

Isochronous Mass Measurement of the neutron-deficient Copper Isotope: Extract the Proton-Neutron Interaction Strength around Doubly Magic ^{56}Ni

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Nuclear mass is one of the fundamental quantity of a nucleus, and the total binding energy, which can be calculated through masses, reflects all the interactions among the nucleons. Recently, isochronous mass spectrometry has been applied consecutively to neutron-deficient ^{78}Kr and ^{58}Ni projectile fragments at the HIRFL-CSR facility in Lanzhou, China. The newly determined mass excesses of ^{55}Cu and ^{56}Cu allow us to investigate the proton-neutron interaction strength of the odd-odd nuclei around the doubly magic ^{56}Ni . A dramatic variation of the $p - n$ interaction strength for Copper isotopes has been found when crossing the $Z = N = 28$ shell closure, which can be empirically explained by the overlap of the wave functions of the last valence neutron and proton.