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(G*) Charged Pion Form Factor –A Unique Precision Experiment at Jefferson Lab

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Hadronic structure is poorly understood as the properties of constituent quarks and gluons (e.g. spin, mass) do not explicitly add up to the properties of hadrons. The form factor describes the transverse position of partons inside a hadron. Perturbative QCD (pQCD) uniquely predicts the form factor at very high Q2, which is experimentally inaccessible. Different non-perturbative QCD models give the same prediction for the value of form factor at low Q2, but these predictions vary at moderate Q2 where published experimental data is limited. The pion is an excellent candidate for the study of the hadronic form factor as it is the lightest charged meson and has only two valence quarks. In this research, an exclusive reaction p(e,e′,⊠+)n is studied at Thomas Jefferson National Accelerator Facility in Newport News, VA. The cross-section is dictated by the polarization of virtual photon. A unique technique, Rosenbluth Separation, is used to precisely separate the longitudinal and transverse components of the cross-section. The form factor is then extracted from longitudinal cross-section. The precision of separation of cross-section depends on accurate determination of small systematic uncertainties. This includes Particle Identification (PID), Particle reconstruction, dead time estimation etc. In this talk, I will discuss importance of the Rosenbluth separation technique and show the status of Pion form factor measurements performed at Jefferson Lab.

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