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Analysis of High-Energy (p,p') data on 10,11B for the PANDORA Project

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The propagation of Ultra-High-energy cosmic rays (UHECR) in extragalactic space has gathered significant attention in the field of high-energy astrophysics. The motivation behind the PANDORA (Photo-Absorption of Nuclei and Decay Observation for Reactions in Astrophysics) project lies in investigating the photo-disintegration and energy loss processes experienced by UHECR particles lighter than iron during their interaction with the strongly Doppler-shifted Cosmic Microwave Background (CMB) photons, seen by UHECRs as high-energy gamma rays. Understanding these complex interactions is essential in comprehending the origins of UHECRs and the mechanisms responsible for their acceleration to such high energy ranges.

One of the methods used follows inelastic proton scattering at 0◦ with proton energies of hundreds of MeV, which favors excitation of dipole modes by relativistic Coulomb excitation. Another method is to use real gamma rays from a dedicated photon facility. For achieving this goal, a joined collaboration between ELI-NP, RCNP, and iThemba LABS has been created. In both the iThemba and RCNP labs, an array of double-sided Si strip detectors and a magnetic spectrometer are used for particle decay and excitation strength. The gamma decay branches will be measured with large volume LaBr3:Ce detectors. Here we will present the PANDORA project and report preliminary analysis from the first experiment at RCNP on 10,11B. These measurements can further be used to constrain the propagation and the origin of UHECRs.

Primary author: GAVRILESCU, Andreea (ELI-NP)

Presenter: GAVRILESCU, Andreea (ELI-NP)

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