Target isotope: $^{58}_{28}$Ni $I^{\pi}_{\circ} = 0^+$ *Abundance:* 68.077(9) % $Q_\alpha = 3369(10)$ keV

$^{62}_{30}$Zn(α)

$E_\circ$ [keV]	J^π	T	$E^*_{\rm analog}$ [keV]	$E_{\rm cm}$ [keV]	E^* [keV]	Ref.
6400				5990	9360	77Gr03
6780				6340	9710	77Gr03

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

Values $E_{\rm cm}$ and E^* are estimated from the mentioned in [77Gr03] maxima in the (α, p) yield.

Target isotope: $^{63}_{29}$Cu $I^{\pi}_{\circ} = 3/2^-$ *Abundance:* 69.17(3) % $S_{\rm p} = 7712.33(86)$ keV

$^{64}_{30}$Zn(p)

$E_\circ$ [keV]	J^π	T	$\Gamma_{\rm p}$ [keV]	Γ [keV]	$E^*_{\rm analog}$ [keV]	$S_{\rm pp}$	$E_{\rm cm}$ [keV]	$\omega\Gamma_\alpha\Gamma_{\rm p_\circ}/\Gamma$	E^* [keV]	Ref.
3217*	$\langle 3^- \rangle$				1546			0.03(1)	10879.1(9)	76Fo06
3251*	$\langle 3^- \rangle$				1589			0.04(1)	10912.5(9)	76Fo06

* Two pronounced resonance-like structures separated by 34 keV appear at these bombarding proton energies in the excitation function [76Fo06]. Their positions are in agreement with the calculated positions of the expected $g_{9/2}$ analogue resonances. Partial radiative widths of transitions to the low-lying levels were measured. They are given in the next Table.

Strengths $S_{\alpha\rm p}=\omega\Gamma_\alpha\Gamma_{\rm p_\circ}/\Gamma$ are measured in the reaction ^{60}Ni(α,p$_o$)^{63}Cu and correspond to maxima in the yield.

In [77Gr03] in the analogous reaction ^{58}Ni(α,p$_o$)^{61}Cu the α-strength concentration among a relatively small number of states of ^{62}Zn was observed as a maximum in the excitation function at α-particle bombarding energy $E_\circ$=6700 keV corresponding to the excitation of compound nucleus E^*=9590 keV.

Branching ratios of γ-transitions [76Fo06, 80Er08, 02Nu0A]. Part 1.

$^{64}_{30}$Zn(p)

E^* [keV]	J^π	$E_\circ$ [keV]	Branching ratios Percentage											Com.
			0 0^+	992 2^+	1800 2^+	1910 0^+	2308 4^+	2737 4^+	2794 2^+	2980 3^+	2999 3^-	3074 $\langle 3^- \rangle$	3199	E^*, keV $J^\pi_{\rm f}$
991.55(5)	2^+		1000(71)											
1799.35(5)	2^+		96(10)	288(21)										
1910.31(6)	0^+			34(3)										
2306.71(8)	4^+			140(10)										
2609.43(15)	0^+			22(2)										
2736.53(8)	4^+				50(4)		7(1)							
2793.8(3)	2^+			29(10)										

(continued) **$^{64}_{30}$Zn**(p)

E^* [keV]	J^π	$E_\circ$ [keV]	Branching ratios Percentage											Com.
			0 0^+	992 2^+	1800 2^+	1910 0^+	2308 4^+	2737 4^+	2794 2^+	2980 3^+	2999 3^-	3074 $\langle 3^- \rangle$	3199	E^*, keV J^π_f
2979.79(9)	3^+			23(2)	27(2)									
2998.38(18)	3^-			47(4)										
3005.69(13)	2^+		13(2)	18(2)	14(1)									
3071.2(7)	$\langle 1,2^+ \rangle$													
3077.77(11)	$\langle 4^+ \rangle$			17(1)			12(1)	4(1)						
3094.58(15)	$3^+,2^+$			29(2)	x									
3186.78(10)	1^+			13(1)	11(1)	8(1)								
3196.8(4)	$\langle 2,3 \rangle$			4(1)	5(1)									
3205.91(10)	$\langle 3 \rangle^+$				34(3)	x	4(1)							
3240(20)	$\langle 0^+ \rangle$													
3261.99(10)	1			15(1)	x									
3285														
3297.18(15)	$\langle 2 \rangle^+$			24(2)										
3306.85(17)	$\langle 4^+ \rangle$						18(2)							
3321.8(12)	$\langle 1 \rangle$													
3365.95(7)	1^+		16(2)	7(1)	4(1)	2(1)								
3369.82(14)	3^+			8(2)	16(1)			4(1)						
3415														
3425.15(11)	1^+		21(2)		15(1)									
3452.3(10)	$\langle 1,2^+ \rangle$													
3458.52(17)	$\langle 2,3 \rangle$			13(1)	9(1)									
3547.0(2)	$\langle \leq 3 \rangle$				$\langle 21 \rangle$									
3552.3(3)	4^+													
3587(2)														
3597.2(2)	$\langle 2–4 \rangle$						7(1)	4(1)						
3701.4(4)	1^-		18(2)											
3718.4(3)				15(2)										
3795.25(18)	1^+				7(1)									
3819.6(2)					$\langle 10 \rangle$									
3853.3(2)	5^+							7(1)						
3898.5(4)	$2^+,3,4^+$			15(2)				3(1)						
4020.4(4)	$\langle 2^+,3^+ \rangle$			5(1)				5(1)						
10879.1(9)	$\langle 3^- \rangle$	3217	$\langle 1 \rangle$	19	9		5	8	9	5	14	6	5	
			4	46	23		11	19	23	12	34	15	12	Γ^i_γ, meV

