

Search for the H-Dibaryon in (K^-, K^+) Reaction at J-PARC

J. K. Ahn¹, K. Imai², W. S. Jung¹, J. L. Kim¹, M. H. Kim¹, S. H. Kim¹, J. W. Lee¹, J. B. Park¹, S. H. Hwang², H. Sako², S. Sato², H. Sugimura², Y. Ichikawa², Y. Han², K. Hosomi², S. Hasegawa², K. Tanida², H. Ekawa^{2,7}, S. Hayakawa^{2,9}, M. Ieiri³, K. Ozawa³, H. Takahashi³, T. Takahashi³, S. H. Kim⁴, J. Y. Lee⁵, K. Nakazawa⁶, M. Sumihama⁶, M. Naruki⁷, M. Niiyama⁷, K. Shirotori⁸, S. Y. Ryu⁸, K. Hicks¹⁰, B. Bassalleck¹¹, C. Rangacharyulu¹², L. Guo¹³

¹Korea University, ²ASRC, Japan Atomic Energy Agency (JAEA)

³High Energy Accelerator Research Organization (KEK), ⁴Institute for Basic Science (IBS)

⁵Seoul National University, ⁶Gifu University, ⁷Kyoto University

⁸RCNP, Osaka University, ⁹Osaka University, ¹⁰Ohio University

¹¹University of New Mexico, ¹²University of Saskatchewan, ¹³Florida International University

for the J-PARC E42 Collaboration

Recent theoretical works predict a weakly bound H-dibaryon or a resonant state near the $\Lambda\Lambda$ threshold and attract much experimental efforts [1,2,3]. We have proposed a dedicated experiment to search for the H-dibaryon in weakly-bound and unbound mass regions near $\Lambda\Lambda$ threshold. We plan to measure production of Ξ^-p , $\Lambda\Lambda$, $\Lambda p\pi^-$ and Σ^-p systems using (K, K^+) reactions from a diamond target at J-PARC. This experiment requires excellent detector capabilities and high precision measurements, in order to resolve any structure in lineshapes of the invariant-mass distributions. We are now constructing a large-acceptance hyperon spectrometer consisting of a superconducting Helmholtz dipole magnet and a time projection chamber [4], which meets the requirement for 1-MeV $\Lambda\Lambda$ mass resolution. In the talk, a current status of the E42 experiment will be reported, as well as other physics opportunities with the E42 hyperon spectrometer.

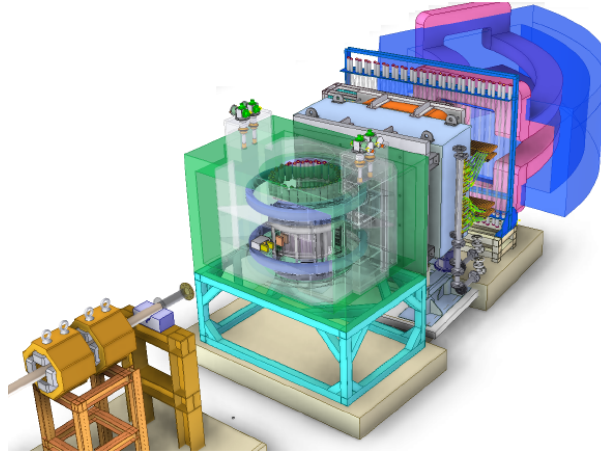


Figure 1: Schematic view of the E42 Hyperon Spectrometer.

- [1] P. E. Shanahan, A. W. Thomas, R. D. Young, JPS Conf. Proc. **1**, 013028 (2014).
- [2] T. Inoue *et al.*, Nucl. Phys. A **881**, 28 (2012).
- [3] S. R. Beane *et al.*, Phys. Rev. D **85**, 054511 (2012).
- [4] H. Sako *et al.*, Nucl. Instrum. Meth. A **763**, 65 (2014).