

The $^{63}\text{Cu}(\vec{p}, \alpha)^{60}\text{Ni}$ Reaction at 23 MeV

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As shown in our previous studies concerning the Z=40, Z=50 and Z=82 regions [1], the homology concept allows for the (\vec{p}, α) reactions on odd mass target nuclei to single out a dominant transition amplitude and, consequently, to identify spin, parity, and configuration. In this work we have studied the $^{63}\text{Cu}(\vec{p}, \alpha)^{60}\text{Ni}$ reaction in order to identify multiplets of ^{60}Ni states which are homologous to the lowest energy states of ^{59}Co (parent states). Angular distributions of cross sections and asymmetries for $^{62}\text{Ni}(\vec{p}, \alpha)^{59}\text{Co}$ were measured previously under the same experimental conditions [2].

The $^{63}\text{Cu}(\vec{p}, \alpha)^{60}\text{Ni}$ reaction has been measured at 23 MeV incident proton energy using a polarized (50%)

proton beam with an intensity up to 0.8 μA on target. An isotopically enriched target with 99.9% enrichment and 50 $\mu\text{g}/\text{cm}^2$ thickness was evaporated on a 5 μg carbon backing. The reaction products were analyzed with the Q3D magnetic spectrograph and identified by the focal plane detector with cathode strip readout [3].

In table 1 the ^{60}Ni levels observed in this work are compared with the NDS compilation [4].

References

- [1] P. Guazzoni *et al.*, Phys. Rev. **C72** (2005) 044604 and references therein.
- [2] P. Guazzoni *et al.*, this report, p. 8.
- [3] H.F. Wirth *et al.*, Annual report 2000, p. 71
- [4] J.K. Tuli, Nuclear Data Sheets **100** (2003) 347

Table 1: Levels of ^{60}Ni

Adopted E_{exc} keV	Present experiment E_{exc} MeV						
0.0	0.0	4399.4		5396	5.395		6.422
1332.518	1.333	4407.45	4.407	5410		6431	
2158.64	2.158	4450		5428	5.421	6460.9	6.461
2284.87	2.284		4.488	5448.7	5.448	6468	
2505.766	2.506	4493.44		5474	5.470	6492	
2626.08	2.627	4535.7		5529.9	5.530		6.508
3119.70	3.120	4548.8		5615		6516	
3124.02		4579.1	4.580	5642			6.527
3186.02	3.186	4613		5650	5.649	6551	
3194.02	3.194	4760.5		5662.9	5.662	6568	6.564
3269.38	3.269	4768		5713		6584	6.584
3318.7	3.318	4781		5741	5.739	6610	6.604
3381		4800.0		5780.5	5.781	6623	6.618
3393.5	3.394	4844.2	4.845	5785.1			6.636
3588.1	3.587	4849.0		5799.3		6652	
3619.55	3.619	4859		5824	5.824	6658	
3622.9		4891		5848		6673	6.674
3670.71	3.671	4932		5863	5.865	6687	6.694
3702		4958	4.951	5900	5.897	6708	
3730.67	3.730	4970	4.971	5921	5.924	6728	
3736.1		4985.72	4.985		5.935	6753	6.757
3875.0		5015.1		5946		6765	
	3.869	5048.3	5.047	5973		6791	6.784
3887.8		5069	5.065	5992	5.994		6.801
3895		5090		6028		6810.4	
3925.8	3.926	5106	5.102	6054	6.053		6.823
4007.9		5110		6071	6.068	6832	
	4.011	5120		6121	6.114	6836.7	
4020.45		5133		6142	6.139	6859	
4035		5148.7	5.148	6181	6.179		6.869
4039.67	4.039	5174		6192		6892	
4078.54	4.078	5188		6239	6.238		6.915
4116	4.115	5205			6.266	6951	6.945
4165.41	4.164	5244		6275		7000	6.994
4191	4.186		5.258		6.282		7.012
4265.13		5264		6292			7.030
4294.5		5293		6331		7056	
4300		5307	5.307		6.344		7.066
4319.0	4.319	5317.8		6362			7.085
4334.7		5348.9		6380	6.379	7103	
4341		5379.1			6.395	7110	7.110
4355.7	4.357		5.385	6403			