4^+				94Fi01		x			x		
1410.2(4)	X^+	⟨4⟩			73Da28							
1416.1(5)							x	x				
1427.5(3)							x					
1429.6(1)	1^+					28(3)	8(1)	4(1)	34(2)			14(1)
1433.0(5)	1^+,2^+	⟨2⟩			67Mo07						x	x
1485.7(2)*	4^+	4			73Da28					≈10	≈70	
1504.9(4)												
1507.3(3)												

(continued) **$^{62}_{29}$Cu**

E^*	J^π	L	σ (d,t)	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
						E_f^*: 0.0	40.8	243	288	390	426	548
[keV]		(d,α)	μb/sr	Γ_{cm}		J_f^π: 1^+	2^+	2^+	2^+	4^+	3^+	1^+
1511.2(22)	X^+	2			73Da28		x			x	x	
1525.9(2)	1^+–3^+	2			67Mo07	62(14)	6(3)					
1568.1(2)	2^-,3^-	3			73Da28		x	x			x	
1581.6(6)	X^-				67Mo07			x	x		x	
1587(5)	X^+				73Da28							
1677.6(1)	5^+	4	47		73Da28			2		28	26	
					73Da28							
1679.1(8)			incl		73Da28							
1682.1(7)					67Mo07				x			
1710.5(2)	1^+–3^+				73Da28	46					46	
1736.3(3)												
1745.0(4)	X^+	$\langle 2 \rangle$			67Mo07							
1759.5(7)					73Da28							
1775(5)	1^+–3^+	2			67Mo07							
1820.3(3)	X^+				73Da28					100		
1827.6(3)											100	
1843.0(11)	X^+				67Mo07							
1916.7(2)*	$\langle 5^+ \rangle$	$\langle 5 \rangle$			73Da28		x				x	
1920*	$\langle 5^+ \rangle$				01Mu14							
1981.4(2)	X^+		28		73Da28						x	
1996(6)	X^+				73Da28							
					73Da28							
2022(6)	$X^{\langle + \rangle}$	[2]			73Da28							
2067.5(3)	$X^{\langle + \rangle}$				73Da28						x	
2107(6)	$X^{\langle + \rangle}$				67Mo07							
2139(6)	$X^{\langle + \rangle}$	4			67Mo07							
2145.9(3)												
2148.0(1)	6^+									79		
2154.7(3)											70	
2160.6(2)	3^+,4^+	4			73Da28			10				
2176(7)	1^+–3^+	2			73Da28							
2224(7)	$X^{\langle + \rangle}$	$\langle 2 \rangle$			73Da28							
2239.5(3)	$X^{\langle + \rangle}$	4			67Mo07					100		
2295.3(1)	$\langle 6^- \rangle$	4		16.4(13) ps	73Da28					1.2		
					73Da28							
2315(7)	X^+	$\langle 2 \rangle$			73Da28							
2360(7)	3^+–5^+	4	31		67Mo07							
2374(7)	$X^{\langle + \rangle}$		incl		73Da28							
2422(7)	$X^{\langle + \rangle}$	4			73Da28							
2444.1(3)	X^+				67Mo07							
					73Da28							
2486(7)		1,2			73Da28							
2506(8)	$X^{\langle + \rangle}$	2,1			73Da28							
2518.7(3)*	$\langle 6^- \rangle$	4			73Da28							
2547(8)	$X^{\langle + \rangle}$	$\langle 2 \rangle$			73Da28							

(continued) **$^{62}_{29}$Cu**

E^* [keV]	J^π	L (d,α)	σ (d,t) μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage						
						E_f^*:	0.0	40.8	243	288	390	426	548
						J_f^π:	1^+	2^+	2^+	2^+	4^+	3^+	1^+
2565(8)					73Da28								
2610(8)		2,1			73Da28								
2622.7(3)											100		
2638.6(3)		2,1			73Da28								
2704(8)	$X^{\langle+\rangle}$	2			73Da28								
2725(8)					73Da28								
2740(3)													
2829(3)													
2835(9)*	$\langle 7^+\rangle$	2			73Da28								
2860(9)	X^+	4			73Da28								
					73Da28								
2876(9)	X^+				73Da28								
					73Da28								
2892.2(1)	$\langle 7^-\rangle$												
2920(9)	$X^{\langle+\rangle}$				73Da28								
2944(8)	$X^{\langle-\rangle}$				73Da28								
					73Da28								
2993(9)	X^+				73Da28								
3008(9)	$\langle 1^+–3^+\rangle$				73Da28								
3029.49(12)	$\langle 7^-\rangle$												
3150(9)	$\langle 3^+–5^+\rangle$												
3191.51(9)	$\langle 6^-\rangle$				94Fi01								
3310(10)	3^+												
3420(10)													
3434.80(11)	$\langle 8^-\rangle$												
3550(10)													
3580(3)													
3627.50(12)	$\langle 8^-\rangle$												
3675*					01Mu14								
3979.2(1)*	$9^{\langle-\rangle}$												
4164.92(12)	$\langle 9^-\rangle$												
4447.23(12)	$\langle 9^-\rangle$												
4628.94(11)	$\langle 7^+\rangle$												
4550***	$[0^+]$												
4746.35(15)	$\langle 9^+\rangle$				94Fi01								
4999.95(13)	$\langle 9^-\rangle$												
5048.29(13)					94Fi01								
5619.59(16)													
5720	2^+												
5785(10)***	$\langle 2^+\rangle$				67Mo07								
6008.11(15)	$\langle 11\rangle$												
6390													
7100.82(18)	$\langle 12\rangle$												
7619.83(18)	$\langle 12\rangle$												
7710													

(continued) **$^{62}_{29}$Cu**

E^*	J^π	L	σ (d,t)	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
						E_f^*: 0.0	40.8	243	288	390	426	548
[keV]		(d,α)	μb/sr	Γ_{cm}		J_f^π: 1^+	2^+	2^+	2^+	4^+	3^+	1^+
7970***	X^+				76Bo06							
					76Bo06							
8190***	X^+				76Bo06							
9057												
9288												
9430												
9490												
9640												
9701												
9928												
10095												
10228												
10417												
			67Hj01		Ref.							
		73Da28			Ref.							

Energy levels and branching ratios [99Si11, 00Hu18]. Part 3 **$^{62}_{29}$Cu**

E^*	J^π					Branching ratios in percentage						
		E_f^*:	637	644.8	675.0	698.3	727.7	755.8	915.3	982.7	1248.7	1370.5
[keV]		J_f^π:	1^+	$\langle 2^+ \rangle$	3^+	$2^+,3^+$	2^+	$\langle 2^+ \rangle$	2^+	3^+	$3^+,4^+$	5^+
915.33(6)	2^+							x				
1051.6(3)	X^+				100							
1144.1(7)	$2^+,3^+$				x							
1248.7(1)*	4^+				10							
1285.1(2)	3^+					x						
1346.3(3)	$\langle 2 \rangle^+$				x		x					
1354.3(5)				22					20			
1403.3(18)	2^+–4^+				x							
1410.2(4)	X^+									100		
1416.1(5)					x	x	x					
1427.5(3)					x							
1429.6(1)	1^+		9(1)			2						
1433.0(5)	$1^+,2^+$				x	x						
1485.7(2)*	4^+				≈20							
1504.9(4)							100					
1507.3(3)					100							
1525.9(2)	1^+–3^+					32(4)						
1568.1(2)	$2^-,3^-$				x							
1581.6(6)	X^-					x						
1677.6(1)	5^+		14		15			6			9	
1679.1(8)						x	x					

(continued) **$^{62}_{29}$Cu**

E^*	J^π	Branching ratios in percentage									
	E_f^*:	637	644.8	675.0	698.3	727.7	755.8	915.3	982.7	1248.7	1370.5
[keV]	J_f^π:	1^+	$\langle 2^+ \rangle$	3^+	$2^+,3^+$	2^+	$\langle 2^+ \rangle$	2^+	3^+	$3^+,4^+$	5^+
1682.1(7)					x						
1710.5(2)	1^+–3^+			8							
1736.3(3)				100							
1745.0(4)	X^+				x						
1759.5(7)			x		x						
1843.0(11)	X^+								100		
1916.7(2)*	$\langle 5^+ \rangle$										x
1981.4(2)	X^+			x							
2067.5(3)	$X^{\langle + \rangle}$			x							
2145.9(3)											100
2148.0(1)	6^+										21
2154.7(3)				30							
2160.6(2)	$3^+,4^+$				90						
2295.3(1)	$\langle 6^- \rangle$										99
2444.1(3)	X^+									100	
2518.7(3)*	$\langle 6^- \rangle$										100
2638.6(3)											100
2740(3)								100			
3191.51(9)	$\langle 6^- \rangle$										72(4)

Energy levels and branching ratios [99Si11, 00Hu18]. Part 4 **$^{62}_{29}$Cu**

E^*	J^π	Branching ratios in percentage									
	E_f^*:	1677.6	2295.3	2892.2	3029.5	3191.5	3434.8	3627.5	3979.2	4164.9	4628.9
[keV]	J_f^π:	5^+	$\langle 6^- \rangle$	$\langle 7^- \rangle$	$\langle 7^- \rangle$	$\langle 6^- \rangle$	$\langle 8^- \rangle$	$\langle 8^- \rangle$	$\langle 9 \rangle$	$\langle 9^- \rangle$	$\langle 7^+ \rangle$
2829(3)			100								
2892.2(1)	$\langle 7^- \rangle$		100								
3029.49(12)	$\langle 7^- \rangle$		87(4)	12.6(9)							
3191.51(9)	$\langle 6^- \rangle$	28(5)									
3434.80(11)	$\langle 8^- \rangle$		63(3)			37(2)					
3580(3)			100								
3627.50(12)	$\langle 8^- \rangle$		73(4)	27.2(15)							
3979.2(1)*	$9^{\langle - \rangle}$						81(4)	19.5(12)			
4164.92(12)	$\langle 9^- \rangle$			57(1)	18.6(11)			24(2)			
4447.23(12)	$\langle 9^- \rangle$			30(5)	7(2)		25(3)		38(2)		
4628.94(11)	$\langle 7^+ \rangle$					44(4)	56(4)				
4746.35(15)	$\langle 9^+ \rangle$							100			
4999.95(13)	$\langle 9^- \rangle$							18.1(11)		82(4)	
5048.29(13)									23.3(19)		77(5)

Energy levels and branching ratios [99Si11, 00Hu18]. Part 5 **$^{62}_{29}$Cu**

E^*	J^π			Branching ratios in percentage			
		E_f^*:	4746.3	4999.9	5048.3	6008.1	7100.8
[keV]		J_f^π:	$\langle 9^+ \rangle$	$\langle 9^- \rangle$		$\langle 11 \rangle$	$\langle 12 \rangle$
5619.59(16)					100		
6008.11(15)	$\langle 11 \rangle$		65(4)	35(3)			
7100.82(18)	$\langle 12 \rangle$					100	
7619.83(18)	$\langle 12 \rangle$					100	x

Energy levels and branching ratios [01Ba27]. **$^{63}_{29}$Cu**

E^*	$2J^\pi$	$2T$	L	C^2S'	L	C^2S'	σ (τ,d)	L	C^2S'	L	C^2S	C^2S	C^2S	L	C^2S	Ref.
[keV]				(d,n)		(τ,d)	μb/sr		(^{7}Li,^{6}He)		(d,τ)	(α,t)	(d,τ)		(t,α)	
0.0	3^-		1	2.4	1	3.0	12400	1	2.4	1	1.2	0.56	1.00	1	1.65	76Br36
669.67(5)	1^-		1	1.6	1	1.38	6810	1	1.4	1	0.5	0.76	0.33	1	0.55	76Br36
962.10(4)	5^-				3	1.92	760	3	2.8	3	0.7	0.40	0.50	3	0.92	76Br36
1327.0(1)	7^-				3	0.64	310	3	0.80	3	1.4	0.10	1.08	3	1.61	76Br36
1412.0(1)	5^-		3	5.0	3	2.70		3	3.5	3		0.68	0.28	3	0.44	68Ok07
1547.1(1)	3^-				$\langle 1 \rangle$	<0.01	150			1			0.02	1	0.04	76Br36
1861.2(1)	7^-									3	1.9		1.36	3	3.31	79Ha03
2011.5(2)	3^-		1	0.58	1	0.12	770							1	0.02	68Ok07
2062.2(1)	$\langle 1 \rangle^-$				1	0.30	1900	1	0.60							76Br36
2081.3(2)	$5^{\langle - \rangle}$															
2092.6(1)	7^-									3	0.5		0.34	3	0.63	79Ha03
2207.9(1)	9^-															
2336.6(1)	5^-				3	0.48	260						0.05			76Br36
2337.4(6)	3^+,5^+													2	0.08	79Ha03
2404.8(1)	7^-				3	0.24	130	3	0.78				0.05	3	0.07	74Wh08
2429(3)																
2497.5(2)	$\langle 3^- \rangle$															79Ha03
2506.5(2)	9^+				4	5.30	1250	4	5.2	3+4	0.2	0.28	0.20	4	0.43	76Br36
2512.0(5)	1–5										0.2					
2535.8(1)	$\langle 5 \rangle^-$															
2547.5(2)	9^-															
2630	1^-,3^-		1	0.16												68Ok07
2673.2(2)	5,7^-									3	0.4		0.4,0.2	3	0.42	79Ha03
2677.1(3)	11^-															
2678.7(5)	$X^{\langle - \rangle}$															
2682.0(8)	$\langle 1^-,3^- \rangle$				1	0.06	400									76Br36
2696.6(1)	1^-,3^-															
2716.7(1)	3^-,5^-															
2761(8)																
2776.7(10)																
2780.2(2)	$\langle 1^-,3^- \rangle$				1	0.16	1220						0.02			76Br36
2806.3(4)	3^-		1	0.53												68Ok07

(continued) **$^{63}_{29}$Cu**

E^* [keV]	$2J^\pi$	$2T$	L	C^2S' (d,n)	L	C^2S' (τ,d)	σ (τ,d) μb/sr	L	C^2S' (^{7}Li,^{6}He)	L	C^2S (d,τ)	C^2S (α,t)	C^2S (d,τ)	L	C^2S (t,α)	Ref.
2810	1^-,3^-															
2832.8(2)	5^-,7^-									3	0.3		0.15	3	0.35	79Ha03
2847(5)	7^-												0.06			01Ba27
2857.8(3)	$\langle 1^-,3^-\rangle$				1	0.06	500									76Br36
2869(8)																
2888.8(4)	1^-,3,5^-															
2956.7(11)																
2977.8(6)	1^-–5^-															
3032.1(10)	1^-,3^-				1	0.04	330						0.01			76Br36
3043.4(4)	$\langle 5^-\rangle$													3	0.04	79Ha03
3093.4(22)																
3101.3(4)	1^-,3^-				1	0.02	150									76Br36
3127.9(11)	X^-															
3183(8)	X^-															
3208(8)	3^+,5^+													2	0.13	67Ba14
3210(20)	X^-															
3225.4(5)	$\langle 5^-\rangle$				3	0.30	190									76Br36
3248(3)																
3263.6(5)	$X^{\langle -\rangle}$															
3280	5^-,7^-															
3291(3)																
3292.6(6)																
3297.4(1)	3^-									1	0.09		0.06			79Ha03
3307.6(5)	$\langle 3^+\rangle$				2	0.12	410							2	0.34	76Br36
3309.7(5)	$X^{\langle +\rangle}$															
3370(8)																
3389(15)																
3406.4(8)																
3418.3(8)																
3425.9(24)	$\langle 1,3\rangle^-$				1	0.12	790									76Br36
3429.9(7)													0.03			91Se09
3461.9(3)	11^+															
3464.9(9)	$\langle 1,3\rangle^-$		1	0.36									0.06			68Ok07
3476.1(10)	$\langle 3^+,5^+\rangle$				2	0.60	2110							2	0.52	76Br36
3500	3^+,5^+															
3537.4(22)																
3540.1(15)																
3541.1(7)																
3565.3(19)																
3570.1(10)	3^+,5^+													2	1.01	67Ba14
3575(3)																
3580.9(7)	$\langle 1,3\rangle^-$				1	0.08	720						0.06			76Br36
3583.5(6)	$\langle 5,7\rangle^-$									3	0.8		[0.5]			79Ha03
3607(3)	$\langle 5^-,7^-\rangle$															
3649.0(7)																

(continued) **$^{63}_{29}$Cu**

E^* [keV]	$2J^\pi$	$2T$	L	C^2S' (d,n)	L	C^2S' (τ,d)	σ (τ,d) μb/sr	L	C^2S' (^{7}Li,^{6}He)	L	C^2S (d,τ)	C^2S (α,t)	C^2S (d,τ)	L	C^2S (t,α)	Ref.
3657.9(10)																
3681.0(7)	$\langle 5,7\rangle^-$									3	0.8		[0.8]			79Ha03
3683(15)	$3^+,5^+$										incl			2	1.01	79Ha03
3708(20)	$1^-,3^-$				1	0.02	160									76Br36
3719.0(6)	X^+															
3730(20)	$5^-,7^-$										incl					79Ha03
3740.1(7)	X^+															
3775.0(4)	$\langle 5,7\rangle^-$												[0.7]			91Se09
3779(15)	$3^+,5^+$													2	0.92	
3786.3(5)	$1^-,3^-$				1	0.04	350									76Br36
3810(20)	X^+															
3840(20)	X^+															
3867.2(10)																
3881(20)	$\langle 3^+,5^+\rangle$				$\langle 2\rangle$	0.10	560							2	1.29	76Br36
3885.68(11)	$5^-,7^-$									3	0.8					79Ha03
3888.8(7)	$\langle 5,7\rangle^-$															
3892(3)																
3895.1(9)	$\langle 5,7\rangle^-$												[0.5]			91Se09
3902.1(10)																
3920(15)																
3960.1(10)							410									76Br36
3970	$7^+,9^+$				4	0.51										65Bl14
3978.4(8)																
4017.1(10)							190						0.02			91Se09
4039.2(17)	$\langle 3^-\rangle$		1	0.19			130									68Ok07
4055.0(7)					1	0.12	140									65Bl14
4110.5(7)	1^+									0	0.4		0.34	0	0.87	79Ha03
4117(4)	1^+														incl	67Ba14
4125.3(6)																
4130.44(25)	$\langle 13^+\rangle$															
4133.2(7)																
4145.2(7)																
4147.8(10)																
4156.24(25)	13^+															
4182(4)																
4189(4)																
4222.1(11)	$\langle 5,7\rangle^-$									3	0.7		[0.7]	3	0.68	79Ha03
4260(20)	$\langle 5^-,7^-\rangle$															
4286.9(9)	$\langle 5,7\rangle^-$												[0.3]			91Se09
4289.2(7)																
4294(2)	$1^-,3^-$													1	0.25	67Ba14
4354.75(15)																
4358.0(6)													0.04			91Se09
4361.9(24)																
4371(15)	$5^-,7^-$													3	0.28	

