



国立研究開発法人理化学研究所 仁科加速器研究センター
第231回 RIBF核物理セミナー

RIKEN Nishina Center for Accelerator Based Science
The 231st RIBF Nuclear Physics Seminar

Precision spectroscopy of pionic atoms to study pion-nucleus interaction in medium

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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. Theories predict strength of isovector interaction between pion and nucleus, represented by a parameter b_1 , is enhanced by nuclear medium effects of the strong interaction, which is related to the partial restoration of the chiral symmetry breaking. So far the value of b_1 at finite density was measured at GSI, Germany, through the spectroscopy of deeply-bound pionic atoms. From the comparison with the b_1 in vacuum, the partial restoration of chiral symmetry breaking was suggested, while the precision of the obtained b_1 is still not enough compared with that in vacuum.

For the further study of b_1 , we performed a precision measurement of deeply bound pionic states in $^{121, 116}\text{Sn}$ using BigRIPS as a high-precision spectrometer. After the fine tuning of the experimental conditions, we achieved unprecedented resolution and measured high quality excitation spectra of $^{121, 116}\text{Sn}$ near the charged pion emission threshold. In these spectra, the $1s$, $2p$ and $2s$ pionic states in $^{121, 116}\text{Sn}$ atoms are observed. From the obtained binding energies and widths, we evaluated optical potential parameters.

The detail of the experiment and its preliminary results will be presented.

* The talk will be given in English language..

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