Contribution ID: **56** Type: **Oral**

Gamma decay of pygmy states in 90,94Zr from inelastic scattering of light ions

The study of the low lying electric dipole strength is attracting considerable attention, in connection with the possible existence of a new collective mode arising from the oscillation of the N=Z core against the neutron skin in neutron rich nuclei. This is the so called Pygmy Dipole Resonance (PDR). From the experimental point of view it was shown the importance of studying the nature of PDR states using different probes for its excitation. The aim of the work to be presented is to investigate the isospin character of the PDR states by comparing high resolution data on their population with the (α,α'γ) reaction (isoscalar character, surface-sensitive), the (p,p'γ) reaction (mainly isoscalar character, better sensitivity to the inner transition density), and the (γ,γ') (isovector character). Results on experiments focused on the low-energy part of the E1 response in 90,94Zr nuclei will be discussed. In particular, the data were obtained using the (p,p'γ) and (α,α'γ) inelastic scattering reactions at energies Ebeam,p = 80 MeV and Ebeam,α =130 MeV, respectively. The inelastically scattered particles were measured by the high-resolution spectrometer Grand Raiden at RCNP, Osaka University. The gamma-rays emitted following the de-excitation of the Zr target nuclei were detected using both the clover type HPGe detectors of the CAGRA array and the large volume LaBr3:Ce scintillation detectors from the HECTOR+ array.

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Track Classification: Invited Talk