(continued) **$^{63}_{29}$Cu**

E^* [keV]	$2J^\pi$	$2T$	L	C^2S' (d,n)	L	C^2S' (τ,d)	σ (τ,d) μb/sr	L	C^2S' (^{7}Li,^{6}He)	L	C^2S (d,τ)	C^2S (α,t)	C^2S (d,τ)	L	C^2S (t,α)	Ref.
4381(4)													[0.1]			91Se09
4403.0(7)																
4416(3)																
4420.4(8)																
4432.9(3)	1^+									0	0.6		0.36	0	1.10	79Ha03
4457.1(6)																
4470.78(9)																
4498.5(4)	17^+															
4498.8(7)	$\langle 5,7\rangle^-$												[0.5]			91Se09
4501.2(10)																
4507.1(10)																
4511.5(24)	$5^-,7^-$															
4517.0(7)																
4531.2(10)																
4533(4)	$[1^+]$												0.08			91Se09
4577.5(3)	$\langle 15^+\rangle$															
4581(15)	$\langle 5^-,7^-\rangle$									3	0.6					79Ha03
4593.2(10)																
4598(4)							350									76Br36
4637(4)							130									76Br36
4644.2(7)																
4647.2(10)																
4691.80(12)							160									76Br36
4735(5)	$[1^+]$						180						0.08			76Br36
4753.1(10)																
4772(4)																
4789.2(10)							230									76Br36
4796.2(10)																
4805.7(10)	1^+												0.13			79Ha03
4810.2(10)																
4839.2(10)							450									76Br36
4869.7(22)							170									76Br36
4876.65(25)																
4890	$7^+,9^+$						220									76Br36
4919.9(6)	$13–19^+$															
4955.4(6)	$5^-,7^-$									3	0.4		[0.2]			79Ha03
5016.2(10)																
5053.2(10)																
5073.2(10)																
5101.2(10)																
5140.2(10)							370									76Br36
5162.2(10)										3,1	0.2					79Ha03
5191(5)																
5226.2(10)							190									76Br36
5253(4)																

(continued) **$^{63}_{29}$Cu**

E^* [keV]	$2J^\pi$	$2T$	L	C^2S' (d,n)	L	C^2S' (τ,d)	σ (τ,d) μb/sr	L	C^2S' (^{7}Li,^{6}He)	L	C^2S (d,τ)	C^2S (α,t)	C^2S (d,τ)	L	C^2S (t,α)	Ref.
5274.2(10)																
5292(4)																
5304(4)							290									76Br36
5312.2(10)																
5319.5(11)																
5335.6(11)							170									76Br36
5359.3(4)	$\langle 19^+ \rangle$															
5366.2(10)	$\langle 1^+ \rangle$						250			$\langle 0 \rangle$	0.3					79Ha03
5401(3)							100									76Br36
5413.9(4)	$\langle 17^+ \rangle$															
5446							190									76Br36
5489							210									76Br36
5543.3(10)							100									76Br36
5566(4)							240									76Br36
5572.2(10)							incl									
5579.3(10)																
5592.3(10)							150									76Br36
5601.9(10)																
5645(5)	$\langle 5^-,7^- \rangle$						<100			$\langle 3 \rangle$	0.3					79Ha03
5713(5)							<100									76Br36
5735.3(10)							<100									76Br36
5656							<100									76Br36
5797.3(10)							<100									76Br36
5804.3(10)																
5828.3(10)	$\langle 5^-,7^- \rangle$									$\langle 3 \rangle$	0.3					79Ha03
5833(4)							140									76Br36
5867.63(15)							230									76Br36
5878(4)																
5920							100									76Br36
5994							260									76Br36
6032							<100									76Br36
6070							180									76Br36
6093.3(10)							180									76Br36
6166							180									76Br36
6285.6(4)																
6375.3(10)																
6496.4(11)																
7075.6(11)																
7400.0(5)	1															
7472.7(5)	1															
7513.3(4)	$\langle 3 \rangle$															
7529.9(4)	1															
7605.6(4)	$\langle 1 \rangle$															
7730.2	$\langle 1 \rangle$															
8564.94(23)*	1^-				1	0.78										76Bo06

(continued) **$^{63}_{29}$Cu**

E^* [keV]	$2J^\pi$	$2T$	L	C^2S' (d,n)	L	C^2S' (τ,d)	σ (τ,d) μb/sr	L	C^2S' (^{7}Li,^{6}He)	L	C^2S (d,τ)	C^2S (α,t)	C^2S (d,τ)	L	C^2S (t,α)	Ref.
8594.2																
8629.0(4)	5^-															
8639.18(23)	5^-															
8693.6(6)	3^-															
8700.8(6)	3^-															
8718.6(7)	$\langle 3^- \rangle$															
8719.1(7)	$\langle 3^- \rangle$															
8719.3(5)	$\langle 3^- \rangle$															
8727.7(5)	3^-															
8731.9(6)	$\langle 3^- \rangle$															
8734.5(5)	$\langle 3^- \rangle$															
8738.6(5)	$\langle 3^- \rangle$															
8743.3(5)	3^-															
8743.7(5)	3^-															
8746.5(6)	$\langle 3^- \rangle$															
8747.5(6)	3^-															
8751(1)**	$\langle 3^- \rangle$				1	0.98										76Bo06
9119	3^-															
9584	1^-															
9807.9(11)																
9830.9(11)																
9842.9(11)																
9849***	9^+				4	4.80										76Bo06
9855.9(11)																
9864.0(4)																
9865	$\langle 3 \rangle^-$															
9970(40)	5^+															
10960(40)***	5^+				2	1.80										76Bo06
11029																
11227																
11230(40)***	9^+				4	2.24										76Bo06
11326																
11469																
11641																
11723																
11816																
11951																
12056																
12196																
																84Ca26

(continued) **$^{63}_{29}$Cu**

E^*	$2J^\pi$	$2T$	L	C^2S'	L	C^2S'	σ (τ,d)	L	C^2S'	L	C^2S	C^2S	C^2S	L	C^2S	Ref.
[keV]				(d,n)		(τ,d)	μb/sr		(^{7}Li,^{6}He)		(d,τ)	(α,t)	(d,τ)		(t,α)	
				68Ok07		76Br36 65Bl14	76Br36		74Wh08 01Ba27		79Ha03	67Ar05	91Se09		67Ba14	

Additional data on this isotope can be found in [01Ny01, 01Ko65, 00Mu20, 92Se03, 79Fi02, 78Ze04, 77Br27].

Abundance: 69.17(3) %.

* Isobar analog (IAS) of ^{63}Ni ground state.

** Possible isobar analog of ^{63}Ni at $E*$=155 keV [76Bo06]; see comments in [01Ba27].

*** IAS of $9/2^+$ and $5/2^+$ states in ^{63}Ni at $E*$=1292, 2291 and 2514 keV; see [01Ba27].

Data for proton transfer reactions (d,n) and (τ,d) are from [68Ok07] and [76Br36].

Data on proton pickup reactions (d,τ) [79Ha03, 91Se09] and (t,α) reaction [67Ba14, 84Ca26] are given at right; in the last column values for the levels at $E^*\leq$2680 keV are from [84Ca26].

Integral values C^2S of the (d,τ) reaction for the mean energies 6.5(10) and 8.5(10) MeV and L=2 are 2.7 and 1.8 [79Ha03, 01Ba27].

Values S_N for the (t,α) reaction were normalized to 8.0 for $\Sigma S_N$for all $f_{7/2}$ states [67Ba14, 01Ba27].

σ (d,d') from [67Hj02], branching ratios and uncertainties in E^* and $T_{1/2}$ are given in Supplement.

Data for this isotope were considered in vol. LB I/18A.

Energy levels and branching ratios [01Ba27]. Part 2 **$^{63}_{29}$Cu**

E^*	$2J^\pi$	C^2S	σ (d,d')	$T_{1/2}$ or	Ref.		Branching ratios in percentage					
						E_f^*: 0.0	670	962	1327	1412	1547	1861
[keV]		(d,τ)	μb/sr	Γ_{cm}		$2J_f^\pi$: 3^-	1^-	5^-	7^-	5^-	3^-	7^-
0.0	3^-	1.6		Stable	76Br36							
669.67(5)	1^-	0.43	131	0.198(6) ps	76Br36	100						
962.10(4)	5^-	0.50	1200	0.57(2) ps	76Br36	100						
1327.0(1)	7^-	1.5	1023	0.61(3) ps	76Br36	84.2(4)		15.8(4)				
1412.0(1)	5^-	0.2	131	1.7(+59-10) ps	68Ok07	71.7(3)	6.5(3)	21.8(3)				
1547.1(1)	3^-	0.05	76	116(8) fs	76Br36	76.3(4)	2.2(3)	21.5(4)				
1861.2(1)	7^-	1.7	113	0.66(+20-12) ps	79Ha03	55(1)		45(1)				
2011.5(2)	3^-		150	33(5) fs	68Ok07	48(1)	22	25		2	2	
2062.2(1)	$\langle 1\rangle^-$		incl		76Br36	16	48				36	
2081.3(2)	$5^{\langle -\rangle}$		incl	126(17) fs		39(1)		24(1)	27(2)		10(1)	
2092.6(1)	7^-	0.45	incl	0.24(8) ps	79Ha03	9(1)		52(1)	40(1)	<5		
2207.9(1)	9^-		128	0.31(+10-5) ps				43(2)	57(2)			
2336.6(1)	5^-		43		76Br36	70(1)	<3	22(2)		8(1)		<5
2337.4(6)	3^+,5^+		incl		79Ha03							
2404.8(1)	7^-		23	0.12(+4-3) ps	74Wh08	<10	<6	43(4)	35(3)	22(3)	<5	<5
2429(3)						100						
2497.5(2)	$\langle 3^-\rangle$		314	103(14) fs	79Ha03	82.2(3)	14.0(3)	2.4(2)		1.5(2)		
2506.5(2)	9^+		incl	1.5(+3-2) ps	76Br36				27(1)			40(2)
2512.0(5)	1–5		incl	0.15(+5-3) ps		93.4(2)	6.6(2)					
2535.8(1)	$\langle 5\rangle^-$		incl			29(2)	7(1)	9(2)	4(1)	38(4)	1.3(4)	5(2)

(continued) **$^{63}_{29}$Cu**

E^*	$2J^\pi$	C^2S	σ (d,d')	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
					E_f^*:	0.0	670	962	1327	1412	1547	1861
[keV]		(d,τ)	μb/sr	Γ_{cm}	$2J_f^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	7^-
2547.5(2)	9^-		incl					≈33				67
2630	1^-,3^-				68Ok07							
2673.2(2)	5,7^-	0.35	224	66(+19-14) fs	79Ha03				63(2)			37(2)
2677.1(3)	11^-		incl	0.58(15) ps					70(2)			
2678.7(5)	$X^{\langle-\rangle}$		incl					34			66	
2682.0(8)	$\langle1^-,3^-\rangle$		incl		76Br36		100					
2696.6(1)	1^-,3^-		incl			34(1)	46(1)				16	
2716.7(1)	3^-,5^-			>0.2 ps		15(2)	4(1)	5(1)	50(6)		9(2)	
2761(8)												
2776.7(10)							100					
2780.2(2)	$\langle1^-,3^-\rangle$				76Br36	37(1)	17(1)				9(1)	
2806.3(4)	3^-			>0.18 ps	68Ok07	67(3)			33(3)			
2810	1^-,3^-											
2832.8(2)	5^-,7^-			200(+55-39) fs	79Ha03	x			24(1)			76(1)
2847(5)	7^-				01Ba27							
2857.8(3)	$\langle1^-,3^-\rangle$			0.4(+15-2) ps	76Br36	35(1)	22(1)	11(2)		31(1)		
2869(8)												
2888.8(4)	1^-,3,5^-					22(2)	16(1)	52(2)				
2956.7(11)						100						
2977.8(6)	1^-–5^-					85(1)	15(1)					
3032.1(10)	1^-,3^-				76Br36	100						
3043.4(4)	$\langle5^-\rangle$				79Ha03	79(1)	6(1)				8(1)	
3093.4(22)						[80]	>20					
3101.3(4)	1^-,3^-				76Br36	55(1)	45(1)					
3127.9(11)	X^-											
3183(8)	X^-											
3208(8)	3^+,5^+				67Ba14							
3210(20)	X^-											
3225.4(5)	$\langle5^-\rangle$				76Br36	34	66					
3248(3)							100					
3263.6(5)	$X^{\langle-\rangle}$					60	40					
3280	5^-,7^-											
3291(3)							100					
3292.6(6)						100						
3297.4(1)	3^-			16(+16-8) fs	79Ha03	32(5)	68(5)					
3307.6(5)	$\langle3^+\rangle$				76Br36	8(2)	15(1)	33(2)				
3309.7(5)	$X^{\langle+\rangle}$					50					50	
3370(8)												
3389(15)												
3406.4(8)						100						
3418.3(8)						62(1)						
3425.9(24)	$\langle1,3\rangle^-$			22(+22-11) fs	76Br36	60(18)	40(10)					
3429.9(7)					91Se09	81(1)		19(1)				
3461.9(3)	11^+					x						
3464.9(9)	$\langle1,3\rangle^-$			0.07(+15-4) ps	68Ok07	54(2)	46(1)					

(continued) **$^{63}_{29}$Cu**

E^*	$2J^\pi$	C^2S	σ (d,d')	$T_{1/2}$ or	Ref.		Branching ratios in percentage						
						E_f^*:	0.0	670	962	1327	1412	1547	1861
[keV]		(d,τ)	μb/sr	Γ_{cm}		$2J_f^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	7^-
3476.1(10)	$\langle 3^+,5^+\rangle$				76Br36		100						
3500	$3^+,5^+$												
3537.4(22)							40(12)	60(24)					
3540.1(15)											39(15)	61(24)	
3541.1(7)							67(9)		33(5)				
3565.3(19)							52	14				34	
3570.1(10)	$3^+,5^+$				67Ba14		100						
3575(3)								100					
3580.9(7)	$\langle 1,3\rangle^-$			5(+8-4) fs	76Br36		37(3)	63(3)					
3583.5(6)	$\langle 5,7\rangle^-$			0.10(+13-4) ps	79Ha03				52(4)	48(4)			
3607(3)	$\langle 5^-,7^-\rangle$						100						
3649.0(7)								93(6)					
3657.9(10)							100						
3681.0(7)	$\langle 5,7\rangle^-$			63(+26-19) fs	79Ha03				100				
3683(15)	$3^+,5^+$				79Ha03								
3708(20)	$1^-,3^-$				76Br36								
3719.0(6)	X^+						11(1)	46(1)	43(1)				
3730(20)	$5^-,7^-$				79Ha03								
3740.1(7)	X^+						64(2)					36(2)	
3775.0(4)	$\langle 5,7\rangle^-$			116(+37-23) fs	91Se09		41(2)			17(1)			14(1)
3779(15)	$3^+,5^+$												
3786.3(5)	$1^-,3^-$				76Br36			55(1)	15(1)		21(1)		
3810(20)	X^+												
3840(20)	X^+												
3867.2(10)									100				
3881(20)	$\langle 3^+,5^+\rangle$				76Br36								
3885.68(11)	$5^-,7^-$				79Ha03								
3888.8(7)	$\langle 5,7\rangle^-$			119(+75-41) fs			18(9)		33(3)	48(3)			
3892(3)							100						
3895.1(9)	$\langle 5,7\rangle^-$			28(+9-6) fs	91Se09		100						
3902.1(10)							100						
3920(15)													
3960.1(10)					76Br36		100						
3970	$7^+,9^+$				65Bl14								
3978.4(8)													
4017.1(10)					91Se09		100						
4039.2(17)	$\langle 3^-\rangle$				68Ok07					52(13)			48(10)
4055.0(7)					65Bl14		61(5)	39(6)					
4110.5(7)	1^+			16(+3-2) fs	79Ha03		100						
4117(4)	1^+				67Ba14		100						
4125.3(6)							40(4)					38(4)	
4130.44(25)	$\langle 13^+\rangle$			2.3(+10-7) ps									
4133.2(7)							38(12)		62(4)				
4145.2(7)							51(4)		49(4)				
4147.8(10)								100					

(continued) **$^{63}_{29}$Cu**

E^*	$2J^\pi$	C^2S	σ (d,d')	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
					E_f^*:	0.0	670	962	1327	1412	1547	1861
[keV]		(d,τ)	μb/sr	Γ_{cm}	$2J_f^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	7^-
4156.24(25)	13^+											
4182(4)						100						
4189(4)						100						
4222.1(11)	$\langle 5,7\rangle^-$			20(+8-5) fs	79Ha03	20(3)		80(3)				
4260(20)	$\langle 5^-,7^-\rangle$											
4286.9(9)	$\langle 5,7\rangle^-$			31(+8-6) fs	91Se09	38(7)		62(7)				
4289.2(7)						81(4)		19(2)				
4294(2)	$1^-,3^-$				67Ba14							
4354.75(15)												
4358.0(6)					91Se09	16(2)	78(4)	7(2)				
4361.9(24)						62(38)	38(4)					
4371(15)	$5^-,7^-$											
4381(4)					91Se09	100						
4403.0(7)							51(12)	49(7)				
4416(3)										100		
4420.4(8)						66(9)						
4432.9(3)	1^+			16(+8-6) fs	79Ha03	48(5)	52(5)					
4457.1(6)						45(8)	27(5)					
4470.78(9)												
4498.5(4)	17^+			4.1(1) ns								
4498.8(7)	$\langle 5,7\rangle^-$			8(+1-1) fs	91Se09	100						
4501.2(10)						100						
4507.1(10)										100		
4511.5(24)	$5^-,7^-$					33(2)		67(27)				
4517.0(7)						22(8)	78(10)					
4531.2(10)								100				
4533(4)	$[1^+]$				91Se09	100						
4577.5(3)	$\langle 15^+\rangle$			2.4(+14-10) ps								
4581(15)	$\langle 5^-,7^-\rangle$				79Ha03							
4593.2(10)								100				
4598(4)					76Br36	100						
4637(4)					76Br36	100						
4644.2(7)						40(2)					60(7)	
4647.2(10)						100						
4691.80(12)					76Br36							
4735(5)	$[1^+]$				76Br36							
4753.1(10)											100	
4772(4)												
4789.2(10)					76Br36	100						
4796.2(10)								100				
4805.7(10)	1^+			7(+5-5) fs	79Ha03	x	x					
4810.2(10)						100						
4839.2(10)					76Br36	100						
4869.7(22)					76Br36			60(5)		40(4)		
4876.65(25)												

