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Study of the K quantum number of pygmy states in ^{154}Sm

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This study aims to investigate the Pygmy Dipole Resonance (PDR) in the deformed ^{154}Sm nucleus. The present study employs the (γ, γ') reaction to examine dipole states in the energy range 3.5 MeV to 7.05 MeV (close to the neutron separation threshold (8 MeV)). The experiment was carried out using the Clover Array at the HIgammaS facility of the Triangle Universities Nuclear Laboratory. The polarised beam produced at the facility enables measurements through the asymmetry method to characterize the nature of populated transitions, allowing differentiation between 1^- and 1^{++} states, an essential aspect in the study of the dipole response of nuclei. Furthermore, the high-resolution beam mode ($< 2\%$) available at HIgammaS makes the determination of the decay branching ratio to the first 2^{++} state possible. This will aid in identifying the K quantum number of various excited states and in analyzing the PDR as a function of excitation energy. The validity of the Alaga rules in the region of the PDR will also be investigated in this work. The motivation behind this study, along with experimental details, will be presented. Preliminary data analysis will be discussed and an outlook on future comparisons will be provided.

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Primary author: MOLAENG, Refilwe Emil (University of the Witwatersrand and iThemba LABS)

Co-authors: AYANGEAKAA, Akaa Daniel (University of North Carolina and Triangle Universities Nuclear Laboratory); GUPTA, Amrita (Technische Universität Darmstadt); SARACINO, Antonella (University of North Carolina and Triangle Universities Nuclear Laboratory); LÖHER, Bastian (GSI Helmholtzzentrum für Schwerionenforschung GmbH); WELLONS, Benjamin (Texas A&M University); GRIBBLE, David (University of North Carolina and Triangle Universities Nuclear Laboratory); SAVRAN, Deniz (GSI Helmholtzzentrum für Schwerionenforschung GmbH); USMAN, Iyabo (School of Physics, University of Witwatersrand, Johannesburg, South Africa); ISAAK, Johann (Technische Universität Darmstadt); SANTUCCI, John (Texas A&M University); KLEEMANN, Jörn (Technische Universität Darmstadt); PRIFTI, Kiriaki (Technische Universität Darmstadt); DONALDSON, Lindsay (iThemba LABS, Old Faure Rd, Eerste River, 7100, South Africa); PELLEGGRI, Luna (University of the Witwatersrand and iThemba LABS); PIETRALLA, Norbert (Technische Universität Darmstadt); PAPST, Oliver

(Technische Universität Darmstadt); ADSLEY, Philip (Department of Physics and Astronomy, Texas A&M University, College Station, Texas, USA); JANSSENS, Robert (University of North Carolina and Triangle Universities Nuclear Laboratory); JOHNSON, Samantha (University of North Carolina and Triangle Universities Nuclear Laboratory); FINCH, Sean (Duke University and Triangle Universities Nuclear Laboratory); KOWALEWSKI, Tyler (University of North Carolina and Triangle Universities Nuclear Laboratory); JAMES, Xavier (University of North Carolina and Triangle Universities Nuclear Laboratory)

Presenter: MOLAENG, Refilwe Emil (University of the Witwatersrand and iThemba LABS)

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