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Structure of 68Ni: new insights from two-neutron transfer on 66Ni

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The region around the nucleus 68Ni, with a shell closure at Z = 28 and a sub-shell closure at N = 40, is the source of considerable interest in nuclear-structure studies. Despite a significant set of experimental and theoretical information available on 68Ni [1, 2, 3, 4, 5], the origin of its structure is still being questioned. A recent clarification of the energy and spin assignment of several low-lying 0+ and 2+ states [6, 7, 8, 9] and state-of-the-art shell model calculations [10] hinted to the possibility of triple shape coexistence and highlighted the need of additional experimental investigation.

To better understand the structure of 68Ni, we performed a two-neutron transfer experiment on 66Ni at 2.85 MeV/u at ISOLDE, CERN. This 66Ni(t,p)68Ni reaction with a radioactive beam and target represents a unique tool to probe the nature of 0+ states in 68Ni. Coincidences between the outgoing light charged particles and γ-rays were detected using the combined MINIBALL [11] gamma-ray spectrometer and the T-REX particle detection array [12]. Results of such coincidence analysis together with the reconstruction of angular distributions of the reaction products, revealing the most populated states, will be presented. An interpretation based on calculations within the Distorted-Wave Born Approximation (DWBA) and shell model two-nucleon amplitudes will be discussed.

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