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# Hard Two-Photon Contribution to Elastic Lepton-Proton Scattering Determined by the OLYMPUS Experiment

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The OLYMPUS collaboration has recently published a precise measurement of the positron-proton to electron-proton elastic scattering cross section ratio, $R_{2\gamma}$, over a wide range of the virtual photon polarization, $0.456 < \epsilon < 0.978$. This provides a direct measure of hard two-photon exchange in elastic lepton-proton scattering widely thought to explain the discrepancy observed between polarised and unpolarised measurements of the proton form factor ratio, $\mu_p G_E^p / G_M^p$. The OLYMPUS results are significantly lower than theoretical calculations that explain the observed discrepancy in terms of two-photon exchange but are in good agreement with predictions based on phenomenological fits to the available form factor data.

This presentation will briefly review the motivation for measuring $R_{2\gamma}$ followed by a description of the OLYMPUS experiment and analysis. In particular, the importance of soft two-photon contributions from radiative corrections included in the analysis will be shown. Then we will present the OLYMPUS results and compare these with results from two similar, recent experiments. Finally, various theoretical calculations will be compared with the experimental results and conclusions drawn.

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