(continued)

$^{63}_{29}$Cu

E^* [keV]	$2J^\pi$	C^2S (d,τ)	σ (d,d') μb/sr	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage						
						E_f^*:	0.0	670	962	1327	1412	1547	1861
						$2J_f^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	7^-
4890	$7^+,9^+$				76Br36								
4919.9(6)	$13–19^+$												
4955.4(6)	$5^-,7^-$				79Ha03		15(3)						
5016.2(10)									100				
5053.2(10)							100						
5073.2(10)							100						
5101.2(10)							100						
5140.2(10)					76Br36		100						
5162.2(10)					79Ha03		100						
5191(5)													
5226.2(10)					76Br36		100						
5253(4)							100						
5274.2(10)							x						
5292(4)							x						
5304(4)					76Br36		x			x			
5312.2(10)							x						
5319.5(11)													
5335.6(11)					76Br36								
5359.3(4)	$\langle 19^+ \rangle$			0.8(+3-1) ps									
5366.2(10)	$\langle 1^+ \rangle$				79Ha03		100						
5401(3)					76Br36						x	x	
5413.9(4)	$\langle 17^+ \rangle$			>2 ps									
5446					76Br36								
5489					76Br36								
5543.3(10)					76Br36				100				
5566(4)					76Br36				x				
5572.2(10)											100		
5579.3(10)							100						
5592.3(10)					76Br36		100						
5601.9(10)								100					
5645(5)	$\langle 5^-,7^- \rangle$				79Ha03								
5713(5)					76Br36								
5735.3(10)					76Br36		100						
5656					76Br36								
5797.3(10)					76Br36		100						
5804.3(10)							100						
5828.3(10)	$\langle 5^-,7^- \rangle$				79Ha03		100						
5833(4)					76Br36			x				x	
5867.63(15)					76Br36								
5878(4)							x		x				
5920					76Br36								
5994					76Br36								
6032					76Br36								
6070					76Br36								
6093.3(10)					76Br36		100						

(continued) **$^{63}_{29}$Cu**

E^*	$2J^\pi$	C^2S	σ (d,d')	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
						E_f^*: 0.0	670	962	1327	1412	1547	1861
[keV]		(d,τ)	μb/sr	Γ_{cm}		$2J_f^\pi$: 3^-	1^-	5^-	7^-	5^-	3^-	7^-
6166					76Br36							
6285.6(4)												
6375.3(10)						100						
6496.4(11)												
7075.6(11)												
7400.0(5)	1					60	28			<1	7	
7472.7(5)	1					58					20	
7513.3(4)	⟨3⟩					7	43	2		4	20	
7529.9(4)	1					3	54	9	3	4	8	2
7605.6(4)	⟨1⟩					35	39				9	
7730.2	⟨1⟩											
8564.94(23)*	1^-				76Bo06	15	2	2		4	12	
8594.2												
8629.0(4)	5^-					14	2	16	9	9	18	8
8639.18(23)	5^-					13	3	8	4	8	8	
8693.6(6)	3^-					65	12					
8700.8(6)	3^-					45	36			18		
8718.6(7)	⟨3^-⟩					93		7				
8719.1(7)	⟨3^-⟩					43		57				
8719.3(5)	⟨3^-⟩					14		14			21	16
8727.7(5)	3^-					60	17			7		
8731.9(6)	⟨3^-⟩					6		72		22		
8734.5(5)	⟨3^-⟩					15	9	40			36	
8738.6(5)	⟨3^-⟩					13	13	34				
8743.3(5)	3^-					39		21		30	9	
8743.7(5)	3^-					26	17	32		11	14	
8746.5(6)	⟨3^-⟩					28	27	45				
8747.5(6)	3^-					16	25	59				
8751(1)**	⟨3^-⟩				76Bo06	68	8	7			17	
9119	3^-											
9584	1^-											
9807.9(11)												
9830.9(11)												
9842.9(11)												
9849***	9^+				76Bo06							
9855.9(11)												
9864.0(4)						4.7(2)	3.4(2)	6.1(3)	2.9(3)	2.8(3)	2.0(2)	2.3(2)
9865	⟨3⟩$^-$											
9970(40)	5^+											
10960(40)***	5^+				76Bo06							
11029												
11227												
11230(40)***	9^+				76Bo06							
11326												
11469												

(continued) **$^{63}_{29}$Cu**

E^*	$2J^\pi$	C^2S	σ (d,d')	$T_{1/2}$ orRef.		Branching ratios in percentage						
					E_f^*:	0.0	670	962	1327	1412	1547	1861
[keV]		(d,τ)	μb/sr	Γ_{cm}	$2J_f^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	7^-
11641												
11723												
11816												
11951												
12056												
12196												
		78Ze04										
			67Hj02									

Energy levels and branching ratios [01Ba27]. Part 3 **$^{63}_{29}$Cu**

E^*	$2J^\pi$					Branching ratios in percentage						
		E_f^*:	2011	2062.2	2081.3	2092.6	2207.8	2336.6	2337.4	2404.8	2497.5	2506.4
[keV]		$2J_f^\pi$:	3^-	$\langle 1\rangle^-$	$5^{\langle -\rangle}$	7^-	9^-	5^-	$3^+,5^+$	7^-	$\langle 3^-\rangle$	9^+
2404.8(1)	7^-		<6	<6	<6							
2506.5(2)	9^+					33(2)						
2535.8(1)	$\langle 5\rangle^-$					6(2)						
2677.1(3)	11^-						30(2)					
2696.6(1)	$1^-,3^-$		4									
2716.7(1)	$3^-,5^-$					16(4)						
2780.2(2)	$\langle 1^-,3^-\rangle$			24(2)								
2888.8(4)	$1^-,3,5^-$				10(1)							
3043.4(4)	$\langle 5^-\rangle$										7(1)	
3127.9(11)	X^-		100									
3307.6(5)	$\langle 3^+\rangle$		14(1)	30(2)								
3418.3(8)											38(1)	
3461.9(3)	11^+											100
3649.0(7)				7(1)								
3775.0(4)	$\langle 5,7\rangle^-$			17(2)					11(1)			
3786.3(5)	$1^-,3^-$		3(1)									
3978.4(8)			72(6)	28(2)								
4125.3(6)			22(4)									
4130.44(25)	$\langle 13^+\rangle$											50
4156.24(25)	13^+											76
4420.4(8)			34(4)									
4457.1(6)				27(5)								
4955.4(6)	$5^-,7^-$		39(5)		45(5)							
5335.6(11)			100									
7400.0(5)	1		5									
7472.7(5)	1										8	
7513.3(4)	$\langle 3\rangle$										6	

(continued) **$^{63}_{29}$Cu**

E^*	$2J^\pi$					Branching ratios in percentage						
		E_f^*:	2011	2062.2	2081.3	2092.6	2207.8	2336.6	2337.4	2404.8	2497.5	2506.4
[keV]		$2J_f^\pi$:	3^-	$\langle 1\rangle^-$	$5^{\langle -\rangle}$	7^-	9^-	5^-	$3^+,5^+$	7^-	$\langle 3^-\rangle$	9^+
7529.9(4)	1			5							8	
7605.6(4)	$\langle 1\rangle$			2							7	
8564.94(23)*	1^-		3	5						1	7	
8629.0(4)	5^-		11									
8639.18(23)	5^-		2	3	3			2			4	
8693.6(6)	3^-		23									
8719.3(5)	$\langle 3^-\rangle$				10	25						
8727.7(5)	3^-			6	10							
8738.6(5)	$\langle 3^-\rangle$		18	21								
9807.9(11)												100
9830.9(11)												100
9842.9(11)												100
9855.9(11)												100
9864.0(4)						3.6(2)				2.9(2)		

Energy levels and branching ratios [01Ba27]. Part 4 **$^{63}_{29}$Cu**

E^*	$2J^\pi$					Branching ratios in percentage						
		E_f^*:	2512.0	2535.8	2678.7	2682.0	2696.6	2780.2	2832.8	2888.8	2956.7	2977.8
[keV]		$2J_f^\pi$:	1,3,5	$\langle 5\rangle^-$	$X^{\langle -\rangle}$	$\langle 1^-,3^-\rangle$	$1^-,3^-$	$\langle 1^-,3^-\rangle$	$5^-,7^-$	$1^-,3,5^-$		
2780.2(2)	$\langle 1^-,3^-\rangle$			13(2)								
3786.3(5)	$1^-,3^-$					6(1)						
7472.7(5)	1							4		3		
7513.3(4)	$\langle 3\rangle$							7		3		
7529.9(4)	1							3				
7605.6(4)	$\langle 1\rangle$						4					
8564.94(23)*	1^-			1	7		4			2	2	2
8629.0(4)	5^-								8			
8639.18(23)	5^-			6	2			3		2		
9864.0(4)			69(1)									

Energy levels and branching ratios [01Ba27]. Part 5 **$^{63}_{29}$Cu**

E^*	$2J^\pi$					Branching ratios in percentage						
		E_f^*:	3043.4	3101.3	3127.9	3225.4	3263.6	3292.6	3309.7	3406.4	3429.9	3461.9
[keV]		$2J_f^\pi$:	$\langle 5^-\rangle$	$1^-,3^-$	X^-	$\langle 5^-\rangle$	$X^{\langle -\rangle}$		$X^{\langle +\rangle}$			11^+
4130.44(25)	$\langle 13^+\rangle$											50
4156.24(25)	13^+											24
7472.7(5)	1			7								

(continued) **$^{63}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage									
	E_f^*:	3043.4	3101.3	3127.9	3225.4	3263.6	3292.6	3309.7	3406.4	3429.9	3461.9
[keV]	$2J_f^\pi$:	$\langle 5^- \rangle$	1^-,3^-	X^-	$\langle 5^- \rangle$	$X^{\langle - \rangle}$		$X^{\langle + \rangle}$			11^+
7513.3(4)	$\langle 3 \rangle$		8								
7605.6(4)	$\langle 1 \rangle$	3									
8564.94(23)*	1^-	2	3		3	1	4	5	2	3	3
8629.0(4)	5^-							6			
8639.18(23)	5^-	5	3	3	3	4	3	7			

Energy levels and branching ratios [01Ba27]. Part 6 **$^{63}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage								
	E_f^*:	3657.9	3775.0	4130.44	4156.24	4498.5	4577.5	5359.3	6285.6	
[keV]	$2J_f^\pi$:		$\langle 5,7 \rangle^-$	$\langle 13^+ \rangle$	13^+	17^+	$\langle 15^+ \rangle$	$\langle 19^+ \rangle$		
4498.5(4)	17^+				100					
4577.5(3)	$\langle 15^+ \rangle$			27	73					
4919.9(6)	13–19^+					100				
5319.5(11)						x				
5359.3(4)	$\langle 19^+ \rangle$					100				
5413.9(4)	$\langle 17^+ \rangle$						100			
6285.6(4)						100				
6496.4(11)								100		
7075.6(11)									x	
8564.94(23)*	1^-	3	2							

Energy levels and branching ratios [96Si12]. **$^{64}_{29}$Cu**

E^*	J^π	L	$(2J+1)S$	σ (d,p)	σ (d,p)	S'	σ (d,t)	L	S_N	L	σ (d,α)	σ (t,τ)	I_d	Ref.
[keV]			(d,p)	μb/sr	μb/sr	(d,p)	μb/sr		(d,t)	(d,α)	μb/sr	*rel.*	(α,d)	
0.0	1^+	1+3	0.17+0.73	190+52	254	0.153	150	1	0.064	0	40	0.86		69Pa07
					+33	0.266	+160	+3	0.259					
159.282(3)	2^+	1+3	0.84+1.09	962+78	1215	0.712	520	1	0.232	2	14*	3.10		69Pa07
278.257(8)	2^+	1+3	0.86+0.92	1100+67	1315	0.754	640	1	0.305	2	4.5	1.58		69Pa07
343.898(9)	1^+	1	1.18	1420	1678	0.946	430	1	0.222		weak			69Pa07
362.231(6)	3^+	1+3	0.14+3.29	157+246	246	1.85	200	3	0.409	4	44			69Pa07
574.629(12)	$\langle 4 \rangle^+$	3	3.64	290	1168	0.635	660	1	0.388	4	17	2.78		69Pa07
608.784(9)	2^+	1	0.74	930	310		310	3	0.715	2	2	1.56		69Pa07
663.00(3)	1^+	1	0.16	202						4	8			69Pa07
739.051(9)	2^+	1	1.73	2180			1170	1	0.732	2	70*			69Pa07
746.245(11)	$\langle 3^+ \rangle$		incl	incl	2280		incl		incl		incl			69Pa07
878.277(19)	$\langle 0 \rangle^+$	1	0.17	224			610	1	0.418		weak	1.56		69Pa07

(continued) **$^{64}_{29}$Cu**

E^* [keV]	J^π	L (d,p)	$(2J+1)S$ (d,p)	σ (d,p) μb/sr	σ (d,p) μb/sr	S' (d,p)	σ (d,t) μb/sr	L	S_N (d,t)	L (d,α)	σ (d,α) μb/sr	σ (t,τ) *rel.*	I_d (α,d)	Ref.
895.714(20)	$\langle 3\rangle^+$	1+3	0.20+0.89	246+74	994		incl		incl	4	18			69Pa07
927.079(10)	$\langle 1\rangle^+$	1	0.40	526			incl		incl	0	38	2.78		69Pa07
1241.09(1)	$1^{\langle+\rangle}$,$2^{\langle+\rangle}$	1	0.74	1030	1195		230	1	0.193		2			69Pa07
1242.65(7)	$\langle\leq 3\rangle$		incl		incl		incl		incl					
1287.15(5)	$\langle 1^+–3^-\rangle$		weak	weak	incl		120	[1]	0.103					69Pa07
1288.6(3)	$\langle\leq 3\rangle$				incl		incl		incl					
1290.6(5)					incl		incl		incl			2.13		77Sh08
1298.12(1)	$\langle 1^+\rangle$	1	0.44	616	incl		incl		incl	0+2	17	incl		69Pa07
1320.33(2)	$\langle 0–2\rangle$													
1354.25(3)	$\langle 3\rangle^+$	1+3	0.09+0.22	112+20	890					4	10	0.44		69Pa07
1363.21(11)	$\langle\leq 4\rangle$										weak			69Pa07
1438.69(3)	$\langle 1\rangle^+$	1+3	0.05+0.15	69+13	214					0	2.2	0.98		69Pa07
1461.35(13)	$\langle 2^-\rangle$	0+2	0.005+0.1	56+7	incl					$\langle 3\rangle$	3			69Pa07
1499.18(3)	$\langle 2\rangle^-$	0	0.018	213						1+3	4*	0.41		69Pa07
1521.15(2)	$\langle 2\rangle^+$	1	0.40	582	176					2	10*			69Pa07
1550.54(12)	$\langle 2^-,3^-\rangle$	4	3.68	280	incl						6*	9.76		69Pa07
1594.23(3)	6^-	4	6.34	481	992					4	14	7.69	154	69Pa07
1594.38(3)	$\langle 1^+,2\rangle$				incl						incl	incl		69Pa07
1607.31(5)	$\langle 2^+–4^-\rangle$		weak	weak						0	3			69Pa07
1615.7(5)	$\langle 4,5,6\rangle$													
1630(10)	$\langle 1^+–5^+\rangle$	$\langle 3\rangle$	0.29	$\langle 26\rangle$										69Pa07
1648(10)	$\langle 1^-,2^-\rangle$	2+0	0.02+0.002	24	823									69Pa07
1683.12(3)	$\langle\leq 3\rangle$	0	0.07+1.23	784+123	390						3.5			69Pa07
1700.65(5)	$\langle 1,2^+\rangle$	2+4	0.61+2.35	672+179	290					$\langle 3\rangle$	7*	23.8		69Pa07
1706.8(5)	$\langle 1–5\rangle$													
1739.85(6)	$\langle 3^+–5^+\rangle$		weak	weak						4	20			69Pa07
1742.59(5)	$\langle 1^+–3^+\rangle$													
1749.2(3)	$\langle\leq 4\rangle$													
1768.99(7)	$\langle 3^+–5^+\rangle$													
1779.54(4)	$\langle 1^+,2^+\rangle$	3+1	0.38+0.02	30+37						4	35			69Pa07
1852.65(3)	$\langle 1^+,2^+\rangle$	1	0.09	132	35					4	5.5	0.43		69Pa07
1884(10)			weak	weak						2,3	2*			69Pa07
1900.28(5)	$\langle 1^+\rangle$	1	0.245	370	619					0+2	5			69Pa07
1905.09(2)	$\langle 1^+,2\rangle$				incl									
1918(1)	$\langle\leq 4\rangle$				incl							0.51		77Sh08
1940(2)	$\langle 1^+–3^+\rangle$	$\langle 1\rangle$	0.04	$\langle 56\rangle$	incl					2	2			69Pa07
1970(2)	$\langle\leq 3\rangle$													
1976.33(18)	$\langle 2–6\rangle$											1.46		77Sh08
1979.3(10)	$\langle 3^{++}5^+\rangle$			$\langle 28\rangle$						4	50			69Pa07
2021.2(5)	$\langle 1^+–3^+\rangle$	1+3	0.04+0.24	67+25						2	2			69Pa07
2041.9(5)	$\langle\leq 3\rangle$													
2050.00(9)	$\langle 1^+–3^-\rangle$	0,1	0.039	$\langle 60\rangle$	240					4	14			69Pa07
2053.3(10)	$\langle\leq 4\rangle$													
2060(2)	$\langle\leq 3\rangle$													
2065(2)	$\langle\leq 4\rangle$	4	2.51	202	267					3	9*	5.68		69Pa07

