

Two photon exchange in elastic ep scattering and the status of the OLYMPUS experiment

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Abstract

Two-photon exchange in elastic ep scattering is believed to explain the observed discrepancy in the proton electric to magnetic form factor ratio, $\mu_p G_E^p/G_M^p$, measured by Rosenbluth separation and by polarization transfer methods.

To quantitatively determine the contribution of two photon exchange to elastic scattering the OLYMPUS experiment was proposed and operated at the DESY laboratory in Hamburg, Germany to measure the ratio in the elastic scattering cross sections, $\sigma_{e+p}/\sigma_{e-p}$. The OLYMPUS experiment used the positron and electron beams of the DORIS storage ring at a beam energy of 2.01 GeV incident on a windowless, internal, hydrogen gas target. A left/right symmetric detector measured the rates for elastic scattering over a broad kinematic range together with a redundant set of luminosity monitors. Approximately 4.45 fb^{-1} were collected.

The current status of the OLYMPUS analysis will be presented.