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Seach for η'-mesic nuclei with the WASA detector at GSI-FRS

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The mass of the η' meson is notably large compared to other members of the light pseudoscalar meson nonet. The origin of the large mass is considered to be attributed to the axial U(1) anomaly and the spontaneous breaking of chiral symmetry in the QCD vacuum. In nuclear matter, various theoretical models predict a mass reduction of η' meson ranging from 37 to 150 MeV/c^2. Such a mass reduction leads to an attractive interaction with nuclei, suggesting the existence of a bound state between η' mesons and nuclei, η'-mesic nuclei.

To search for η'-mesic nuclei, we conducted missing-mass spectroscopy in the $^{12}\mathrm{C}(p, d)$ reaction with simultaneous measurements of decay products of η'-mesic nuclei at the fragment separator (FRS) at GSI in 2022 February. Here, forward-going deuterons were detected with the FRS to obtain the missing-mass spectrum. The WASA central detector was installed at the central focal plane of the FRS to perform coincidence measurements of deuterons with backward protons originating from the decay of η'-mesic nuclei.

The presentation will provide relevant details of the experiment and the status of the data analysis.

session

E. Hadron and Nuclear Interactions

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