

Special Seminar



Thursday – May 22, 2014

10:00 AM

Kolker Room (26-414)

Resolving the Proton Form Factor Problem with Positron-Proton Scattering

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Abstract: The proton electromagnetic form factors are essential pieces of our knowledge of nucleon structure. However, unpolarized and polarized electron scattering measurements of the proton electric form factor differ from each other by up to a factor of three at high momentum transfer. One possible resolution of this discrepancy is to include the contribution of hard two-photon exchange (TPE) contributions. These contributions are very difficult to calculate due to the need to integrate over all possible intermediate excited-nucleon states. However, we can directly determine the TPE effect by measuring the ratio of the positron-proton to electron-proton elastic scattering cross sections.

We have measured the ratio of positron-proton to electron-proton elastic scattering cross sections over a wide range of momentum transfer and virtual photon polarization using a mixed simultaneous beam of electrons and positrons in Hall B at Jefferson Lab. At moderate momentum transfer our measurements are consistent with the difference between the unpolarized and polarized electron scattering measurements of the proton electric form factor.



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