(continued) **$^{64}_{29}$Cu**

E^* [keV]	J^π	L	$(2J+1)S$ (d,p)	σ (d,p) μb/sr	σ (d,p) μb/sr	S' (d,p)	σ (d,t) μb/sr	L	S_N (d,t)	L (d,α)	σ (d,α) μb/sr	σ (t,τ) *rel.*	I_d (α,d)	Ref.
2073.2(5)	⟨5–7⟩		incl											69Pa07
2075.12(11)	⟨2$^-$–4$^-$⟩		incl											69Pa07
2080.1(15)	⟨≤3⟩													
2092.3(2)	⟨1$^+$–3$^+$⟩	⟨3⟩	0.325	⟨34⟩						2	4*			69Pa07
2115(10)	⟨≤3$^+$⟩	1	0.028	47										69Pa07
2139.7(7)	⟨≤3⟩	1	0.032	54						⟨4⟩	12*	2.50		69Pa07
2144.53(6)	⟨2$^+$⟩		incl								incl			69Pa07
2184.2(5)	⟨3$^+$⟩			83						⟨4⟩	2.5			69Pa07
2212(9)	⟨1$^+$–5$^+$⟩	⟨3⟩	0.38	⟨41⟩										69Pa07
2221(2)	⟨3$^+$⟩	⟨3⟩	0.36	⟨39⟩						4	22			69Pa07
2244(2)	⟨≤3⟩													
2251.6(10)	⟨4,5,6⟩										2*			69Pa07
2254.06(12)	⟨≤3⟩											6.29		77Sh08
2267.01(6)	⟨2$^-$–4$^-$⟩	2+4	0.16+0.80	190+67	600						7	incl		69Pa07
2274.27(8)	⟨≤3⟩				incl									
2279.75(6)	⟨≤3⟩				incl									
2301.09(6)	⟨≤3⟩				incl						5			69Pa07
2309.4(10)	⟨3$^+$⟩	1	0.142	246	incl					4	6			69Pa07
2316.49(7)	⟨1$^-$,2$^-$⟩				incl									
2323.2(7)														
2324.75(19)		0+2	0.02+0.02	190+26										69Pa07
2354.62(7)	⟨≤3⟩		weak	weak							5			69Pa07
2360.47(11)	⟨≤3⟩													
2376.41(9)	⟨1$^+$⟩		weak	weak						0	2			69Pa07
2378.4(5)	⟨7$^-$⟩												92	94Fi01
2381.2(15)	⟨≤3⟩													
2387.2(12)														
2387.95(12)	⟨1$^+$⟩		weak							0	2			69Pa07
2417(2)	⟨≤3⟩	0+4	0.004+0.2	39+15						4	35			69Pa07
2456.69(8)	⟨1$^+$–3$^+$⟩													
2465.47(10)	⟨1$^-$,2$^-$⟩	0+2	0.04+0.26	504+302	910					⟨1⟩	4.5*			69Pa07
2491.2(15)	⟨≤3⟩				incl					3	3.5*			69Pa07
2493.57(7)	⟨2$^-$⟩	2	0.050	58	incl									69Pa07
2497.59(3)	⟨1,2$^+$⟩				incl									
2507.29(12)	⟨≤3⟩													
2522(7)		⟨0⟩	0.023	⟨280⟩						⟨0+2⟩	3			69Pa07
2533.65(7)	⟨≤3⟩	0+2	0.01+0.05	168+58						⟨0+2⟩	3			69Pa07
2567(6)	⟨3$^+$–5$^+$⟩									4	6			69Pa07
2586(6)	⟨3$^+$,4$^+$⟩	3	0.515	63						4	12			69Pa07
2594.9(5)	⟨1$^+$⟩		weak							⟨0+2⟩	4			69Pa07
2607(7)		0	0.012	134						4	17			69Pa07
2622(10)	⟨1$^+$⟩		weak							0+2	2.5			69Pa07
2635.53(12)	⟨≤3⟩	2	0.27	280	473					0	20			69Pa07
2647.91(11)	⟨≤3⟩	4+0	1.17+0.02	202+103	184									69Pa07
2657.34(5)	⟨1$^+$,2⟩													

(continued) **$^{64}_{29}$Cu**

E^* [keV]	J^π	L	$(2J+1)S$ (d,p)	σ (d,p) μb/sr	σ (d,p) μb/sr	S' (d,p)	σ (d,t) μb/sr	L	S_N (d,t)	L (d,α)	σ (d,α) μb/sr	σ (t,τ) *rel.*	I_d (α,d)	Ref.
2670(10)	⟨1$^-$,2$^-$⟩	0	0.019	224						⟨3+1⟩	3*			69Pa07
2692.9(5)											30			69Pa07
2695.22(9)	⟨1$^-$,2$^-$⟩	0	0.028	336										69Pa07
2716.7(5)														
2717.97(10)	⟨1$^-$,2$^-$⟩	0+2	0.02+0.03	224+37							9			69Pa07
2726.19(6)	⟨1$^+$–3$^+$⟩													
2732.32(8)	⟨0$^+$–2⟩													
2764.19(11)	⟨1$^-$,2$^-$⟩	0+2	0.02+0.05	190+65	187					3	35			69Pa07
2776.56(7)	⟨1$^+$,2$^+$⟩	1	0.180	336										69Pa07
2807(10)	⟨1$^-$,2$^-$⟩	0	0.012	146							5			69Pa07
2830.54(7)	⟨≤3⟩	0+2	0.02+0.17	280+213							7*			69Pa07
2854(11)	⟨0$^+$–3$^+$⟩	1	0.116	218							3*			69Pa07
2869(1)	⟨3$^+$⟩	1+3	0.05+0.29	101+39						4	25			69Pa07
2892.35(7)	⟨1$^+$⟩	1+3	0.05+0.14	90+18						0	5			69Pa07
2896.84(7)	⟨1$^+$⟩	1	0.031	60						⟨0+2⟩	8*			69Pa07
2932.48(11)	⟨2$^-$⟩	0+2	0.07+0.26	784+324	342					⟨1+3⟩	2*			69Pa07
2970(11)	⟨3$^+$–5$^+$⟩	0+4	0.01+0.72	112+67	153					4	28			69Pa07
2985(11)	⟨1$^-$,2$^-$⟩	0+2	0.01+0.04	78+56										69Pa07
3013.07(6)	⟨1$^-$,2$^-$⟩	0+2	0.01+0.02	123+25										69Pa07
3033.76(13)	⟨0$^-$–2$^-$⟩	2	0.161	202										69Pa07
3051.2(15)			weak	weak										69Pa07
3051.77(10)	⟨≤3⟩			≈78										69Pa07
3072(2)	⟨2$^-$–4$^-$⟩	4	0.49	47										69Pa07
3080.84(9)	⟨2$^-$–4$^-$⟩	⟨4⟩	1.17	123	180									69Pa07
3111.82(8)	⟨0,1,2⟩													
3125.5(3)	⟨≤3⟩													
3126.9(5)														
3154(10)	⟨0$^-$–4$^-$⟩	⟨2⟩	0.148		206									67Hj02
3190.5(5)	⟨8$^-$⟩	0	0.005											67Hj02
3191.07(12)	⟨≤4⟩		incl		210									67Hj02
3207.59(9)	⟨0,1,2⟩				incl									
3257.61(7)	⟨0,1,2⟩													
3290(10)		0	0.007		284									67Hj02
3313.11(9)	⟨0,1,2⟩		incl		incl									67Hj02
3343.92(17)	⟨≤3⟩												86	94Fi01
3352.84(4)	⟨≤3⟩												incl	
3412.19(9)	⟨≤3⟩	⟨0⟩	0.011		438									67Hj02
3440.28(8)	⟨≤3⟩		incl		incl									67Hj02
3465.57(12)	⟨≤3⟩													
3475.52(17)	⟨0,1,2⟩	2	0.155		220									67Hj02
3493.37(20)	⟨≤3⟩		incl		incl									67Hj02
3511.19(11)	⟨1,2⟩		incl		incl									67Hj02
3524.70(11)	⟨≤4⟩				incl									
3596.04(6)	⟨≤3⟩													
3603.09(15)	⟨≤3⟩	2	0.364		530									67Hj02

(continued) **$^{64}_{29}$Cu**

E^* [keV]	J^π	L	$(2J+1)S$ (d,p)	σ (d,p) μb/sr	σ (d,p) μb/sr	S' (d,p)	σ (d,t) μb/sr	L	S_N (d,t)	L (d,α)	σ (d,α) μb/sr	σ (t,τ) *rel.*	I_d (α,d)	Ref.
3629.42(9)	$\langle\leq3\rangle$		incl		incl									67Hj02
3687(10)														
3711.92(15)	$\langle\leq3\rangle$													
3763(10)		$\langle0\rangle$	0.015		637									67Hj02
3783.14(8)	$\langle1,2^+\rangle$		incl		incl									67Hj02
3799.3(7)	9^+				incl								320	94Fi01
3802.74(13)	$\langle\leq3\rangle$													
3826.92(10)	$\langle1^+,2,3\rangle$													
≈3900	$\langle1^-,2^-\rangle$	0	0.038		1552									67Hj02
3988.0(7)														
3990.85(21)	$\langle1–4\rangle$													
4034.03(8)	$\langle0,1,2\rangle$	2	0.742		1165									67Hj02
4071.59(10)	$\langle1^+–3^+\rangle$													
4140.83(11)	$\langle0^-–2^-\rangle$	2	0.491		778									67Hj02
4264.15(18)	$\langle1,2^+\rangle$													
4327.67(12)	$\langle1^+–3^-\rangle$	$\langle2\rangle$	0.193		316									67Hj02
4432.92(24)	$\langle1^-,2^-\rangle$	0	0.026		1070									67Hj02
4444.48(17)	$\langle\leq3\rangle$													
4549.86(21)	$\langle\leq3\rangle$													
4560(30)	$\langle7^+\rangle$												264	94Fi01
4763.39(12)	$\langle\leq4\rangle$													
≈5000	$\langle0–4^-\rangle$	2	0.512		924									67Hj02
5350(30)													185	94Fi01
≈6630														
6810(6)**	$\langle0^+\rangle$													
6826(6)**	$\langle0^+\rangle$													
≈8170**	$\langle2^+\rangle$													
			69Pa07	69Pa07	67Hj02		67Hj02		67Hj02		69Pa07			Ref.
			96Si12			67Hj02						77Sh08		Ref.

Additional data on this isotope can be found in [94Fi01].
* This value of cross section is tentative [69Pa07].
** IAS of the ground state and first 2^+ excited state of ^{64}Ni [96Si12].
Data on the (d,p) reaction in two first columns and on (d,α) reaction are from [69Pa07].
Values σ (t,τ) are from [77Sh08]. I_d is an approximate yield of deuterons from (α,d) reaction at 20° in units counts per channel [94Fi01].
Data for this isotope were considered in vol. LB I/18A.

Energy levels and branching ratios [96Si12]. Part 2

$^{64}_{29}$Cu

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage			
			E_f^*:	0.0	159	278	344
			J_f^π:	1^+	2^+	2^+	1^+
0.0	1^+	12.700(2) h	69Pa07				
159.282(3)	2^+	21(4) ps	69Pa07	100			
278.257(8)	2^+	<9 ps	69Pa07	100	x		
343.898(9)	1^+	<4 ps	69Pa07	96(1)	4(1)		
362.231(6)	3^+	<4 ps	69Pa07	2.3(2)	98(1)	x	
574.629(12)	$\langle 4\rangle^+$	<17 ps	69Pa07		6		
608.784(9)	2^+	<9 ps	69Pa07	82(2)	8(1)	4(1)	6(1)
663.00(3)	1^+	<8 ps	69Pa07	32(2)	27(2)	35(2)	6(1)
739.051(9)	2^+	<11 ps	69Pa07	6.8(2)	63(2)	9.6(4)	2.7(4)
746.245(11)	$\langle 3^+\rangle$	<13 ps	69Pa07		x	70	
878.277(19)	$\langle 0\rangle^+$	<15 ps	69Pa07	56(1)	3(1)	x	40(3)
895.714(20)	$\langle 3\rangle^+$	<20 ps	69Pa07	14(5)	6(1)	64(2)	
927.079(10)	$\langle 1\rangle^+$	<11 ps	69Pa07	7.8(2)	16.0(3)	67(3)	
1241.09(1)	$1^{\langle+\rangle}$,$2^{\langle+\rangle}$		69Pa07		19	26(1)	
1242.65(7)	$\langle\leq 3\rangle$			100			
1287.15(5)	$\langle 1^+–3^-\rangle$		69Pa07				
1288.6(3)	$\langle\leq 3\rangle$				54	22	
1290.6(5)			77Sh08		x		x
1298.12(1)	$\langle 1^+\rangle$		69Pa07	22(1)	44(1)	23	8
1320.33(2)	$\langle 0–2\rangle$			76		6	10
1354.25(3)	$\langle 3\rangle^+$		69Pa07	10(2)	55(2)	x	
1363.21(11)	$\langle\leq 4\rangle$		69Pa07	[100]			
1438.69(3)	$\langle 1\rangle^+$		69Pa07	21(1)	31(1)	<47	
1461.35(13)	$\langle 2^-\rangle$		69Pa07				
1499.18(3)	$\langle 2\rangle^-$		69Pa07	19(2)	30(1)	27(1)	
1521.15(2)	$\langle 2\rangle^+$		69Pa07	16(1)	19(1)		1
1550.54(12)	$\langle 2^-,3^-\rangle$		69Pa07		16	76	
1594.23(3)	6^-	20.4(7) ns	69Pa07				
1594.38(3)	$\langle 1^+,2\rangle$		69Pa07	26(2)		x	7
1607.31(5)	$\langle 2^+–4^-\rangle$		69Pa07		x		
1615.7(5)	$\langle 4,5,6\rangle$						
1630(10)	$\langle 1^+–5^+\rangle$		69Pa07				
1648(10)	$\langle 1^-,2^-\rangle$		69Pa07				
1683.12(3)	$\langle\leq 3\rangle$		69Pa07	64			24
1700.65(5)	$\langle 1,2^+\rangle$		69Pa07		34(5)		
1706.8(5)	$\langle 1–5\rangle$						
1739.85(6)	$\langle 3^+–5^+\rangle$		69Pa07				
1742.59(5)	$\langle 1^+–3^+\rangle$			30(4)			28(3)
1749.2(3)	$\langle\leq 4\rangle$						
1768.99(7)	$\langle 3^+–5^+\rangle$						
1779.54(4)	$\langle 1^+,2^+\rangle$		69Pa07	68			2(1)
1852.65(3)	$\langle 1^+,2^+\rangle$		69Pa07	78(4)			22(2)
1884(10)			69Pa07				
1900.28(5)	$\langle 1^+\rangle$		69Pa07	72			28

(continued) **$^{64}_{29}$Cu**

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Ref.	E_f^*: J_f^π:	Branching ratios in percentage 0.0 1^+	159 2^+	278 2^+	344 1^+
1905.09(2)	⟨1$^+$,2⟩							
1918(1)	⟨≤4⟩		77Sh08					
1940(2)	⟨1$^+$–3$^+$⟩		69Pa07		100			
1970(2)	⟨≤3⟩				100			
1976.33(18)	⟨2–6⟩		77Sh08					
1979.3(10)	⟨3$^+$+5$^+$⟩		69Pa07					
2021.2(5)	⟨1$^+$–3$^+$⟩		69Pa07		26			
2041.9(5)	⟨≤3⟩				100			
2050.00(9)	⟨1$^+$–3$^-$⟩		69Pa07					
2053.3(10)	⟨≤4⟩					x		
2060(2)	⟨≤3⟩				100			
2065(2)	⟨≤4⟩		69Pa07					
2073.2(5)	⟨5–7⟩		69Pa07					
2075.12(11)	⟨2$^-$–4$^-$⟩		69Pa07					
2080.1(15)	⟨≤3⟩				51			
2092.3(2)	⟨1$^+$–3$^+$⟩		69Pa07					
2115(10)	⟨≤3$^+$⟩		69Pa07					
2139.7(7)	⟨≤3⟩		69Pa07		13			
2144.53(6)	⟨2$^+$⟩		69Pa07					
2184.2(5)	⟨3$^+$⟩		69Pa07		22			
2212(9)	⟨1$^+$–5$^+$⟩		69Pa07					
2221(2)	⟨3$^+$⟩		69Pa07		100			
2244(2)	⟨≤3⟩				100			
2251.6(10)	⟨4,5,6⟩		69Pa07					
2254.06(12)	⟨≤3⟩		77Sh08					100
2267.01(6)	⟨2$^-$–4$^-$⟩		69Pa07				x	
2274.27(8)	⟨≤3⟩				5	5	6	18(6)
2279.75(6)	⟨≤3⟩							
2301.09(6)	⟨≤3⟩		69Pa07		29	x		12
2309.4(10)	⟨3$^+$⟩		69Pa07		8	9	47	
2316.49(7)	⟨1$^-$,2$^-$⟩				x			x
2323.2(7)								
2324.75(19)			69Pa07					
2354.62(7)	⟨≤3⟩		69Pa07		5			
2360.47(11)	⟨≤3⟩							
2376.41(9)	⟨1$^+$⟩		69Pa07					
2378.4(5)	⟨7$^-$⟩		94Fi01					
2381.2(15)	⟨≤3⟩				30		70	
2387.2(12)								
2387.95(12)	⟨1$^+$⟩		69Pa07					
2417(2)	⟨≤3⟩		69Pa07					
2456.69(8)	⟨1$^+$–3$^+$⟩				x			
2465.47(10)	⟨1$^-$,2$^-$⟩		69Pa07		100			
2491.2(15)	⟨≤3⟩		69Pa07		93	7		
2493.57(7)	⟨2$^-$⟩		69Pa07					

