HAW14-2014-020031

Abstract for an Invited Paper
for the HAW14 Meeting of
the American Physical Society

Study Light Λ Hypernuclei From Decay Pion Spectroscopy[1]

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Continued primary electron beam with high intensity and precision, such that at JLab and MAMI, makes it possible to study light Λ hypernuclei via the pion momentum spectroscopy from 2-body mesonic decay. The Λ binding energy B_Λ of ground state from various light hypernuclei (produced by fragmentations of the primary hypernuclei) can be simultaneously measured with unprecedented precision. The precisely measured B_Λ from a sequence of light hypernuclei can solidly confirm some of the emulsion results which were measured unambiguously and replace those which were highly questionable from the emulsion technique, thus provide stringent information for theoretical investigation on the ΛN interactions. The precisely measured B_Λ difference between the isospin mirror pairs of light hypernuclei may provide more reliable result in study the origin of the excessive charge symmetry breaking (CSB) in ΛN interactions. Through fragmentation, highly neutron rich light hypernuclei may have higher production rate than that from direction beam production. This makes it possible to search for hypernuclei with extreme neutron number, such as ${}^{6}_{\Lambda}\mathrm{H}$ or even ${}^{8}_{\Lambda}\mathrm{H}$ at the drip line. Therefore, the new technique with decay pion spectroscopy is highly promising and such experiment is already undergoing at MAMI. Part of the preliminary results from the MAMI experiment will be presented as illustration.

[1]DE-FG02-97ER41047