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Study of highly-excited states in 140Ce via inelastic scattering of 17O

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Giant Resonances are collective modes of excitation of atomic nuclei, providing useful information on nuclear structure and on the effective nucleon-nucleon interaction. It is possible to excite such resonances with different probes as for example: photons, charged particles or heavy ions, followed by subsequent decays by emission of particles and γ's. Below particle threshold, a large fraction of highly excited states has been found to be of a dipole nature and it has been associated to the Pygmy Dipole Resonance, caused by the oscillation of the neutron skin against the inert proton-neutron core.
Main aim of this study is a deeper understanding of the nuclear structure properties of the Pygmy Dipole structures in 140Ce, excited via inelastic scattering of an 17O ion beam. Comparison with previous results for this nucleus, investigated in (γ,γ') and (α,α') experiments, will be helpful for drawing final conclusions.
The experiment was performed at Laboratori Nazionali di Legnaro, Italy. Inelastic scattering of 17O projectiles at 20 MeV/A was used to excite the resonance modes in the 140Ce target (2.5 mg/cm2 thick). Gamma rays were registered by 5 AGATA triple clusters and 8 large volume scintillators (LaBr3), useful for high γ-energy. The detectors were mounted at a distance of about 20 cm from the target position, resulting in a full absorption efficiency of about 0.8% at 10 MeV. The scattered 17O ions were identified by two ΔE-E Si telescopes of the TRACE array mounted inside the scattering chamber at 9° (which is the grazing angle for the reaction) with respect to the beam axis. The telescopes consisted of 2 segmented Si-pad detectors, each made of 60 pixels (with a pixel size of 4x4 mm2) covering an active area of 20x50 mm2. The resulting solid angle for the Si telescope was about 100 msr.
During the talk, issues concerning complex data analysis will be discussed and preliminary results of the experiment will be presented.

Primary author: Mr KRZYSIEK, Mateusz (IFJ PAN Kraków)

Co-authors: Prof. MAJ, Adam (IFJ PAN Kraków); Dr GIAZ, Agnese (University and INFN Milano); Dr BÜRGER, Alexander (Department of Physics, University of Oslo, Norway); MORALES LOPEZ, Ana Isabel (University and INFN Milano); GOTTARDO, Andrea (INFN Legnaro); Prof. GÖRGEN, Andreas (Department of Physics, University of Oslo, Norway); Dr WIENS, Andreas (Institut fur Kernphysik der Universitat zu Koln, Germany); GADEA RAGA, Andres (University of Valencia); BRACCO, Angela (University and INFN Milano); Dr LARSEN, Ann-Cecilie (Department of Physics, University of Oslo, Norway); MILLION, Benedicte (University and INFN Milano); Dr BENEDIKT, Birkenbach (Institut fur Kernphysik der Universitat zu Koln, Germany); Prof. FORNAL, Bogdan (IFJ PAN Kraków); UR, Calin Alexandru (INFN Padova); MICHELAGNOLI, Caterina (University and INFN Padova); BOIANO, Ciro (University and INFN Milano); NAPOLI, Daniel Ricardo (INFN Legnaro); MENGONI, Daniele (University and INFN Padova); Mr BARRIENTOS, Diego (University of Salamanca (Spain)); BAZZACCO, Dino (INFN Padova); FARNEA, Enrico (INFN Padova); Dr CRESPI, Fabio Celso Luigi (INFN Milano); RECCHIA, Francesco (Univ. and INFN Padova); CAMERA, Franco (University and INFN Milano); DE ANGELIS, Giacomo (INFN Legnaro); BENZONI, Giovanna (INFN Milano); Mr HESS, Herbert (IKP University of Cologne); Dr GREBOSZ, Jerzy (IFJ PAN Kraków); VALIENTE DOBON, Jose' Javier (INFN Legnaro); Dr MAZUREK, Katarzyna (IIFJ PAN Kraków); Ms GEIBEL, Kerstin (University of Cologne); Mrs PELLEGRI, Luna (University and INFN Milano); Prof. GUTTORMSEN, Magne Sveen (Department of Physics, University of Oslo, Norway); Dr KMIECIK, Maria (IFJ PAN Kraków); Mr CIEMALA, Michal (IFJ PAN Kraków); Mr ZIEBLINSKI, Miroslaw (IFJ PAN Kraków); Dr WITOLD, Męczyński (IFJ PAN, Krakow); BLASI, Nives (University and INFN Milano); WIELAND, Oliver (University and INFN Milano); Prof. REITER, Peter (IKP University of Cologne); Dr BEDNARCZYK, Piotr (IFJ PAN Kraków); NICOLINI, Roberto (University and INFN Milano); Prof. LUNARDI, Santo (University and INFN Padova); BRAMBILLA, Sergio (University and INFN Milano); LEONI, Silvia (University and INFN Milano); Prof. LENZI, Silvia Monica (University and INFN Padova); RIBOLDI, Stefano (University and INFN Milano); Prof. SIEM, Sunniva (Department of Physics, University of Oslo, Norway); Mr HUYUK, Tayfun (IFIC (CSIC - Universidad de Valencia)); Mr STEINBACH, Tim (Institut fur Kernphysik der Universitat zu Koln, Germany); VANDONE, Valeria (University and INFN Milano)

Presenter: Mr KRZYSIEK, Mateusz (IFJ PAN Kraków)

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