(continued) **$^{64}_{29}$Cu**

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Ref.	Branching ratios in percentage			
			E_f^*:	0.0	159	278	344
			J_f^π:	1^+	2^+	2^+	1^+
2497.59(3)	$\langle 1,2^+\rangle$						25(2)
2507.29(12)	$\langle \leq 3\rangle$				100		
2522(7)			69Pa07				
2533.65(7)	$\langle \leq 3\rangle$		69Pa07	100			
2567(6)	$\langle 3^+–5^+\rangle$		69Pa07				
2586(6)	$\langle 3^+,4^+\rangle$		69Pa07				
2594.9(5)	$\langle 1^+\rangle$		69Pa07				
2607(7)			69Pa07				
2622(10)	$\langle 1^+\rangle$		69Pa07				
2635.53(12)	$\langle \leq 3\rangle$		69Pa07				
2647.91(11)	$\langle \leq 3\rangle$		69Pa07				
2657.34(5)	$\langle 1^+,2\rangle$			16(2)	66(5)		
2670(10)	$\langle 1^-,2^-\rangle$		69Pa07				
2692.9(5)			69Pa07				
2695.22(9)	$\langle 1^-,2^-\rangle$		69Pa07				
2716.7(5)							
2717.97(10)	$\langle 1^-,2^-\rangle$		69Pa07				
2726.19(6)	$\langle 1^+–3^+\rangle$						
2732.32(8)	$\langle 0^+–2\rangle$			74(7)			
2764.19(11)	$\langle 1^-,2^-\rangle$		69Pa07		42(11)		
2776.56(7)	$\langle 1^+,2^+\rangle$		69Pa07	31(7)			
2807(10)	$\langle 1^-,2^-\rangle$		69Pa07				
2830.54(7)	$\langle \leq 3\rangle$		69Pa07	39(8)			
2854(11)	$\langle 0^+–3^+\rangle$		69Pa07				
2869(1)	$\langle 3^+\rangle$		69Pa07				
2892.35(7)	$\langle 1^+\rangle$		69Pa07				
2896.84(7)	$\langle 1^+\rangle$		69Pa07				
2932.48(11)	$\langle 2^-\rangle$		69Pa07	100			
2970(11)	$\langle 3^+–5^+\rangle$		69Pa07				
2985(11)	$\langle 1^-,2^-\rangle$		69Pa07				
3013.07(6)	$\langle 1^-,2^-\rangle$		69Pa07				15(12)
3033.76(13)	$\langle 0^–2^-\rangle$		69Pa07				
3051.2(15)			69Pa07				
3051.77(10)	$\langle \leq 3\rangle$		69Pa07	85(12)			
3072(2)	$\langle 2^–4^-\rangle$		69Pa07				
3080.84(9)	$\langle 2^–4^-\rangle$		69Pa07				
3111.82(8)	$\langle 0,1,2\rangle$			20(6)			
3125.5(3)	$\langle \leq 3\rangle$						
3126.9(5)							
3154(10)	$\langle 0^–4^-\rangle$		67Hj02				
3190.5(5)	$\langle 8^-\rangle$		67Hj02				
3191.07(12)	$\langle \leq 4\rangle$		67Hj02				
3207.59(9)	$\langle 0,1,2\rangle$						
3257.61(7)	$\langle 0,1,2\rangle$			71(7)			
3290(10)			67Hj02				

(continued) **$^{64}_{29}$Cu**

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}	Ref.	E_f^*: J_f^π:	Branching ratios in percentage 0.0 1^+	159 2^+	278 2^+	344 1^+
3313.11(9)	⟨0,1,2⟩		67Hj02		43(6)			
3343.92(17)	⟨≤3⟩		94Fi01					54(17)
3352.84(4)	⟨≤3⟩						20(7)	
3412.19(9)	⟨≤3⟩		67Hj02			37(6)	33(5)	
3440.28(8)	⟨≤3⟩		67Hj02					
3465.57(12)	⟨≤3⟩							
3475.52(17)	⟨0,1,2⟩		67Hj02			83(8)		
3493.37(20)	⟨≤3⟩		67Hj02					
3511.19(11)	⟨1,2⟩		67Hj02		33(15)		18(4)	
3524.70(11)	⟨≤4⟩							
3596.04(6)	⟨≤3⟩							
3603.09(15)	⟨≤3⟩		67Hj02		15(5)			
3629.42(9)	⟨≤3⟩		67Hj02					
3687(10)								
3711.92(15)	⟨≤3⟩					100		
3763(10)			67Hj02					
3783.14(8)	⟨1,2^+⟩		67Hj02			35(5)		
3799.3(7)	9^+		94Fi01					
3802.74(13)	⟨≤3⟩				35(7)			
3826.92(10)	⟨1^+,2,3⟩					14(2)		
≈3900	⟨1^-,2^-⟩		67Hj02					
3988.0(7)								
3990.85(21)	⟨1–4⟩						25(8)	
4034.03(8)	⟨0,1,2⟩		67Hj02		17(3)	15(5)		
4071.59(10)	⟨1^+–3^+⟩					17(3)		6(2)
4140.83(11)	⟨0^-–2^-⟩		67Hj02					
4264.15(18)	⟨1,2^+⟩							
4327.67(12)	⟨1^+–3^-⟩		67Hj02					
4432.92(24)	⟨1^-,2^-⟩		67Hj02					
4444.48(17)	⟨≤3⟩				68(6)		14(6)	
4549.86(21)	⟨≤3⟩							
4560(30)	⟨7^+⟩		94Fi01					
4763.39(12)	⟨≤4⟩							
≈5000	⟨0–4^-⟩		67Hj02					
5350(30)			94Fi01					
≈6630								
6810(6)**	⟨0^+⟩							
6826(6)**	⟨0^+⟩							
≈8170**	⟨2^+⟩							
			Ref.					
		94Fi01	Ref.					

Energy levels and branching ratios [96Si12]. Part 3

$^{64}_{29}$Cu

E^*	J^π		Branching ratios in percentage									
		E_f^*:	362	575	609	663	739.0	746.2	878.3	895.7	927.1	1241.1
[keV]		J_f^π:	3^+	$\langle 4\rangle^+$	2^+	1^+	2^+	$\langle 3^+\rangle$	$\langle 0\rangle^+$	$\langle 3\rangle^+$	$\langle 1\rangle^+$	
574.629(12)	$\langle 4\rangle^+$		94									
739.051(9)	2^+		18(1)									
746.245(11)	$\langle 3^+\rangle$		21		8							
895.714(20)	$\langle 3\rangle^+$		x	15(15)			x	x				
927.079(10)	$\langle 1\rangle^+$		9									
1241.09(1)	$1^{\langle+\rangle}$,$2^{\langle+\rangle}$		x		15			40(2)	x			
1287.15(5)	$\langle 1^+–3^-\rangle$		100									
1288.6(3)	$\langle\leq 3\rangle$					24						
1290.6(5)						x						
1298.12(1)	$\langle 1^+\rangle$						3					
1320.33(2)	$\langle 0–2\rangle$		x		8							
1354.25(3)	$\langle 3\rangle^+$		16(1)	19(1)				x				
1438.69(3)	$\langle 1\rangle^+$		44(2)		x	2.9(5)	x					
1461.35(13)	$\langle 2^-\rangle$		x							x		
1499.18(3)	$\langle 2\rangle^-$				23							
1521.15(2)	$\langle 2\rangle^+$		<44	55	4	4(1)						
1550.54(12)	$\langle 2^-,3^-\rangle$						7					
1594.23(3)	6^-			100								
1594.38(3)	$\langle 1^+,2\rangle$		66(2)	x								
1607.31(5)	$\langle 2^+–4^-\rangle$			100	x							
1615.7(5)	$\langle 4,5,6\rangle$			100								
1683.12(3)	$\langle\leq 3\rangle$							8	<3		4	
1700.65(5)	$\langle 1,2^+\rangle$								66(3)	<32		
1706.8(5)	$\langle 1–5\rangle$							x				
1739.85(6)	$\langle 3^+–5^+\rangle$			100								
1742.59(5)	$\langle 1^+–3^+\rangle$									42(1)		
1768.99(7)	$\langle 3^+–5^+\rangle$		100	x								
1779.54(4)	$\langle 1^+,2^+\rangle$		30(1)									
1905.09(2)	$\langle 1^+,2\rangle$							80(2)		20(1)		
1976.33(18)	$\langle 2–6\rangle$			100								
1979.3(10)	$\langle 3^{++}5^+\rangle$		x									
2021.2(5)	$\langle 1^+–3^+\rangle$											74
2050.00(9)	$\langle 1^+–3^-\rangle$							53(5)				
2080.1(15)	$\langle\leq 3\rangle$		49									
2092.3(2)	$\langle 1^+–3^+\rangle$		100									
2139.7(7)	$\langle\leq 3\rangle$					31	56					
2144.53(6)	$\langle 2^+\rangle$		48(3)	11(1)	13(1)	14(2)						
2184.2(5)	$\langle 3^+\rangle$				70							
2251.6(10)	$\langle 4,5,6\rangle$			100								
2267.01(6)	$\langle 2^-–4^-\rangle$		x									
2279.75(6)	$\langle\leq 3\rangle$				100							
2301.09(6)	$\langle\leq 3\rangle$										17	12
2309.4(10)	$\langle 3^+\rangle$					36						
2354.62(7)	$\langle\leq 3\rangle$						95					
2360.47(11)	$\langle\leq 3\rangle$											100

(continued) **$^{64}_{29}$Cu**

E^*	J^π	Branching ratios in percentage									
	E_f^*:	362	575	609	663	739.0	746.2	878.3	895.7	927.1	1241.1
[keV]	J_f^π:	3^+	$\langle 4\rangle^+$	2^+	1^+	2^+	$\langle 3^+\rangle$	$\langle 0\rangle^+$	$\langle 3\rangle^+$	$\langle 1\rangle^+$	
2376.41(9)	$\langle 1^+\rangle$						50(9)				
2387.95(12)	$\langle 1^+\rangle$						100				
2417(2)	$\langle \leq 3\rangle$				100						
2456.69(8)	$\langle 1^+–3^+\rangle$								100		
2493.57(7)	$\langle 2^-\rangle$		53(4)		47(4)						
2497.59(3)	$\langle 1,2^+\rangle$				7(1)			20(1)			
2657.34(5)	$\langle 1^+,2\rangle$								7(1)		
2695.22(9)	$\langle 1^-,2^-\rangle$								100		
2717.97(10)	$\langle 1^-,2^-\rangle$									100	
2726.19(6)	$\langle 1^+–3^+\rangle$										10(2)
2732.32(8)	$\langle 0^+–2\rangle$			26(4)							
2776.56(7)	$\langle 1^+,2^+\rangle$	22(3)				47(3)					
3207.59(9)	$\langle 0,1,2\rangle$									35(3)	
3475.52(17)	$\langle 0,1,2\rangle$				17(8)						
3493.37(20)	$\langle \leq 3\rangle$			100							
3511.19(11)	$\langle 1,2\rangle$					49(6)					
3603.09(15)	$\langle \leq 3\rangle$			60(6)				25(7)			
3783.14(8)	$\langle 1,2^+\rangle$							10(8)			
3802.74(13)	$\langle \leq 3\rangle$				57(7)						
3826.92(10)	$\langle 1^+,2,3\rangle$	45(5)									
3990.85(21)	$\langle 1–4\rangle$	75(8)									
4034.03(8)	$\langle 0,1,2\rangle$									12(4)	
4071.59(10)	$\langle 1^+–3^+\rangle$								28(3)		
4140.83(11)	$\langle 0^-–2^-\rangle$				55(12)						
4264.15(18)	$\langle 1,2^+\rangle$							63(6)			37(6)
4327.67(12)	$\langle 1^+–3^-\rangle$			14(4)					40(5)		
4432.92(24)	$\langle 1^-,2^-\rangle$									21(6)	
4444.48(17)	$\langle \leq 3\rangle$				18(5)						

Energy levels and branching ratios [96Si12]. Part 4 **$^{64}_{29}$Cu**

E^*	J^π	Branching ratios in percentage									
	E_f^*:	1242.6	1287.1	1298.1	1320.3	1354.2	1363.2	1438.7	1461.3	1499.2	1594.2
[keV]	J_f^π:	$\langle \leq 3\rangle$		$\langle 1^+\rangle$	$\langle 0,1,2\rangle$	$\langle 3\rangle^+$	$\langle \leq 4\rangle$	$\langle 1\rangle^+$	$\langle 2^-\rangle$	$\langle 2\rangle^-$	6^-
2050.00(9)	$\langle 1^+–3^-\rangle$					47(7)					
2073.2(5)	$\langle 5–7\rangle$										100
2075.12(11)	$\langle 2^-–4^-\rangle$						100				
2184.2(5)	$\langle 3^+\rangle$					8					
2274.27(8)	$\langle \leq 3\rangle$				65(5)						
2376.41(9)	$\langle 1^+\rangle$										50(7)
2378.4(5)	$\langle 7^-\rangle$										100
2497.59(3)	$\langle 1,2^+\rangle$									17(1)	

(continued) **$^{64}_{29}$Cu**

E^*	J^π	Branching ratios in percentage									
	E_f^*:	1242.6	1287.1	1298.1	1320.3	1354.2	1363.2	1438.7	1461.3	1499.2	1594.2
[keV]	J_f^π:	⟨≤3⟩		⟨1$^+$⟩	⟨0,1,2⟩	⟨3⟩$^+$	⟨≤4⟩	⟨1⟩$^+$	⟨2$^-$⟩	⟨2⟩$^-$	6$^-$
2647.91(11)	⟨≤3⟩				100						
2692.9(5)											100
2716.7(5)											100
2726.19(6)	⟨1$^+$–3$^+$⟩			13(1)				8(1)			
2830.54(7)	⟨≤3⟩					61(4)					
2892.35(7)	⟨1$^+$⟩	36(3)									
3013.07(6)	⟨1$^-$,2$^-$⟩							85(4)			
3051.77(10)	⟨≤3⟩	15(3)									
3190.5(5)	⟨8$^-$⟩										100
3343.92(17)	⟨≤3⟩									46(8)	
3412.19(9)	⟨≤3⟩						31(2)				
3826.92(10)	⟨1$^+$,2,3⟩								27(3)		
4071.59(10)	⟨1$^+$–3$^+$⟩									39(4)	
4432.92(24)	⟨1$^-$,2$^-$⟩		36(6)								
4763.39(12)	⟨≤4⟩	39(4)			21(4)						

Energy levels and branching ratios [96Si12]. Part 5 **$^{64}_{29}$Cu**

E^*	J^π	Branching ratios in percentage									
	E_f^*:	1594.4	1607.3	1683.1	1700.6	1706.8	1739.8	1742.6	1769.0	1852.6	1905.1
[keV]	J_f^π:	⟨1$^+$,2⟩		⟨≤3⟩	⟨1,2$^+$⟩	⟨1–5⟩				⟨1$^+$,2$^+$⟩	⟨1$^+$,2⟩
2021.2(5)	⟨1$^+$–3$^+$⟩					x					
2144.53(6)	⟨2$^+$⟩									13(2)	
2354.62(7)	⟨≤3⟩		x								
2497.59(3)	⟨1,2$^+$⟩		13(1)	18(1)							
2657.34(5)	⟨1$^+$,2⟩			11(1)							
2726.19(6)	⟨1$^+$–3$^+$⟩								32(2)		
2896.84(7)	⟨1$^+$⟩								67(2)		
3033.76(13)	⟨0$^-$–2$^-$⟩						100				
3126.9(5)		67									
3257.61(7)	⟨0,1,2⟩				29(2)						
3352.84(4)	⟨≤3⟩										55(2)
3783.14(8)	⟨1,2$^+$⟩				55(4)						
4034.03(8)	⟨0,1,2⟩							55(4)			
4432.92(24)	⟨1$^-$,2$^-$⟩	43(9)									

Energy levels and branching ratios [96Si12]. Part 6 **$^{64}_{29}$Cu**

E^*	J^π	Branching ratios in percentage										
	E_f^*:	1976.3	2041.9	2073.2	2075.1	2092.3	2254.1	2267.0	2274.3	2279.7	2324.7
[keV]	J_f^π:	⟨2–6⟩	⟨≤3⟩	⟨5,6,7⟩			⟨≤3⟩		⟨≤3⟩	⟨≤3⟩	
2301.09(6)	⟨≤3⟩		31								
2323.2(7)				100							
2387.2(12)				x							
2764.19(11)	⟨1$^-$,2$^-$⟩				58(3)						
2892.35(7)	⟨1$^+$⟩							64(3)			
2896.84(7)	⟨1$^+$⟩					13(3)					
3191.07(12)	⟨≤4⟩						100				
3465.57(12)	⟨≤3⟩							29(3)			
3524.70(11)	⟨≤4⟩								100		
3596.04(6)	⟨≤3⟩									17(1)	
3802.74(13)	⟨≤3⟩	9(2)									
3826.92(10)	⟨1$^+$,2,3⟩										15(2)
4071.59(10)	⟨1$^+$–3$^+$⟩										10(2)

Energy levels and branching ratios [96Si12]. Part 7 **$^{64}_{29}$Cu**

E^*	J^π	Branching ratios in percentage									
	E_f^*:	2354.6	2376.4	2378.4	2387.2	2387.9	2456.7	2493.6	2497.6	2533.6	2692.9
[keV]	J_f^π:	⟨≤3⟩	⟨1$^+$⟩	⟨7$^-$⟩		⟨1$^+$⟩		⟨2$^-$⟩	⟨1,2$^+$⟩	⟨≤3⟩	
2635.53(12)	⟨≤3⟩					100					
2692.9(5)				<60							
2726.19(6)	⟨1$^+$–3$^+$⟩									38(4)	
2896.84(7)	⟨1$^+$⟩						19(3)				
3051.2(15)					x						
3080.84(9)	⟨2$^-$–4$^-$⟩							22(7)	78(9)		
3126.9(5)											33
3190.5(5)	⟨8$^-$⟩			x							
3207.59(9)	⟨0,1,2⟩		65(1)								
3440.28(8)	⟨≤3⟩							100			
3596.04(6)	⟨≤3⟩	83(9)									
3988.0(7)				100							

