

η' mesic nucleus spectroscopy with (p,d) reaction at GSI

Monday, 25 August 2014 17:20 (25 minutes)

We plan a missing-mass spectroscopy experiment of η' mesic nuclei to study in-medium properties of the η' meson. The large mass of the η' meson compared to the other pseudoscalar mesons is explained by the axial anomaly effect. Since this effect on the η' mass is associated with spontaneous breaking of chiral symmetry, in the nuclear medium, where chiral symmetry is partially restored, the mass of the η' meson may be reduced. Then, such a mass reduction serves as attractive potential in an η' -nucleus system and η' meson nucleus bound states may exist.

The experiment is planned at GSI using a 2.5 GeV proton beam accelerated by SIS (Heavy Ion Synchrotron). We will inject the proton beam onto a carbon target to produce η' mesic nuclei by the $^{12}\text{C}(p,d)$ reaction. The missing-mass spectrum of the reaction will be obtained by analyzing the momentum of the ejectile deuteron with the FRS (Fragment Separator) used as a spectrometer.

The first pilot experiment will be carried out in July-August 2014. In this contribution, we would like to report the status of the experiment and describe very preliminary analysis.

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Session Classification: Hadrons in medium - hyperons and mesons in nuclear matter

Track Classification: 10) Hadrons in medium - hyperons and mesons in nuclear matter