QED corrections to the Bethe-Heitler process in the $\gamma p \to l^+ l^- p$ reaction

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Abstract

High-precision calculation of electromagnetic processes become more and more important for the interpretation of scattering experiments. One example is the Bethe-Heitler process, the lepton pair photoproduction on a proton target, which can be used as a test of lepton universality. Violation of this universality could shed light on the proton radius puzzle, the discrepancy between the charge radii measurements from muonic spectroscopy and data with electrons. An upcoming experiment at MAMi (Mainz) aims to compare the cross-sections of muon and electron pair production. A precise knowledge of the electromagnetic radiative corrections is needed for these measurements. As a first step, the leading QED radiative corrections are presented in the Soft-photon approximation.