Energy levels and branching ratios [96Si12]. Part 8 **$^{64}_{29}$Cu**

E^*	J^π	Branching ratios in percentage									
	E_f^*:	2718.0	2732.3	2896.8	2932.5	3051.8	3080.8	3190.5	3191.1	3475.5	3802.7
[keV]	J_f^π:	⟨1$^-$,2$^-$⟩		⟨1$^+$⟩	⟨2$^-$⟩	⟨≤3⟩		⟨8$^-$⟩	⟨≤4⟩	⟨0,1,2⟩	⟨≤3⟩
3111.82(8)	⟨0,1,2⟩			80(8)							
3313.11(9)	⟨0,1,2⟩					57(5)					

(continued) **$^{64}_{29}$Cu**

E^*	J^π	Branching ratios in percentage									
	E_f^*:	2718.0	2732.3	2896.8	2932.5	3051.8	3080.8	3190.5	3191.1	3475.5	3802.7
[keV]	J_f^π:	$\langle 1^-,2^-\rangle$		$\langle 1^+\rangle$	$\langle 2^-\rangle$	$\langle \leq 3\rangle$		$\langle 8^-\rangle$	$\langle \leq 4\rangle$	$\langle 0,1,2\rangle$	$\langle \leq 3\rangle$
3352.84(4)	$\langle \leq 3\rangle$	25(2)									
3465.57(12)	$\langle \leq 3\rangle$				71(17)						
3629.42(9)	$\langle \leq 3\rangle$		100								
3799.3(7)	9^+							100			
4140.83(11)	$\langle 0^- – 2^-\rangle$						45(3)				
4327.67(12)	$\langle 1^+ – 3^-\rangle$								46(2)		
4549.86(21)	$\langle \leq 3\rangle$									100	
4763.39(12)	$\langle \leq 4\rangle$										40(3)

Energy levels and branching ratios [93Bh04]. **$^{65}_{29}$Cu**

E^*	$2J^\pi$	L	S'	L	C^2S'	L	C^2S'	σ (τ,d)	L	C^2S'	L	C^2S	C^2S	σ (t,p)	Ref.
[keV]			(α,p)		(d,n)		(τ,d)	μb/sr		(α,t)		(d,τ)	(t,α)	arb.u	
0	3^-	1	1.00	1	1.58	1	3.08	9200	1	1.18	1	1.7	1.52	45000	67Ba14
770.64(9)	1^-	1	0.44	1	0.89	1	1.30	4600	1	0.47	1	0.44	0.45	49	75Se14
1115.56(1)	5^-	3	0.40			3	1.14	370	3	1.95	3	0.55	0.66	610	75Se14
1481.83(3)	7^-			3	4.35	3	0.32	130	3	0.55	3	1.2	0.89	560	68Ok07
1623.4(1)	5^-	3	1.08			3	2.40	850	3	3.74	3	0.39	0.43	150	75Se14
1725.0(1)	3^-			$\langle 1\rangle$	0.07	1	0.06	130						76	68Ok07
2094.3(1)	$\langle 7\rangle^-$										3	1.5	1.45		78Ze04
2107.4(1)	$\langle 5\rangle^-$					3	0.36	130	3	0.38				110	76Br36
2212.8(2)	$\langle 1\rangle^-$			1	0.44	1	0.34	1700	2	0.12				36	68Ok07
2278.5(9)	$\langle 7\rangle^-$										3	0.73	0.65	16	78Ze04
2329.1(2)	3^-					1	0.24	1300						630	76Br36
2406.6(5)														35	
2525.7(2)	9^+	4	0.85						4	3.15				300	75Se14
2533.0(2)	$1,3,5^-$														
2533.9(4)	$\langle 7^+,9^+\rangle$					4	3.80	690					0.35		76Br36
2593.4(4)	$\langle 1^-,5^-\rangle$														
2620(8)															
2643.5(5)															
2649.7(1)	$\langle 5^-,7^-\rangle$					3	0.31				3	1.8	1.98	160	76Br36
2654.9(3)															
2669.0(17)															
2752.8(19)	$\langle 7^+,9^+\rangle$								3,4	0.5,0.2				27	70Ro22
2839(3)	$\langle 7^+,9^+\rangle$													145	
2862.8(2)														incl	
2866.9(2)	$3^-,5,7^-$														
2874.5(2)	$\langle 3^-\rangle$													1780	
2894.5(2)	$1^-,3,5^-$			$\langle 1\rangle$	0.43	1	0.16	850						incl	68Ok07
2902.5(2)									3,4	1.0,0.4					70Ro22

(continued) **$^{65}_{29}$Cu**

E^* [keV]	$2J^\pi$	L	S' (α,p)	L	C^2S' (d,n)	L	C^2S' (τ,d)	σ (τ,d) μb/sr	L	C^2S' (α,t)	L	C^2S (d,τ)	C^2S (t,α)	σ (t,p) arb.u	Ref.
2948(2)															
2977(10)															
2990(2)															
2997(2)															
3036(8)															
3079(15)	1^-,3^-								1	0.36			0.18	105	70Ro22
3079.7(2)	$\langle 3,5\rangle^+$														
3086(2)															
3116(3)	$\langle 1^-,3^-\rangle$			1	0.10	1	0.10	570						400	68Ok07
3120.2(15)															
3127(3)															
3132(3)															
3143(3)															
3157(3)															
3166.5(10)									[2]	0.13				250	70Ro22
3173(3)															
3240.3(22)	$\langle 1^+,3,5^+\rangle$												0.66		67Ba14
3261.1(20)	1^-,5^-,7^-							120						120	76Br36
3274(3)															
3326.1(10)	$\langle 3,5\rangle$								[2]	0.14				220	70Ro22
3337.9(20)															
3347(10)															
3355.3(11)													0.24	440	67Ba14
3399(3)						2	0.24	760						incl	76Br36
3407(10)															
3427(10)	5^-,7^-														
3449(3)															
3457(3)						$\langle 2\rangle$	0.08	260						360	76Br36
3482(10)				[1]	0.16		0.42	420						300	68Ok07
3504(2)					incl		incl	incl					0.26	incl	67Ba14
3513(10)															
3541(10)														600	
3563(4)															
3576(10)															
3595(10)	3^+,5^+					2	0.06	210							76Br36
3631.9(15)	$\langle 1^+,3^+\rangle$														
3646(10)	$\langle 5^-,7,9^+\rangle$													520	
3656(10)													0.26		67Ba14
3685(10)														440	
3714(4)														incl	
3728(10)															
3740(3)															
3753(4)						[2]	0.18	570							76Br36
3777(10)															
3796(10)						[2]	0.4						0.21	690	76Br36

(continued) **$^{65}_{29}$Cu**

E^* [keV]	$2J^\pi$	L	S' (α,p)	L	C^2S' (d,n)	L	C^2S' (τ,d)	σ (τ,d) μb/sr	L	C^2S' (α,t)	L	C^2S (d,τ)	C^2S (t,α)	σ (t,p) arb.u	Ref.
3808(10)															
3825(2)															
3851(10)								120							76Br36
3881(10)															
3895(2)	1^+												0.40		67Ba14
3904(10)															
3925(2)															
3958(2)															
3964(3)	1^-,3^-					1	0.06	520							76Br36
3987(3)															
4006(2)													0.22		67Ba14
4014(10)															
4031(10)															
4044(10)															
4049(4)															
4056(2)	$\langle 1^+,3,5^+\rangle$				1.05	[1]	0.26						0.04		65Bl14
4087(3)	$\langle 1^+,3,5^+\rangle$						incl								68Ok07
4095.5(24)															
4119(4)															
4126(2)															
4141(2)															
4176(4)															
4184(4)						[4]	0.7		4	0.75					65Bl14
4201(4)															
4217(4)															
4227(4)															
4237(4)															
4244(4)															
4266(4)															
4271(2)															
4290(10)															
4304(10)															
4320(10)															
4331(4)															
4357(4)															
4366(10)															
4376(2)															
4389(4)															
4397(2)															
4418(4)	5^-,7^-												0.99		67Ba14
4436(4)															
4460(4)															
4483(4)															
4490(10)															
4513(10)															

(continued) **$^{65}_{29}$Cu**

E^*	$2J^\pi$	L	S'	L	C^2S'	L	C^2S'	σ (τ,d)	L	C^2S'	L	C^2S	C^2S	σ (t,p)	Ref.
[keV]			(α,p)		(d,n)		(τ,d)	μb/sr		(α,t)		(d,τ)	(t,α)	arb.u	
4524(4)															
4533(2)													0.89		67Ba14
4540(4)															
4566(4)													0.93		67Ba14
4598(10)															
4616(10)													0.26		67Ba14
4647(10)															
4668(10)															
4682(10)															
4706(10)															
4724(4)															
4736(10)															
4759(4)															
4776(4)															
4795(10)															
4808(10)															
4822(10)															
4848(10)															
4863(4)															
4892(4)															
4923(4)															
4932(4)															
5017(4)															
5063(4)															
5077(4)															
5083(4)															
5100(4)															
5217(5)															
5230(5)															
5236(5)															
5244(5)															
5262(5)															
5296(5)															
5305(5)															
5310(5)															
5320(5)															
5335(5)															
5384(5)															
5392(5)															
5424(5)															
5430(5)															
5447(5)															
5526(5)															
5603(5)															
5618(5)															

(continued) **$^{65}_{29}$Cu**

E^*	$2J^\pi$	L	S'	L	C^2S'	L	C^2S'	σ (τ,d)	L	C^2S'	L	C^2S	C^2S	σ (t,p)	Ref.
[keV]			(α,p)		(d,n)		(τ,d)	μb/sr		(α,t)		(d,τ)	(t,α)	arb.u	
5632(5)															
5779(5)															
6070	$\langle 3\rangle$														
6556	$\langle 1\rangle$														
7939.3(14)	$\langle 5\rangle$														
8484.3(15)															
10575(10)															
10900(10)	3^-					$\langle 3\rangle$	≈2.5								76Br36
11288(10)	3^-														
11587(10)															
11928(10)	1^+														
12015(10)	1^-														
≈12337															
12477(10)	5^+														
12694(10)	3^-														
12891(10)															
13343(10)	5^+														
13391(10)	1^+														
13448(10)															
13507(10)	5^+														
13590(10)	$\langle 3^+\rangle$														
13693(10)															
13833(10)															
13871(10)	$\langle 5^+\rangle$														
13915(10)															
13955(10)															
14056(10)															
14111(10)	5^+														
14302(10)	5^+														
14441(10)															
14537(10)															
			75Se14		68Ok07		76Br36			70Ro22		78Ze04	67Ba14	66Bj02	Ref.
			72Bu17		66Ok02			76Br36					84Ca26		Ref.

Additional data on this isotope can be found in [01Ny01, 00Ko51, 93Ma16, 86Se02, 84Ca26, 72Bu17, 66Ok02].

Abundance: 30.83(3) %.

Six IAS states were suggested in the region of level energy E^*=10750 – 13090 keV [86Wa02]; for six possible IAS states spectroscopic factors were estimated in [76Bo06].

Data for proton transfer reactions (d,n) and (τ,d) are from [68Ok07] (renormalized in [86Wa02]) and [76Br36, 65Bl14].

Data on proton pickup reactions (d,τ) [79Ha03, 01Ba27] and the (t,α) reaction [67Ba14, 84Ca26] are given at right.

Data for this isotope were considered in vol. LB I/18A.

Energy levels and branching ratios [93Bh04]. Part 2

$^{65}_{29}$Cu

E^*	$2J^\pi$	L	σ (d,d')	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
						E_f^*: 0	770.6	1116	1482	1623	1725	2094
[keV]			μb/sr	Γ_{cm}		$2J_f^\pi$: 3^-	1^-	5^-	7^-	5^-	3^-	$\langle 7\rangle^-$
0	3^-	1		Stable	67Ba14							
770.64(9)	1^-	1	116	99(5) fs	75Se14	100						
1115.56(1)	5^-	3	250	0.285(9) ps	75Se14	100	0.006(1)					
1481.83(3)	7^-	3	676	0.41(7) ps	68Ok07	83		16.9(2)				
1623.4(1)	5^-	3	74	1.0(3) ps	75Se14	56(2)	10.9(13)	33(1)				
1725.0(1)	3^-		68	77(11) fs	68Ok07	72(2)	<0.64	28(1)				
2094.3(1)	$\langle 7\rangle^-$	3	121	>0.2 ps	78Ze04	29(1)		53(2)	13(1)	5.0(7)		
2107.4(1)	$\langle 5\rangle^-$				76Br36	17(3)	10(3)	36(3)	32(2)		6(1)	
2212.8(2)	$\langle 1\rangle^-$			>74 fs	68Ok07	37(12)	55(9)				8	
2278.5(9)	$\langle 7\rangle^-$	3	27	>0.1 ps	78Ze04	2.2(8)		98(4)				
2329.1(2)	3^-		15	10(5) fs	76Br36	48	29	23				
2406.6(5)			35					27(3)	56(4)			17(2)
2525.7(2)	9^+		249		75Se14				100			
2533.0(2)	$1,3,5^-$		incl			41	49				9	
2533.9(4)	$\langle 7^+,9^+\rangle$	4	incl		76Br36				42(2)			42(5)
2593.4(4)	$\langle 1^-,5^-\rangle$		23			x	x					x
2620(8)			incl									
2643.5(5)			incl				x	44(19)	x			56(22)
2649.7(1)	$\langle 5^-,7^-\rangle$	3	incl		76Br36	11(4)	62(8)	7(4)		7(4)	12	
2654.9(3)				58(13) fs		31(4)					69(4)	
2669.0(17)											100	
2752.8(19)	$\langle 7^+,9^+\rangle$		19		70Ro22				100			
2839(3)	$\langle 7^+,9^+\rangle$		122									
2862.8(2)			incl			100						
2866.9(2)	$3^-,5,7^-$		incl			66(5)			12(5)	22(7)		
2874.5(2)	$\langle 3^-\rangle$		incl	14(+7-5) fs		65(6)	35(13)					
2894.5(2)	$1^-,3,5^-$		incl		68Ok07	13(4)	41(7)			46(7)		
2902.5(2)					70Ro22	100						
2948(2)								100				
2977(10)			75									
2990(2)												
2997(2)									100			
3036(8)			134									
3079(15)	$1^-,3^-$	1	incl		70Ro22							
3079.7(2)	$\langle 3,5\rangle^+$						48(12)	52(15)				
3086(2)												
3116(3)	$\langle 1^-,3^-\rangle$				68Ok07	100						
3120.2(15)									88(9)	12(6)		
3127(3)							100					
3132(3)						100						
3143(3)						100						
3157(3)			59					100				
3166.5(10)			incl		70Ro22	100						
3173(3)						100						
3240.3(22)	$\langle 1^+,3,5^+\rangle$	[2]			67Ba14	x		x				

(continued) **$^{65}_{29}$Cu**

E^*	$2J^\pi$	L	σ (d,d')	$T_{1/2}$ or	Ref.		Branching ratios in percentage					
						E_f^*:	0	770.6	1116	1482	1623	1725	2094
[keV]			μb/sr	Γ_{cm}		$2J_f^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	$\langle 7\rangle^-$
3261.1(20)	$1^-,5^-,7^-$		149		76Br36		100						
3274(3)			incl				100						
3326.1(10)	$\langle 3,5\rangle$		147		70Ro22		100						
3337.9(20)			incl							100			
3347(10)			incl										
3355.3(11)		[2]	incl		67Ba14		36(5)				14(8)	8(5)	42(8)
3399(3)			incl		76Br36		100						
3407(10)													
3427(10)	$5^-,7^-$												
3449(3)													
3457(3)					76Br36		100						
3482(10)					68Ok07								
3504(2)		[2]	124		67Ba14								
3513(10)			incl										
3541(10)			incl										
3563(4)							100						
3576(10)													
3595(10)	$3^+,5^+$				76Br36								
3631.9(15)	$\langle 1^+,3^+\rangle$		55				22	78					
3646(10)	$\langle 5^-,7,9^+\rangle$												
3656(10)		[1]			67Ba14								
3685(10)													
3714(4)								100					
3728(10)			68										
3740(3)			incl										
3753(4)			incl		76Br36		100						
3777(10)			incl										
3796(10)		2	38		76Br36								
3808(10)			incl										
3825(2)			incl										
3851(10)					76Br36								
3881(10)													
3895(2)	1^+	0			67Ba14		100						
3904(10)													
3925(2)			27				100						
3958(2)			incl				100						
3964(3)	$1^-,3^-$				76Br36		100						
3987(3)								100					
4006(2)		3	34		67Ba14								
4014(10)			incl										
4031(10)													
4044(10)													
4049(4)							100						
4056(2)	$\langle 1^+,3,5^+\rangle$	1	107		65Bl14		100						
4087(3)	$\langle 1^+,3,5^+\rangle$		incl		68Ok07		100						

(continued) **$^{65}_{29}$Cu**

E^*	$2J^\pi$	L	σ (d,d')	$T_{1/2}$ or	Ref.		Branching ratios in percentage					
						E_f^*:	0	770.6	1116	1482	1623	1725	2094
[keV]			μb/sr	Γ_{cm}		$2J_f^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	$\langle 7\rangle^-$
4095.5(24)			incl				58(11)	42(14)					
4119(4)							100						
4126(2)			24										
4141(2)			incl										
4176(4)							100						
4184(4)					65Bl14		100						
4201(4)							100						
4217(4)							100						
4227(4)							100						
4237(4)							100						
4244(4)							100						
4266(4)			23				100						
4271(2)			incl				100						
4290(10)													
4304(10)													
4320(10)													
4331(4)							100						
4357(4)							100						
4366(10)													
4376(2)													
4389(4)							100						
4397(2)													
4418(4)	5^-,7^-	3			67Ba14		100						
4436(4)							100						
4460(4)							100						
4483(4)							100						
4490(10)													
4513(10)													
4524(4)							100						
4533(2)		[0]			67Ba14								
4540(4)							100						
4566(4)		3			67Ba14		100						
4598(10)													
4616(10)		3			67Ba14								
4647(10)													
4668(10)													
4682(10)													
4706(10)													
4724(4)							100						
4736(10)													
4759(4)							100						
4776(4)							100						
4795(10)													
4808(10)													
4822(10)													

(continued) **$^{65}_{29}$Cu**

E^*	$2J^\pi$	L	σ (d,d')	$T_{1/2}$ or	Ref.	Branching ratios in percentage						
						E_f^*: 0	770.6	1116	1482	1623	1725	2094
[keV]			μb/sr	Γ_{cm}		$2J_f^\pi$: 3^-	1^-	5^-	7^-	5^-	3^-	$\langle 7\rangle^-$
4848(10)												
4863(4)						100						
4892(4)						100						
4923(4)						100						
4932(4)						100						
5017(4)						100						
5063(4)						100						
5077(4)						100						
5083(4)						100						
5100(4)						100						
5217(5)						100						
5230(5)						100						
5236(5)						100						
5244(5)						100						
5262(5)						100						
5296(5)						100						
5305(5)						100						
5310(5)						100						
5320(5)						100						
5335(5)						100						
5384(5)						100						
5392(5)						100						
5424(5)						100						
5430(5)						100						
5447(5)						100						
5526(5)						100						
5603(5)						100						
5618(5)						x		x				
5632(5)						100						
5779(5)						100						
6070	$\langle 3\rangle$			0.7(3) fs								
6556	$\langle 1\rangle$			7(3) fs								
7939.3(14)	$\langle 5\rangle$					63			11	16	4	
8484.3(15)				1.38(13) fs		93	4				1.4	
10575(10)												
10900(10)	3^-				76Br36							
11288(10)	3^-											
11587(10)												
11928(10)	1^+											
12015(10)	1^-											
≈12337												
12477(10)	5^+											
12694(10)	3^-											
12891(10)												
13343(10)	5^+											

(continued) **$^{65}_{29}$Cu**

E^*	$2J^\pi$	L	σ (d,d')	$T_{1/2}$ or	Ref.	Branching ratios in percentage							
						E_f^*:	0	770.6	1116	1482	1623	1725	2094
[keV]			μb/sr	Γ_{cm}		$2J_f^\pi$:	3^-	1^-	5^-	7^-	5^-	3^-	$\langle 7\rangle^-$
13391(10)	1^+												
13448(10)													
13507(10)	5^+												
13590(10)	$\langle 3^+\rangle$												
13693(10)													
13833(10)													
13871(10)	$\langle 5^+\rangle$												
13915(10)													
13955(10)													
14056(10)													
14111(10)	5^+												
14302(10)	5^+												
14441(10)													
14537(10)													
					Ref.								
					Ref.								

