

Abstract Submitted
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Novel Likelihood PID Method for Hypernuclear Spectroscopy¹

PAVLO BATURIN, JOERG REINHOLD, Florida International University, JEFFERSON LAB E01-011 (HKS) COLLABORATION — Jefferson Lab experiment E01-011 (HKS), undertaken in Fall 2005, measured the electroproduction of Λ -hypernuclei in the $(e,e'K^+)$ reaction with a resolution of 400 keV (FWHM), a record for reaction spectroscopy. The experiment employed time-of-flight and several layers of aerogel and water Čerenkov detectors for particle identification (PID). At the current moment, the entire analysis has been done by applying hard cuts to the corresponding distributions. Here we present an alternative PID approach that employs a likelihood method. Probability density functions were obtained for each detector distribution, which then were combined to likelihood values for each possible particle. This improves the efficiency for kaon identification and should also reduce background due to misidentification of protons and pions. The expected increase in signal to background ratio will improve the statistical significance of the observed excitation spectra, especially for the core excited states with poor statistics. It might also improve the energy resolution. The presentation will explain the new likelihood PID approach, compare it to the standard one, and give a brief outline of the method's benefits.

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