

# Photon-Photon Scattering: Fundamental Constants and Bounding New Physics

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Direct measurement of the elastic scattering of real photons on an electromagnetic field would allow the fundamental low-energy constants of quantum electrodynamics (QED) to be experimentally determined and bounds placed on new physics. We show that scenarios involving the collision of three laser beams have several advantages over conventional two-beam scenarios. The kinematics of a three-beam collision allows for a higher signal-to-background ratio in the detection region, without the need for polarimetry, and separates out contributions from different orders of photon scattering. We show that measurements of elastic photon scattering and vacuum birefringence are possible with currently available technology. We also discuss how future multi-petawatt laser facilities could be used to place bounds on new physics beyond QED.