Two-Photon Exchange in Precision Measurements of Nucleon Electromagnetic Form Factors

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Electromagnetic form factors are fundamental properties of the nucleon that were measured in a variety of electron-scattering experiments involving either polarized or unpolarized particles. The accuracy of existing measurements of specific observables requires sub-per-cent level understanding of the scattering amplitude which, in turn, requires considerations beyond a first Born approximation [1]. Recent positron-scattering experiments tested QED effects dependent on the nucleon structure, while single-spin asymmetries probed the absorptive part of the two-photon scattering amplitude. An ongoing MUSE experiment at PSI aims to address a problem of proton's charge radius in a comparative analysis of scattering of electrons, muons, and their anti-particles on a proton target.

In this presentation, I will give an overview of both theoretical and experimental developments in the studies of hadronic-structure-dependent QED corrections and focus on theoretical issues and approaches to their solutions.

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[1] A. Afanasev *et al*, Progress in Particle and Nuclear Physics **95** (2017): 245-278.