A search for baryon-number-violating decays of the Λ using CLAS at Jefferson Lab

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Explaining the vast matter/anti-matter asymmetry of our universe remains one of the fundamental problems in understanding cosmological evolution. Though the experimental upper-limit on the proton lifetime strongly suggests that baryon-number-violating decays of nucleons are an unlikely mechanism for providing this asymmetry, there is no data regarding such processes for baryons containing second- or third-generation quarks. Several GUTs suggest the existence of new gauge bosons that would allow for decays of baryons to meson-lepton final states; futhermore, flavor-dependent couplings would allow for suppression of these effects for the nucleons, but not other baryons. We present the status of a search for such baryon-number-violating decays of the Λ using data from the CLAS detector at Jefferson Lab for photoproducton off of the proton. The dataset studied contains roughly 3.0×10^6 $K^+\Lambda$ photoproduction events that are reconstructable from three final-state tracks (recoil K^+ and decay products). We investigate nine potential decay modes in which the Λ decays to a meson-lepton pair. We perform a blind analysis during the optimization of data selection criteria. Preliminary estimates suggest that these techniques will be sensitive to branching fractions on the order of $\Gamma_{\mathrm{BNV}}/\Gamma_{\mathrm{tot}} \approx 6 \times 10^{-6}$, roughly two orders of magnitude smaller than those of the currently known rare Λ decays.