Hypernuclear spectroscopy with electron beam at JLab Hall C

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Hypernuclear spectroscopy with electron beam at JLab Hall C has been studied since 2000. The first experiment, JLab E89-009, used Short Orbit Spectrometer (SOS) as a kaon arm and a split-pole type spectrometer (ENGE) as an electron arm. E89-009 employed zero-degree tagging method, which tags scattered electrons at zero-degree and the kaon arm also covered zero-degree. This method obtains maximum yield of hypernuclei but sufferers from high rate background of electrons from bremsstrahlung and positrons from pair-creation. Nevertheless, this experiment demonstrated the possibility of the (e,e'K^+) reaction for hypernuclear spectroscopy by obtaining a hypernuclear mass spectrum with an energy resolution of better than 1 MeV (FWHM) [1][2]. However, poor signal to noise ratio and poor statistics requires us to improve the experimental setup.

Therefore, E01-011 experiment was proposed based on the success of the JLab E01-011 experiment. Improvements of E01-011 from E09-009 can be summarized as: 1. Employed newly constructed high resolution kaon spectrometer (HKS) as a kaon arm. 2. Employed so-called 'tilt-method' for the electron arm. With the newly constructed HKS, having 2×10^{-4} momentum resolution, we expect an energy resolution of 400 keV (FWHM). The 'tilt-method' means the electron arm is tilted vertically to the splitter dispersive plane to avoid background electrons from bremsstrahlung and moeller scattering. The setup allowed us to use up to a few tens μA beam. The experiment was performed in 2005 and final result will be shown shortly.

The third experiment, JLab E05-115 experiment was proposed as a natural extension of E01-011 experiment and will be performed in 2009. Improvements of experimental setup are, 1. Employed newly constructed high resolution electron spectrometer (HES) as a electron arm, 2. Employed a new charge-separation magnet (Splitter), fully customized for hypernuclear experiment at Hall C. With the third generation experimental setup, we can study variety of targets up to medium-heavy ones such as ^{52}Cr. This talk mainly focuses on the current status of the E05-115 experiment.

[1] T. Miyoshi *et al*., Phys. Rev. Lett. **90**, 232502 (2003).
[2] L.Yuan *et al*., Phys. Rev. C **73**, 044607 (2004).