Polarization Observables in $\gamma p \to K^+ + \Lambda$ and $K^+ + \Sigma^0$ Using Circularly Polarized Photons on a Polarized Frozen Spin Target

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The search for undiscovered excited states of the nucleon continues to be a focus of experiments at the Thomas Jefferson National Accelerator Facility (JLab). A large effort using the CEBAF Large Acceptance Spectrometer (CLAS) detector has provided the database, which will allow nearly model-independent partial wave analyses (PWA) to be carried out in the search for such states. Polarization observables play a crucial role in the effort, as they are essential in disentangling the contributing resonant and non-resonant amplitudes. Recent coupled-channel analyses have found strong sensitivity of the K^++Λ channel to several higher mass nucleon resonances. In 2008 and 2010, double-polarization data were taken at JLab using circularly and linearly polarized tagged photons incident on a longitudinally and transversely polarized frozen spin butanol target (FROST), operated at the temperature of 30 mK. The reaction products were detected in CLAS. This work is based on the analysis of FROST data and the extraction of the E, L_x, L_z, T, F, T_x, and T_z asymmetries of the $K^+\Lambda$ and $K^+\Sigma^0$ final states and their comparison to predictions of recent multipole analyses. There are very few published measurements of the T asymmetry and none for the E, L_x, L_z, F, T_x, and T_z asymmetries for the $K^+\Lambda$ final state. The $K^+\Sigma^0$ final state has no published measurements for these asymmetries. Comparison of CLAS results with the phenomenological models MAID, Bonn Gatchina, and RPR-Ghent will be shown. This work is the first of its kind and will significantly broaden the world database for these reactions.