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Intermediate-energy Coulomb excitation of 72Ni

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Transition strengths in the Ni isotopes between N=40 and N=50 have been recently subject of extensive experimental and theoretical investigations [1-6], aiming to understand whether the tensor force acts to reduce the Z=28 shell closure as the neutron g 9/2 orbit is filled towards 78 Ni. The effect of the Z=28 shell gap quenching and its evolution from 68 Ni towards 78 Ni would be reflected as an enhancement in the quadrupole transition strengths, compared with the seniority scheme predictions for the neutron g 9/2 subshell. In 70 Ni, the large B(E2) value for the first 2 + excited state obtained by Coulomb excitation [1] was interpreted as an evidence of a large neutron-induced polarization of the proton core [1]. Later, this interpretation was reinforced with an inelastic proton scattering experiment on 74 Ni [2], in which a large deformation parameter was found, pointing to an enhanced quadrupole collectivity.
However, a much lower B(E2) value has been deduced for 74 Ni in a Coulomb excitation experiment [3]. In that work, both experimental and shell-model calculations using the residual LNPS interaction, restore the normal core polarization picture in the neutron rich Ni isotopic chain and suggests that the B(E2) strength predominantly corresponds to neutron excitations.
The known experimental transition strengths by Coulomb excitation are constrained so far to and 74 Ni, while it is still unknown for 72 Ni.
70
Ni
We report on preliminary results from the Coulomb excitation of 72 Ni performed at the Radioactive Isotope Beam Factory at RIKEN. The BigRIPS fragment separator [7] was used to select and purify a secondary beam of 72 Ni at 183 MeV/u. Coulomb excitation of 72 Ni was produced by impinging the beam on a 950 mg/cm 2 Au target. In order to identify the reaction products after the target, the ZeroDegree spectrometer [7] was used, while the gamma rays were detected with the DALI2 array consisted of 186 NaI(TI) detectors around the target position [8]. Detailed analysis and preliminary results will be presented during the talk.

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