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Proton elastic scattering from 50Ca at the RIKEN RIBF toward future studies of the nuclear matter EoS

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Constraining the equation of state (EoS) of nuclear matter remains one of the key open questions in both nuclear physics and astrophysics, with significant implications for phenomena such as neutron stars and supernova explosions. One approach is to investigate the differences in proton and neutron density distributions across isotopic chains, which are expected to provide a valuable insight into the symmetry energy of the nuclear matter EoS. Proton elastic scattering is known to be highly sensitive to the neutron and proton density distributions, particularly in magic nuclei such as calcium ($Z = 20$) and tin ($Z = 50$), where the closed proton shells enhance this sensitivity.
A measurement of proton elastic scattering for the neutron-rich nucleus ^{50}Ca has been performed in inverse kinematics at the RIKEN RI Beam Factory (RIBF). The experiment employed a newly developed $E - E$ telescope array, DELTA, consisting of Silicon Strip Detectors (SSD) and GAGG(Ce) calorimeters, to reconstruct the four-momentum of recoil protons. In this presentation, we report the results of the ^{50}Ca(p, p) elastic scattering experiment, focusing on the extracted angular distributions. We also outline future plans to extend this study to rare isotopes ^{52}Ca and ^{104}Sn and present ongoing developments toward the next experimental campaign.

Research field of your presentation

Experimental Low-energy nuclear physics

Author: NAKADA, Tomoya (Kyoto University)

Co-authors: ZENIHIRO, Juzo (Kyoto University); THE TRIP COLLABORATION; THE ESPRI COLLABORATION

Presenter: NAKADA, Tomoya (Kyoto University)

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