Energy levels and branching ratios [93Bh04]. Part 3 **$^{65}_{29}$Cu**

E^*	$2J^\pi$	Branching ratios in percentage		
		E_f^*:	2107	2212.84	2278.5
[keV]		$2J_f^\pi$:	$\langle 5\rangle^-$	$\langle 1\rangle^-$	$\langle 7\rangle^-$
2533.9(4)	$\langle 7^+,9^+\rangle$				15(3)
7939.3(14)	$\langle 5\rangle$		6		
8484.3(15)				1.4	

Energy levels and branching ratios [98Bh02]. **$^{66}_{29}$Cu**

E^*	J^π	L	$(2J+1)C^2S$	σ (d,p)	σ (d,p)	L	C^2S	L	σ (d,α)	σ (t,τ)	I_d	Ref.
[keV]			(d,p)	μb/sr	μb/sr	(t,α)	(t,α)	(d,α)	μb/sr	*rel.*	(α,d)	
0.0	1^+	1+3	0.16+0.32	190+25	245+42	1	0.30	0+2	50	0.86		69Da09
185.95(2)	2^+	1+3	0.09+1.50	110+125	115+168	1	0.48	2	9	1.30	18	69Da09
237.82(1)												
275.03(2)	3^+	3	2.92	250	72+308	1	0.78	4	13			69Da09
385.78(1)	$\langle 1^+\rangle$	1	1.17	1580	2280	1	0.04	4+2	3	1.33		69Da09
465.16(1)	2^+	1	1.72	2350	2550			$\langle 2\rangle$	11	1.53		69Da09
590.75(2)	4^+	3	2.01	185	21+243	1	0.67	4	17	3.19	24	69Da09
679						1,3	0.07,0.1					84Ca26

(continued) **$^{66}_{29}$Cu**

E^* [keV]	J^π	L (d,p)	$(2J+1)C^2S$ (d,p)	σ (d,p) μb/sr	σ (d,p) μb/sr	L (t,α)	C^2S (t,α)	L (d,α)	σ (d,α) μb/sr	σ (t,τ) *rel.*	I_d (α,d)	Ref.
729.82(2)	3^+	1	0.06	88	129	3	0.15	4+2	10			69Da09
822.69(1)	2^+	1	0.80	1040	1472	1	0.08	2	8	1.81		69Da09
884(7)										0.64		77Sh08
916												
1008.49(10)				40								
1017.14(2)	3^+	1	0.57	890	1568	1	0.04	4	84	2.32		69Da09
1052.08(2)	1^+	1	0.18	270	incl	1	0.07	0	21			69Da09
1154.2(14)	$\langle 6\rangle^-$	4	9.63	780	1250			5	10	28.0	188	69Da09
1158.09(4)	$\langle 2^+,3\rangle$				incl					incl		77Sh08
1212.52(2)	$1^+,2^+$	1	0.35	570	1240			2	6			69Da09
1247.15(2)	4^-	2+4	0.55+1.84	600+150	462			3	9	20.7		69Da09
1344.01(2)	1^+	1	0.85	280	309			0	10	1.74		69Da09
1432.2(9)	1^+	1	0.39	660	916			0+2	4			69Da09
1439.41(3)	$\langle 1^+$–$3^+\rangle$									5.40		77Sh08
1498						1,3	0.04					84Ca26
1547.39(4)	1^+–3^+	1	0.04	60	409	1	0.12					69Da09
1560.15(9)	X^+	1	0.05	98	incl							69Da09
1577.34(5)	1^+–3^+	1	0.11	195	incl							69Da09
1630(25)	$1^-,2^-$	0	0.002		68							69Da09
1678.00(3)	$1^+,2^+$	1	0.04	70	68			4+2	2.5			69Da09
1694.07(5)	$\langle 1\rangle^+$	1	0.03	46				0+2	2			69Da09
1713.20(6)	$\langle 1^+\rangle$	$\langle 1\rangle$	0.08	140				0+2	2			69Da09
1735.96(6)	$\langle 4,5\rangle^-$	4	3.10	270	233			$\langle 5\rangle$	4	7.67	73	69Da09
1745.89(4)	$\langle 1,2\rangle$											
1820.35(1)	1^+	1+3	0.05+0.19	106+23	199			0	19			69Da09
1879(7)										0.89		77Sh08
1894(8)	$1^-,2^-$	0	0.005	45					2			69Da09
1911.31(8)												
1927.19(5)	$1^+,2^+$	1	0.07	130	214			4	3			69Da09
1971.18(5)	2^-	0+2	0.03+0.10	320+120	317			$\langle 3\rangle$	2	1.48		69Da09
2018.36(3)	1^+–3^+	1+3	0.08+0.18	135+23	177			2	12			69Da09
2023.32(2)	$\langle 1,2\rangle$											
2124.09(10)	2^-	0+4	0.02+1.63	250+150	757	4	0.10		2.5	1.41		69Da09
2163.12(9)	X^-	2	0.39	500	423				3			69Da09
2166.01(7)	X^+			weak							103	
2195(9)		2	0.04	55	805	1+3	0.04+0.1	0+2	2		incl	69Da09
2260.66(9)		2	0.35	450	274			4+2	9	1.90	incl	69Da09
2329(9)		2	0.46	600	1110	1+3	0.01+0.1					69Da09
2347(7)										3.38		77Sh08
2363.63(6)		2	0.28	360	incl			4	5.5			69Da09
2394.93(11)		1+3	0.03+0.55	160+80	incl			$\langle 1\rangle$	4			69Da09
2449.19(16)		2	0.41	550	505			0	7			69Da09
2453.05(5)	$\langle 1^+$–$3^+\rangle$											
2503.00(9)	$\langle 2^+,3^+\rangle$	$\langle 1\rangle$	0.04	80				$\langle 2\rangle$	2.5			69Da09
2520.77(13)	2^-–4^-	2	0.12	150	≈100							69Da09

(continued) **$^{66}_{29}$Cu**

E^* [keV]	J^π	L (d,p)	$(2J+1)C^2S$ (d,p)	σ (d,p) μb/sr	σ (d,p) μb/sr	L (t,α)	C^2S (t,α)	L (d,α)	σ (d,α) μb/sr	σ (t,τ) *rel.*	I_d (α,d)	Ref.
2537(10)	0^+,1^+							0	3			69Da09
2560.43(16)	2^-	0	0.008	100								69Da09
2567(10)	$\langle 5\rangle^+$							6	50			69Da09
2586.27(4)		0	0.057	700	702	3	0.15					69Da09
2597.49(6)												
2608.50(11)		0	0.028	340				0	3			69Da09
2629.29(9)	3^+,4^+			weak				4	4			69Da09
2644(11)	$\langle 1,2\rangle^-$	2	0.08	157+115	711							69Da09
2664.44(6)	1^-,2^-	0	0.057	730	incl							69Da09
2681.16(4)	1^+	$\langle 1\rangle$	0.04	80				0+2	15			69Da09
2688.22(8)	$\langle 1^+\rangle$											
2707(11)	3^+–5^+					3	0.51	4	17			84Ca26
2739.16(7)	2^-–4^-	2	0.34	480	471			3	10			69Da09
2767.86(12)	$\langle 1\rangle^+$							0	5			69Da09
2799.85(7)	$\langle 2\rangle^-$	0	0.006	75+13				0+2	2			69Da09
2813.84(9)	1^-,2^-	0	0.008	100								69Da09
2844.72(10)	1^-,2^-	0	0.008	110								69Da09
2867.69(7)	0^+,1^+	$\langle 0\rangle$	0.004	75	160			0	9			67Hj02
2903(12)	$\langle 3\rangle^+$	$\langle 1\rangle$	0.03	62				4	13			69Da09
2943.33(14)	$\langle 1^-,2^-\rangle$	0+2	0.02+0.05	230+70	166							69Da09
2948.76(8)	$\langle 1^-,2^-\rangle$											
2953.35(9)	$\langle 1,2\rangle^-$	2	0.05	70								69Da09
2987.96(21)		$\langle 2\rangle$	0.03	45				$\langle 6\rangle$	2			69Da09
3010.18(10)	3^+–5^+	$\langle 3\rangle$	0.77	135				4	17			69Da09
3026.09(6)	$\langle 1^-,2^-\rangle$	[0]			1365							67Hj02
3045.95(13)	$\langle 1^-,2^-\rangle$	0+2	0.05+0.19	620+280								69Da09
3048.82(11)												
3077.29(12)	$\langle 1^-,2^-\rangle$	0+2	0.07+0.16	850+230	570							69Da09
3091.37(6)	$\langle 1^-,2^-\rangle$											
3099.08(8)	$\langle 2^+$–$4^+\rangle$										85	
3110.86(6)											incl	
3141.74(15)												
3151.97(9)		$\langle 2\rangle$	0.495		768							67Hj02
3165.77(7)	$\langle 1$–$3\rangle^+$		incl			3	0.56					84Ca26
3208.95(8)												
3247.83(8)					342							
3287.36(9)	X^+					3	0.33				73	84Ca26
3333.77(5)	X^+	$\langle 1\rangle$	0.312		1065	3	0.18				incl	67Hj02
3342.06(11)					incl							
3371.23(9)												
3397.63(11)					87							
3432.37(13)												
3479.48(12)												
3487.05(10)	$\langle 2^+,3^+\rangle$											
3508.84(11)	$\langle 2^+$–$4^+\rangle$				352							

(continued) **$^{66}_{29}$Cu**

E^* [keV]	J^π	L	$(2J+1)C^2S$ (d,p)	σ (d,p) μb/sr	σ (d,p) μb/sr	L (t,α)	C^2S (t,α)	L (d,α)	σ (d,α) μb/sr	σ (t,τ) *rel.*	I_d (α,d)	Ref.
3535.49(7)					incl							
3559(8)		2	0.371		605	3	0.39					67Hj02
3583.53(12)												
3601.00(6)												
3636.56(7)	1^-,2^-	0+2	0.02+0.11		955+181							67Hj02
3672												
3705.08(11)	2^-–4^-	2	0.272		455							67Hj02
3710(30)	$\langle 9^+ \rangle$										303	94Fi01
3750.30(8)					597							
3780.19(10)												
3814.66(10)	1^-,2^-	0+2	0.02+0.11		607+189							67Hj02
3875												
3890(30)	$\langle 7^+ \rangle$										152	94Fi01
3896.38(8)	$\langle 2^- \rangle$	$\langle 0 \rangle$	0.044		1830							67Hj02
3934.58(15)	$\langle 1^-,2^- \rangle$	0+2	0.02+0.24		784+405							67Hj02
4013.69(12)	$\langle 1^+$–$3^+ \rangle$											
4056.98(8)	$\langle 1,2 \rangle^-$	2	0.2		358							67Hj02
4080												
4116.41(10)		[0]	0.042		1730							
4180(30)	$\langle 7^+ \rangle$											
4250(25)	$\langle 1,2 \rangle^-$	2	0.304		565							67Hj02
4300.2(3)												
4462.70(10)	$\langle 1,2 \rangle^-$	2	0.385		730							67Hj02
4527.91(9)	$\langle 1,2 \rangle^-$	2	0.366		695							67Hj02
4850.76(8)												
5077.21(8)												
			98Bh02	69Da09	67Hj02		84Ca26		69Da09	77Sh08	94Fi01	Ref.

Additional data on this isotope can be found in [94Fi01].

Average values S_N from the(d,p) reaction with L=1 transfer are given; for L=2,3 and 4 transfers $d_{5/2}$, $f_{5/2}$ and $g_{9/2}$ states are assumed, respectively [98Bh02]. I_d is an approximate yield of deuterons from (α,d) reaction at 20° in units counts per channel [94Fi01].

Cross section of (t,τ) reaction was measured by the ^{3}He yield at 30° [77Sh08]. Data for this isotope were considered in vol. LB I/18A.

Energy levels and branching ratios [98Bh02]. Part 2 **$^{66}_{29}$Cu**

E^*	J^π	$T_{1/2}$ or	Ref.	Branching ratios in percentage								
				E_f^*:	0.0	185.9	238	275	386	465	591	730	822.7
[keV]		Γ_{cm}		J_f^π:	1^+	2^+		3^+	$\langle 1^+ \rangle$	2^+	4^+	3^+	2^+
0.0	1^+	5.12(1) m	69Da09										
185.95(2)	2^+		69Da09		100								
237.82(1)					100								
275.03(2)	3^+		69Da09		1.4(2)	98.6(2)							
385.78(1)	$\langle 1^+ \rangle$		69Da09		96.9(4)	3.1(4)							
465.16(1)	2^+		69Da09		94.9(5)	1.5(3)		3.6(4)					
590.75(2)	4^+		69Da09					100					
679			84Ca26										
729.82(2)	3^+		69Da09			91(4)		9(4)					
822.69(1)	2^+		69Da09		60(1)	4.4(2)			28(1)	7.3(5)			
884(7)			77Sh08										
916													
1008.49(10)									100				
1017.14(2)	3^+		69Da09			60(1)				10.8(5)	12.4(6)		16.9(15)
1052.08(2)	1^+		69Da09		64(1)		25(1)			10.7(6)			
1154.2(14)	$\langle 6 \rangle^-$	600(20) ns	69Da09								100		
1158.09(4)	$\langle 2^+,3 \rangle$		77Sh08					47(2)			21(2)		32(3)
1212.52(2)	$1^+,2^+$		69Da09		61.0(9)			39(1)					
1247.15(2)	4^-		69Da09					100					
1344.01(2)	1^+		69Da09		2.4(13)				26(2)	72(2)			
1432.2(9)	1^+		69Da09										
1439.41(3)	$\langle 1^+–3^+ \rangle$		77Sh08		95.1(7)								
1498			84Ca26										
1547.39(4)	$1^+–3^+$		69Da09					50(2)	8.8(9)		42(2)		
1560.15(9)	X^+		69Da09				87(7)						
1577.34(5)	$1^+–3^+$		69Da09									100	
1630(25)	$1^-,2^-$		69Da09										
1678.00(3)	$1^+,2^+$		69Da09		53(2)							26(1)	
1694.07(5)	$\langle 1 \rangle^+$		69Da09										
1713.20(6)	$\langle 1^+ \rangle$		69Da09									64(3)	
1735.96(6)	$\langle 4,5 \rangle^-$		69Da09									100	
1745.89(4)	$\langle 1,2 \rangle$				15(2)	75(2)		10(1)					
1820.35(1)	1^+		69Da09		12.8(7)		22(1)			31(1)			20.2(5)
1879(7)			77Sh08										
1894(8)	$1^-,2^-$		69Da09										
1911.31(8)												22(5)	78(5)
1927.19(5)	$1^+,2^+$		69Da09									86(2)	
1971.18(5)	2^-		69Da09										
2018.36(3)	$1^+–3^+$		69Da09			34(2)		64(2)				2.1(4)	
2023.32(2)	$\langle 1,2 \rangle$					13.5(10)		11(3)	45(3)	8(3)		7.6(6)	
2124.09(10)	2^-		69Da09		48(5)			52(5)					
2163.12(9)	X^-		69Da09		100								
2166.01(7)	X^+					100							
2195(9)			69Da09										
2260.66(9)			69Da09					64(6)	23(3)				

