

# All-Optical Nonlinear Breit-Wheeler Pair Production from Gamma-Flash Photons

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High-power laser facilities give experimental access to fundamental strong-field quantum electrodynamics processes. A key effect to be explored is the nonlinear Breit-Wheeler process: the conversion of high-energy photons into electron-positron pairs through the interaction with a strong electromagnetic field. A major challenge to observing nonlinear Breit-Wheeler pair production experimentally is first having a suitable source of high-energy photons. In this paper we outline a simple all-optical setup which efficiently generates photons through the so-called  $\gamma$ -flash mechanism by irradiating a solid target with a high-power laser. We consider the collision of these photons with a secondary laser, and systematically discuss the prospects for exploring the nonlinear Breit-Wheeler process at current and next-generation high-power laser facilities.