ISOSPIN CHARACTER OF THE LOW-LYING DIPOLE STATES IN ^{140}CE STUDIED VIA INELASTIC SCATTERING OF ^{17}O

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The electric dipole (E1) response is one of the basic properties of atomic nucleus. Its mayor part is exhausted by the Isovector Giant Dipole Resonance (IVGDR)[1]. Below IVGDR, a small fraction of fragmented dipole states is also observed, and associated to so called 'Pygmy Dipole Resonance' (PDR), which was connected with a collective oscillation of number of neutrons at the nuclear surface against the inert proton-neutron core. The interpretation of the mode is still under debate which emphasizes the need for further experimental data.

This presentation reports on the study on soft dipole modes in ^{140}Ce using (^{17}O,^{17}O'γ) reaction. The experiment was performed at LNL-Legnaro, Italy. Inelastic scattering of ^{17}O ion beam at 20 MeV/A was used to excite the resonance modes in the ^{140}Ce target. Gamma rays were registered by 5 triple clusters of AGATA-Demonstrator and 8 large volume scintillators ($LaBr_3$). The scattered ^{17}O ions were identified by two ΔE-E Si telescopes of the TRACE array mounted inside the scattering chamber. The telescopes consisted of 2 segmented Si-pad detectors, each made of 60 pixels.

General aim was to investigate the structure of these states, in particular its isospin mixing by comparison to previous data from (γ, γ') and (α, α') experiments [2]. The more specific goal was to confront the experimental data with theoretical calculations using distorted wave Born approximation (DWBA) based on form factor obtained by folding the microscopically calculated transition density for the 'pygmy' state.

Finally, the percentage of the Isoscalar Energy Weighted Sum Rule (ISEWSR) exhausted by the 'pygmy' states in ^{140}Ce will be presented and confronted with the theoretical predictions.

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