

## Hypernuclear spectroscopy with heavy ion beams: The HypHI project at GSI and FAIR

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Until recently hypernuclei have been mainly studied via induced reactions of meson- or electron-beams on stable target materials, therefore the isospin of the produced hypernuclei is close to that of the target nucleus. With fragmentation reactions of heavy ion projectiles above the  $\Lambda$ -threshold, a  $\Lambda$ -hyperon produced in the participant region of the nuclear collision can be coalesced in the projectile fragment forming a hypernucleus with the similar velocity of the projectile, and the isospin of the produced hypernucleus is widely distributed due to the nature of fragmentation reactions. Therefore, this production method gives an opportunity to study neutron or proton rich hypernuclei. Furthermore, with this method, the produced hypernuclei can be separated and their magnetic moments can be measured because of large Lorentz boost of the produced hypernuclei.

The HypHI collaboration aims to perform precise hypernuclear spectroscopy with stable heavy ion beams and rare isotope beams at GSI and FAIR in order to study hypernuclei at extreme isospin, especially neutron rich hypernuclei to look insight hyperon-nucleon interactions in the neutron rich nuclear medium, and hypernuclear magnetic moments to investigate baryon properties in the nuclear matter [1, 2]. We are currently preparing for the first experiment with  ${}^6\text{Li}$  and  ${}^{12}\text{C}$  beams at 2 A GeV to demonstrate the feasibility of the precise hypernuclear spectroscopy by identifying light hypernuclei mainly such as  ${}^3_{\Lambda}\text{H}$ ,  ${}^4_{\Lambda}\text{H}$  and  ${}^5_{\Lambda}\text{He}$  [2, 3]. The first physics experiment, Phase 0, on these hypernuclei is planned in the mid of 2009. In the presentation, an overview of the HypHI project and the detail of the first experiment will be discussed. I would also like to discuss on the possibility to measure hypernuclear resonance states and hypernuclear radii in the HypHI Phase 0 experiment.

1. T.R. Saito et al., Letter Of Intent of “Hypernuclei with Stable Heavy Ion Beam and RI-beam Induced Reactions at GSI (HypHI)”. Submitted to GSI PAC EA 30
2. T.R. Saito et al., Proceedings of The IX International Conference on Hypernuclear and Strange Particle Physics HYP2006, October 10th-14th 2006, Mainz, Germany, p.p. 171
3. T.R. Saito et al., Proposal of the HypHI Phase 0 experiment approved by the G-PAC 34

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