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Precision spectroscopy of deeply bound pionic states in 121, 116Sn

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We report our recent experiment of the pionic 121, 116Sn atom using missing-mass spectroscopy of the 122, 117Sn(d, 3He) reaction near the charged pion emission threshold. An established approach for quantitative evaluation of the chiral symmetry breaking in finite density is study of pion-nucleus interaction through the experimental measurement of pionic atoms. So far the 1s pionic states in 205Pb and 115, 119, 123Sn have been discovered at GSI. The deduced chiral order parameter was compared with that of the vacuum, which was deduced from the pionic hydrogen and deuterium, and partial chiral restoration was suggested. However, the evaluation still had large systematic and statistical errors. For the further study of the symmetry breaking in medium, we performed precision spectroscopy of deeply bound pionic states in 121, 116Sn at RIKEN, RI Beam Factory in June 2014. The current status of the analysis will be reported.

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