(continued) **$^{66}_{29}$Cu**

E^*	J^π	$T_{1/2}$ or	Ref.	Branching ratios in percentage								
				E_f^*:	0.0	185.9	238	275	386	465	591	730	822.7
[keV]		Γ_{cm}		J_f^π:	1^+	2^+		3^+	$\langle 1^+ \rangle$	2^+	4^+	3^+	2^+
2329(9)			69Da09										
2347(7)			77Sh08										
2363.63(6)			69Da09									100	
2394.93(11)			69Da09					100					
2449.19(16)			69Da09		100								
2453.05(5)	$\langle 1^+–3^+ \rangle$							35(3)				35(3)	
2503.00(9)	$\langle 2^+,3^+ \rangle$		69Da09								49(5)		
2520.77(13)	$2^–4^–$		69Da09								100		
2537(10)	$0^+,1^+$		69Da09										
2560.43(16)	$2^–$		69Da09		34(8)								
2567(10)	$\langle 5 \rangle^+$		69Da09										
2586.27(4)			69Da09			14.1(24)							
2597.49(6)						49(3)							
2608.50(11)			69Da09		100								
2629.29(9)	$3^+,4^+$		69Da09										47(4)
2644(11)	$\langle 1,2 \rangle^–$		69Da09										
2664.44(6)	$1^–,2^–$		69Da09		32(2)			9.5(20)					
2681.16(4)	1^+		69Da09		20(1)								
2688.22(8)	$\langle 1^+ \rangle$				64(4)		36(4)						
2707(11)	$3^+–5^+$		84Ca26										
2739.16(7)	$2^–4^–$		69Da09			35(4)							
2767.86(12)	$\langle 1 \rangle^+$		69Da09										65(10)
2799.85(7)	$\langle 2 \rangle^–$		69Da09			15(5)							
2813.84(9)	$1^–,2^–$		69Da09										
2844.72(10)	$1^–,2^–$		69Da09					53(4)				47(4)	
2867.69(7)	$0^+,1^+$		67Hj02				76(3)			24(3)			
2903(12)	$\langle 3 \rangle^+$		69Da09										
2943.33(14)	$\langle 1^–,2^– \rangle$		69Da09			61(9)			39(9)				
2948.76(8)	$\langle 1^–,2^– \rangle$							44(3)					
2953.35(9)	$\langle 1,2 \rangle^–$		69Da09		37(4)					27(5)			12.7(20)
2987.96(21)			69Da09		46(9)								
3010.18(10)	$3^+–5^+$		69Da09			32(7)				22(6)			
3026.09(6)	$\langle 1^–,2^– \rangle$		67Hj02		67(2)								
3045.95(13)	$\langle 1^–,2^– \rangle$		69Da09					26(10)				74(10)	
3048.82(11)						100							
3077.29(12)	$\langle 1^–,2^– \rangle$		69Da09			21(4)				44(6)			14(7)
3091.37(6)	$\langle 1^–,2^– \rangle$				21(3)								
3099.08(8)	$\langle 2^+–4^+ \rangle$					36(5)			22(6)		26(8)		
3110.86(6)					19(4)								
3141.74(15)								100					
3151.97(9)			67Hj02					52(4)					
3165.77(7)	$\langle 1–3 \rangle^+$		84Ca26		20(2)					67(3)		13(3)	
3208.95(8)					26(4)								
3247.83(8)													
3287.36(9)	X^+		84Ca26						14(2)	86(2)			

(continued) **$^{66}_{29}$Cu**

E^*	J^π	$T_{1/2}$ or	Ref.	Branching ratios in percentage								
				E_f^*:	0.0	185.9	238	275	386	465	591	730	822.7
[keV]		Γ_{cm}		J_f^π:	1^+	2^+		3^+	$\langle 1^+ \rangle$	2^+	4^+	3^+	2^+
3333.77(5)	X^+		67Hj02										
3342.06(11)								100					
3371.23(9)												34(4)	
3397.63(11)								44(8)			56(8)		
3432.37(13)													
3479.48(12)							60(6)						
3487.05(10)	$\langle 2^+,3^+ \rangle$				13(3)					36(4)	14(3)		
3508.84(11)	$\langle 2^+–4^+ \rangle$					9(3)	70(5)				8(2)		
3535.49(7)													
3559(8)			67Hj02										
3583.53(12)								20(5)					
3601.00(6)												11(3)	
3636.56(7)	$1^-,2^-$		67Hj02			8.3(13)					20(2)		
3672													
3705.08(11)	$2^–4^-$		67Hj02										
3710(30)	$\langle 9^+ \rangle$		94Fi01										
3750.30(8)						19(3)							
3780.19(10)													
3814.66(10)	$1^-,2^-$		67Hj02		11(2)					19(2)			21(4)
3875													
3890(30)	$\langle 7^+ \rangle$		94Fi01										
3896.38(8)	$\langle 2^- \rangle$		67Hj02		15(2)								
3934.58(15)	$\langle 1^-,2^- \rangle$		67Hj02						55(5)				
4013.69(12)	$\langle 1^+–3^+ \rangle$								25(3)				
4056.98(8)	$\langle 1,2 \rangle^-$		67Hj02			52.4(18)		34.4(19)					
4080													
4116.41(10)													83(3)
4180(30)	$\langle 7^+ \rangle$												
4250(25)	$\langle 1,2 \rangle^-$		67Hj02										
4300.2(3)								29(8)		23(6)			48(8)
4462.70(10)	$\langle 1,2 \rangle^-$		67Hj02			100							
4527.91(9)	$\langle 1,2 \rangle^-$		67Hj02										
4850.76(8)													
5077.21(8)													
			Ref.										

Energy levels and branching ratios [98Bh02]. Part 3

$^{66}_{29}$Cu

E^*	J^π	Branching ratios in percentage									
	E_f^*:	1008.5	1017.1	1052.1	1158.1	1212.5	1247.2	1344.0	1439.4	1547.4	1560.2
[keV]	J_f^π:		3^+	1^+	$\langle 2^+,3\rangle$	$1^+,2^+$	4^-	1^+			X^+
1439.41(3)	$\langle 1^+–3^+\rangle$		4.9(7)								
1560.15(9)	X^+							13(7)			
1678.00(3)	$1^+,2^+$							11.0(17)			
1694.07(5)	$\langle 1\rangle^+$					100					
1713.20(6)	$\langle 1^+\rangle$			36(3)							
1820.35(1)	1^+			13.8(4)							
1927.19(5)	$1^+,2^+$		5.2(10)			8.7(16)					
1971.18(5)	2^-					24.1(17)	75.9(17)				
2023.32(2)	$\langle 1,2\rangle$					4.9(7)		3.14(25)	3.9(4)		
2260.66(9)				13(7)							
2503.00(9)	$\langle 2^+,3^+\rangle$			51(5)							
2560.43(16)	2^-						66(8)				
2586.27(4)					68.3(23)				18(1)		
2597.49(6)								25.1(20)			
2629.29(9)	$3^+,4^+$									53(4)	
2664.44(6)	$1^-,2^-$		37(2)		21.4(17)						
2681.16(4)	1^+			7.6(13)	2.3(6)	22.0(14)					
2739.16(7)	$2^-–4^-$							65(4)			
2767.86(12)	$\langle 1\rangle^+$									35(10)	
2799.85(7)	$\langle 2\rangle^-$						47(6)				
2813.84(9)	$1^-,2^-$			16(5)					62(4)		
2948.76(8)	$\langle 1^-,2^-\rangle$								24(2)	10(2)	
2953.35(9)	$\langle 1,2\rangle^-$			16.9(20)							
3010.18(10)	$3^+–5^+$							46(6)			
3077.29(12)	$\langle 1^-,2^-\rangle$		11.3(22)								
3091.37(6)	$\langle 1^-,2^-\rangle$			10.7(16)					69(3)		
3099.08(8)	$\langle 2^+–4^+\rangle$		16(4)								
3432.37(13)				83(4)							
3487.05(10)	$\langle 2^+,3^+\rangle$	28(6)									
3508.84(11)	$\langle 2^+–4^+\rangle$		13(5)								
3535.49(7)									22(5)		20(5)
3583.53(12)						24(6)			35(4)		
3636.56(7)	$1^-,2^-$		25(3)	8.0(18)		17.1(19)					
3705.08(11)	$2^-–4^-$						56(4)				
4013.69(12)	$\langle 1^+–3^+\rangle$		75(3)								
4527.91(9)	$\langle 1,2\rangle^-$										17(3)

Energy levels and branching ratios [98Bh02]. Part 4 **$^{66}_{29}$Cu**

E^*	J^π		Branching ratios in percentage									
		E_f^*:	1577.3	1678.0	1694.1	1713.2	1736.0	1745.9	1820.3	1911.3	1927.2	1971.2
[keV]		J_f^π:		$1^+,2^+$	$\langle 1\rangle^+$	$\langle 1^+\rangle$	$\langle 4,5\rangle^-$	$\langle 1,2\rangle$	1^+		$1^+,2^+$	2^-
1678.00(3)	$1^+,2^+$		10(3)									
2023.32(2)	$\langle 1,2\rangle$									3.0(6)		
2453.05(5)	$\langle 1^+–3^+\rangle$								29.7(19)			
2681.16(4)	1^+				22.1(8)				6.0(6)		19.8(8)	
2799.85(7)	$\langle 2\rangle^-$							38(6)				
2813.84(9)	$1^-,2^-$								22(3)			
2987.96(21)												54(9)
3026.09(6)	$\langle 1^-,2^-\rangle$							32.5(18)				
3110.86(6)												81(4)
3247.83(8)			100									
3487.05(10)	$\langle 2^+,3^+\rangle$											9(3)
3535.49(7)							15(3)					
3601.00(6)			66(4)					7.7(19)				
3636.56(7)	$1^-,2^-$							12.5(14)				
3750.30(8)								39(3)				
3814.66(10)	$1^-,2^-$											25.0(24)
3896.38(8)	$\langle 2^-\rangle$						18(3)					
4527.91(9)	$\langle 1,2\rangle^-$								18(3)			
4850.76(8)			6.3(22)	60.2(24)		24.5(19)						
5077.21(8)					28(4)							

Energy levels and branching ratios [98Bh02]. Part 5 **$^{66}_{29}$Cu**

E^*	J^π		Branching ratios in percentage									
		E_f^*:	2018.4	2023.3	2166.0	2363.6	2449.2	2520.8	2586.3	2597.5	2608.5	2629.3
[keV]		J_f^π:		$\langle 1,2\rangle$	X^+							$3^+,4^+$
2597.49(6)						26(4)						
2948.76(8)	$\langle 1^-,2^-\rangle$										22(3)	
3077.29(12)	$\langle 1^-,2^-\rangle$							9.3(21)				
3151.97(9)						48(4)						
3208.95(8)					74(4)							
3333.77(5)	X^+								76.3(19)			
3371.23(9)												66(4)
3432.37(13)				17(4)								
3636.56(7)	$1^-,2^-$							8.8(14)				
3705.08(11)	$2^-–4^-$			44(4)								
3750.30(8)			19.9(22)									8.9(23)
3780.19(10)						58(5)						
3896.38(8)	$\langle 2^-\rangle$									67(3)		
3934.58(15)	$\langle 1^-,2^-\rangle$		45(5)									
4056.98(8)	$\langle 1,2\rangle^-$						13.2(15)					

Energy levels and branching ratios [98Bh02]. Part 6

$^{66}_{29}$Cu

E^*	J^π	Branching ratios in percentage									
	E_f^*:	2664.4	2799.8	2813.8	3010.2	3045.9	3077.3	3099.1	3110.9	3397.6	3487.0
[keV]	J_f^π:	$1^-,2^-$	$\langle 2\rangle^-$	$1^-,2^-$		$\langle 1^-,2^-\rangle$	$\langle 1^-,2^-\rangle$				$\langle 2^+,3^+\rangle$
2953.35(9)	$\langle 1,2\rangle^-$	6.4(24)									
3333.77(5)	X^+		23.7(19)								
3479.48(12)				40(6)							
3535.49(7)							42(13)				
3583.53(12)						20(3)					
3601.00(6)											15(3)
3750.30(8)								13.5(16)			
3780.19(10)					42(5)						
3814.66(10)	$1^-,2^-$									23.4(22)	
4116.41(10)				17(3)							
4527.91(9)	$\langle 1,2\rangle^-$		65(4)								
4850.76(8)							9.0(16)				
5077.21(8)									44(3)		27(3)

Energy levels and branching ratios [91Bh06].

$^{67}_{29}$Cu

E^*	$2J^\pi$	L	C^2S	L	L	σ (t,p)	$T_{1/2}$ or	Ref.	Branching ratios in percentage		
									E_f^*:	0	1115.4
[keV]			(d,τ)	(α,p)	(t,p)	arb.u	Γ_{cm}		$2J_f^\pi$:	3^-	
0	3^-	1	1.9	1	0	41000	61.83(12) h	78Ze04			
1115.4(4)		3	0.3	1+3	$\langle 2\rangle$	720		78Ze04		100	
1170(20)		1	0.3	incl	$\langle 2\rangle$	95		78Ze04			
1640(20)		3	0.9	3	$\langle 2\rangle$	150		78Ze04			
1680(20)					$\langle 2\rangle$	740		66Bj02			
1937.1(4)	3^-				0	1970		66Bj02		58(9)	42(7)
2272(1)	$\langle 1^-,3^-\rangle$				$\langle 2\rangle$	1540		66Bj02		100	
2340		3	3.1					78Ze04			
2510(20)				4	$\langle 3\rangle$	270		66Bj02			
2623.1(10)	$\langle 1^-,3^-\rangle$				$\langle 2\rangle$	250		66Bj02		100	
2680.1(10)	3^-				$\langle 0\rangle$	3800		66Bj02		x	
2841.1(10)	$\langle 1^-,3^-\rangle$				$\langle 2\rangle$	360		66Bj02		100	
≈2930											
≈2940											
3000(20)						180		66Bj02			
3030(20)					$\langle 2\rangle$	550		66Bj02			
3090(20)	3^-				0	1130		66Bj02			
3130(20)						80		66Bj02			
≈4310						≈600		66Bj02			
			78Ze04	75Se14		66Bj02		Ref.			

Additional data on this isotope can be found in [01Ny01].
Uncertainties in E^* and $T_{1/2}$ are given in Supplement.

Energy levels and branching ratios [02Bu29]. **$^{68}_{29}$Cu**

E^*	J^π	σ (t,τ)	$T_{1/2}$ or	Ref.	Branching ratios in percentage			
					E_f^*:	0.0	84.6	610.5
[keV]		*rel.*	Γ_{cm}		J_f^π:	1^+	$\langle 2\rangle^+$	$\langle 3^-\rangle$
0.0	1^+	1.04	31.1(15) s	77Sh08				
84.6(4)	$\langle 2\rangle^+$	1.08		77Sh08		100		
610.5(6)	$\langle 3^-\rangle$	0.65		77Sh08		1.5(3)	99	
721.6(7)	$\langle 6^-\rangle$	12.8	3.75(5) m	77Sh08			35(5)	65(3)
772		13.8		77Sh08				
864		0.75		77Sh08				
950		19.0		77Sh08				
1042		2.94		77Sh08				
1145		3.03		77Sh08				
1350		4.61		77Sh08				
1586		0.50		77Sh08				
1631		0.60		77Sh08				
1723		1.91		77Sh08				
1829		0.62		77Sh08				
1870		1.41		77Sh08				
1908		0.84		77Sh08				
2014		0.43		77Sh08				
2098		1.73		77Sh08				
2211				77Sh08				
2364				77Sh08				
		77Sh08		Ref.				

Cross section of the (t,τ) reaction was measured by the ^{3}He yield at 30° [77Sh08].

Energy levels and branching ratios [00Bh05]. **$^{69}_{29}$Cu**

E^*	$2J^\pi$	L	C^2S	$T_{1/2}$ or	Ref.	Branching ratios in percentage					
						E_f^*:	0.0	1213.3	1710.8	1870.8	2181.4
[keV]			(d,τ)	Γ_{cm}		$2J_f^\pi$:	3^-		$\langle 7\rangle^-$	$\langle 7\rangle^-$	$\langle 9^-\rangle$
0.0	3^-	1	1.3	2.85(15) m	78Ze04						
1096(6)	1^-	1	0.46		78Ze04						
1213.3(4)		3	1.5		78Ze04		100				
1310											
1430											
1560											
1710.8(5)	$\langle 7\rangle^-$	3	2.7		78Ze04		100				
1870.8(4)	$\langle 7\rangle^-$	3	0.45		78Ze04		x	x			
2181.4	$\langle 9^-\rangle$								100		
2285.3(5)							5.0(21)		95(6)		
2550.4(4)							5.4(7)	1.0(5)		94(3)	
2551.8	$\langle 9^+\rangle$									100	
2667.3	$\langle 9^+\rangle$										100
2696.4(6)							4.3(8)	96(3)			

(continued) **$^{69}_{29}$Cu**

E^*	$2J^\pi$	L	C^2S	$T_{1/2}$ or	Ref.	Branching ratios in percentage				
					E_f^*:	0.0	1213.3	1710.8	1870.8	2181.4
[keV]			(d,τ)	Γ_{cm}	$2J_f^\pi$:	3^-		$\langle 7\rangle^-$	$\langle 7\rangle^-$	$\langle 9^-\rangle$
2741.8	$\langle 13^+\rangle$			0.36 μs						
2755.8(4)										
2799.5(5)										
2939.0(7)										
3000										
3300										
3340.3(7)										
3700										
3942.4(11)										
			78Ze04		Ref.					

Additional data on this isotope can be found in [02Ne07, 02Ge16, 00Is01, 97Is13].

Energy levels and branching ratios [00Bh05]. Part 2 **$^{69}_{29}$Cu**

E^*	$2J^\pi$			Branching ratios in percentage			
		E_f^*:	2285.3	2550.4	2551.8	2667.3	2755.8
[keV]		$2J_f^\pi$:			$\langle 9^+\rangle$	$\langle 9^+\rangle$	
2741.8	$\langle 13^+\rangle$				x	x	
2755.8(4)			32(1)	68(2)			
2799.5(5)				100			
2939.0(7)							100
3340.3(7)							100
3942.4(11)			100				

Energy levels [04Tu09, 93Bh01]. **$^{70}_{29}$Cu**

E^*	J^π	σ (t,τ)	$T_{1/2}$ or	Ref.
[keV]		*rel.*	Γ_{cm}	
0.0	1^+	8.08	4.5(10) s	77Sh08
100(6)		5.84		77Sh08
140(80)	3^-–5^-		47(5) s	
226(6)		6.50		77Sh08
366(6)		1.28		77Sh08
506(6)		2.85		77Sh08
		77Sh08		Ref.

Additional data on this isotope can be found in [04Va08].
Cross section of the (t,τ) reaction was measured by the ^{3}He yield at 30° [77Sh08].

Energy levels [93Bh02]. $^{71}_{29}$Cu

E^* [keV]	$2J^\pi$	$T_{1/2}$ or Γ_{cm}	Ref.
0.0	3^-	19.5(16) s	98Is11
534*	$\langle 5,7^- \rangle$		98Is11
1189	7^-		98Is11
1786	9^+		98Is11
2128	11^-		98Is11
2623	15^-		98Is11
2756	19^-		98Is11

* uncertain [98Is11]