



国立研究開発法人理化学研究所 仁科加速器科学研究センター
第306回 RIBF核物理セミナー
RIKEN Nishina Center for Accelerator Based Science
The 306th RIBF Nuclear Physics Seminar

New directions in hypernuclear physics

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Studies of hypernuclei, subatomic bound systems with at least one hyperon, have been contributing for understanding the fundamental baryonic interactions as well as the nature of dense nuclear matters. Hypernuclei have already been studied for almost seven decades in reactions involving cosmic rays and with meson- and electron-beams. In recent years, hypernuclear studies can also be performed by using energetic heavy ion beams, and some of these experiments have revealed unexpected results on three-body hypernuclear states, i.e., shorter lifetime and larger binding energy of the lightest hypernucleus, the hypertriton, than what was formerly determined and the unprecedented bound state with a Lambda hyperon with two neutrons. These results have initiated several ongoing experimental programs all over the world to study these three-body hypernuclear states precisely. We, the High Energy Nuclear Physics Laboratory of the Cluster for Pioneering Research at RIKEN, together with international collaborations, are studying those light hypernuclear states by employing different approaches from the other experiments. We employ heavy ion beams on fixed nuclear targets with the WASA detector and the Fragment separator FRS at GSI in Germany for measuring their lifetime precisely, and we also analyze the entire volume of the nuclear emulsion irradiated by kaon beams in the J-PARC E07 experiment in order to measure their binding energies at the world best precision. We are using Machine Learning techniques for the both projects. In the seminar, these projects will be discussed on some details, and our perspective with heavy ion beams at FAIR in Germany and at HIAF in China and with nuclear emulsions will also be briefly discussed.

Reference: Takehiko R. Saito et al., Nature Reviews Physics volume 3, pages 803-813 (2021).

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via Zoom Meeting System



* The talk will be given in English language.
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