(continued) **$^{64}_{30}$Zn(p)**

E^* [keV]	J^π	$E_\circ$ [keV]	Branching ratios Percentage											Com.
			0	992	1800	1910	2308	2737	2794	2980	2999	3074	3199	E^*, keV
			0^+	2^+	2^+	0^+	4^+	4^+	2^+	3^+	3^-	$\langle 3^-\rangle$		J^π_f
10912.5(9)	$\langle 3^-\rangle$	3251	$\langle 1\rangle$	26	10		4	3	5	3	15	5	4	
			6	92	36		13	11	19	9	54	17	13	Γ^i_γ, meV

Additional data on this isotope can be found in [86Sz04, 80Er08, 02Nu0A].

γ-ray spectra following (p,γ) reaction with the proton energy about 2 MeV were used to study transitions between the low-lying levels; relative intensities given in the table are normalized by I_γ=1000 for E_γ=991 keV.

Branching ratios from the resonances at $E_\circ$=3217 keV and 3251 keV [76Fo06] are presented at the bottom of the table.

Partial radiative widths [76Fo06] are given in the second line after the branching ratios.

Branching ratios of γ-transitions [76Fo06]. Part 2. **$^{64}_{30}$Zn(p)**

E^* [keV]	J^π	$E_\circ$ [keV]	Branching ratios Percentage											Com.
			3285	3360	3415	3681	3760	3845	3854	4154	4305	4365	4684	E^*, keV
														J^π_f
10879.1(9)	$\langle 3^-\rangle$	3217		2	4	3	2			3	5			
				6	11	7	4			7	12			Γ^i_γ, meV
10912.5(9)	$\langle 3^-\rangle$	3251	3					3	3	5	4	3	2	
			11					12	11	15	12	13	7	Γ^i_γ, meV

Partial radiative widths [76Fo06] are given in the second line after the branching ratios.

Target isotope: $^{65}_{29}$Cu $I^\pi_\circ = 3/2^-$ *Abundance:* 30.83(3) % $S_p = 8925.5(12)$ keV **$^{66}_{30}$Zn(p)**

$E_\circ$ [keV]	J^π	T	Γ_p [keV]	Γ [keV]	E^*_{analog} [keV]	S_{pp}	E_{cm} [keV]	E^* [keV]	Ref.	
2506(10)							2468	11394	67Co04	80Er08
2523(10)							2485	11410	67Co04	
2569(10)				30(5)			2530	11456	67Co04	doublt
2627(10)				15(5)			2587	11513	67Co04	
2707(10)				30(5)			2666	11592	67Co04	doublt
2769(10)				12(5)	272		2727	11653	67Co04	
2814(10)				17(5)			2771	11697	67Co04	

