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

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We plan a missing-mass spectroscopy experiment of eta'mesic nuclei to study in-medium properties of the eta' meson. The large mass of the eta'meson compared to the other pseudoscalar mesons is explained by the axial anomaly effect. Since this effect on the eta'mass is associated with spontaneous breaking of chiral symmetry, in the nuclear medium, where chiral symmetry is partially restored, the mass of the eta'meson may be reduced. Then, such a mass reduction serves as attractive potential in an eta'-nucleus system and eta' 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 eta'mesic nuclei by the 12C(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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