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Photoproduction of Meson from the Proton with Linearly Polarized Photons

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Protons are not fundamental particles. Experiments performe years have shown that protons have an internal structure. Physi protons (as well as other hadronic particles) are composed of quar the interaction governing the quark/gluon dynamics is descr Chromodynamics (QCD). Unfortunately, precise calculations in the explored at CEBAF are not yet possible. For this reason, th calculations in this non-pertubative regime employ models that aspects of QCD but retain enough simplicity to allow predictions t

In the energy regime from the Delta threshold to 3 GeV, the photoproduction experiments is the spectrum of resonances that re the available energy in the sub-nucleonic system. Many experiment performed at CEBAF to study this resonance spectrum; the widths, of the resonances offer rigid constraints in the understanding of This experiment will look at a very narrow subset of the possible CEBAF from the baryon resonance spectrum. We will excite the prot linearly polarized photons and measure the decays of proton reson r-mesons (r^0, r^+).

One of the most successful models in describing the baryon re the constiuent quark model of Isgur and Karl. However, an outstand model is the prediction of more resonances than have been seen exp with pion beams. One possible explanation for these missing res resonances have a very weak $N\pi$ coupling. The model does indicate that thes have a reasonable $N\eta$ and a significant decay branch through the $N\rho$ channel. By looking a the photoproduction of η-mesons at the center-of -mass energies where resonances are expected, our experiment may give a clear indicat resonances exist.

One of the difficulties in extracting fundamental informat resonances is that the experimental observables are only connect quantities (such as the partial width or branching ratio) through the case of the photoproduction of η-mesons with a baryon resonance intermedi 12 amplitudes must be determined. In order to unambiguously extrac complete set of experiments must be performed, using polarized bea and measuring the recoil polarization of the proton. This experim polarized photon beam, is the next step in a set of experiments to parameters of the resonance spectrum.