# Spectroscopy of electro-produced hypernuclei at Mainz Microtron

Sho NAGAO
Department of Physics, Tohoku University
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## Abstract

Λ hypernuclei which has a Λ particle in the nuclei are strong tool to understand exotic structure of hypernuclei, ΛN interaction and so on. The binding energies of Λ in the hypernuclei are basic data and one of the most important information to understand ΛN interaction. At the present time, most of the binding energies for ground state on A<16 hypernuclei were determined by emulsion experiments in 1960's ~ 70's [1] [2]. Recently, a high resolution spectroscopy for electro-produced hypernuclei, what is called (e,e'$K^+$) reaction spectroscopy, was established at Jefferson Laboratory (JLab). Thanks to the high intense electron beam and thin target thickness (~100 mg/cm$^2$), the experiments succeeded to measure the Λ binding energies on several hypernuclei with an accuracy of ~ 200 keV.

Mainz Microtron (MAMI-C) was upgraded the beam energy up to 1.5 GeV in 2006. Therefore, we have also progressed investigations for the strangeness physics. We aim to measure the binding energy of the ground state on several hypernuclei with much higher accuracy using new experimental technique; called hypernuclei decay pion spectroscopy.

The decay pion spectroscopy was designed to measure the binding energy of light hypernuclei with an accuracy of 30 keV; it corresponds to similar or better accuracy with emulsion data. We have performed the experiment from 2011 using $^9$Be target with a thickness of 22 mg/cm$^2$. A first peak which corresponds to $^4_\Lambda$H was identified and its binding energy was determined in 2012 experiment. The further experiment was also performed to find subsequent peaks in 2014.

The brief introduction of the determination for hypernuclei will be given in this talk. The latest results of the decay pion spectroscopy will be shown. The capability future possibilities for strangeness program at MAMI will also be mentioned.

[1] M.Juric et al., Nucl. Phys. B 52 (1973) 1-30.
[2] D.H.Davis, Nucl. Phys. A 754 (2005) 3c-13c.