(continued) **$^{66}_{30}$Zn(p)**

$E_\circ$ [keV]	J^π	T	Γ_p [keV]	Γ [keV]	E^*_{analog} [keV]	S_{pp}	E_{cm} [keV]	E^* [keV]	Ref.		
2875(10)	[2$^+$]		0.60	20(5)	383		2831	11757	67Co04	83Sa15	66Ha16
2960(10)	[2$^+$]		0.88	26(5)	462		2915	11841	67Co04	83Sa15	66Ha16
3035(10)				25(5)			2989	11915	67Co04		
3318(10)							⟨3268⟩	12193	67Co04		
3334(10)	[2$^+$]		0.96	21(5)	819		3283	12209	67Co04	83Sa15	66Ha16
3418(10)				14(5)			3366	12292	67Co04		
3450(10)				17(5)			3398	12323	67Co04		
3533(10)	[1$^+$]		1.14	16(5)	1015		3479	12405	67Co04	83Sa15	66Ha16
3560(10)	[2$^+$]		1.52	18(1)	1051		3506	12432	66Ha16		
3681(10)					1152		3625	12551	67Co04		
3731(10)	[2$^+$]		2.80	30(1)	1209		3674	12600	67Co04	83Sa15	66Ha16
3782(10)					1247		3725	12650	67Co04		
3819(10)				13(5)			3761	12687	67Co04		
3849(10)	[1$^+$]			15(5)	1339		3788	12716	67Co04	83Sa15	
3928(10)	[1$^+$]						3868	12794	83Sa15		

In the neighbour nucleus ^{64}Zn the pronounced resonance structures were observed at the proton bombarding energies $E_\circ$=3217 and 3251 keV [76Fo06].
Excitations of 22 levels of ^{64}Zn from the (p,n$_o$)-reaction are given in [75Le03].

Branching ratios of γ-transitions [80Er08, 02Nu0A]. **$^{66}_{30}$Zn(p)**

E^* [keV]	J^π	Branching ratios Percentage									Com.
		0.0 0$^+$	1039 2$^+$	1873 2$^+$	2372 0$^+$	2451 4$^+$	2765 4$^+$	2780 2$^+$	2827 3$^-$	3078 4$^+$	E^*, keV J^π_f
1039.237(3)	2$^+$	1000(75)									
1872.781(3)	2$^+$		368(27)								
2372.373(4)	0$^+$		18(1)								
2451.01(5)	4$^+$		118(9)								
2703.6(4)	⟨3⟩		7(1)	99(11)							
2762.8(6)	⟨2⟩										
2765.56(7)	4$^+$		22(2)	28(2)		6(1)					
2780.182(7)	2$^+$	39(3)	11(1)	7(1)		2(1)					
2826.73(5)	3$^-$		50(4)	6(1)							
2938.101(5)	2$^+$		42(3)								
3030	⟨0$^+$⟩										
3077.73(23)	4$^+$			8(1)		27(2)	2(1)				
3105.064(5)	0$^+$		2(1)	9(1)							
3212.610(9)	2$^+$		32(2)								
3226.2(11)											

(continued) **$^{66}_{30}$Zn**(p)

E^* [keV]	J^π	Branching ratios Percentage									Com.
		0.0 0^+	1039 2^+	1873 2^+	2372 0^+	2451 4^+	2765 4^+	2780 2^+	2827 3^-	3078 4^+	E^*, keV J^π_f
3228.909(4)	1^+	⟨x⟩	17(1)	2(1)							
3241.2(11)											
3331.469(6)	2^+		4(1)	24(2)							
3380.975(5)	$1^{(-)}$	18(2)		8(1)							
3427.435(18)	$1,2^-$			⟨x⟩							
3432.438(5)	$1^{(-)}$	12(1)	12(1)								
3507.280(23)	2^+		15(1)								
3523.6(8)							8(1)				
3531.726(14)	0^+		5(1)								
3576.404(23)	4^+		7(1)	6(1)				3(1)			
3670.73(5)	2^+		9(1)	5(1)		5(1)					
3689.01(16)	1^+–3^+			⟨11⟩							
3709.4(3)	⟨5⟩						4(1)				
3725.3(5)											
3731.6(5)							6(1)				
3738.239(21)	1	14(1)									
3738.24(4)	$\langle 4^+ \rangle$										
3747.03(19)	5^-					6(1)				2(1)	
3753.05(4)	4^+		⟨x⟩								
3791.154(4)	1^+		11(1)								
3806.4(10)											
3824.9(3)	0										
3874(5)											
3882.457(10)	⟨2⟩			5(1)							
3898.3(6)	5^-								2(1)		
3924.71(20)			8(1)		⟨x⟩						
4019.2(15)	2^+							4(1)			
4075.7(3)	$\langle 6^- \rangle$										
4081.0(15)											
4086.012(5)	1	10(1)									
4108.5(10)											
4119.0(5)	$\langle 1^- \rangle$		5(1)								

γ-ray spectra following (p,γ) reaction with the proton energy about 2 MeV were used to study transitions between the low-lying levels; relative intensities given in the table are normalized by I_γ=1000 for E_γ=1039 keV.