

Abstract Submitted
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Observing the two-photon Breit-Wheeler process for the first time¹ OLIVER PIKE, EDWARD HILL, STEVEN ROSE, Imperial College London, FELIX MACKENROTH, Max Planck Institute for Nuclear Physics, Heidelberg — As the inverse of Dirac annihilation, the Breit-Wheeler process [1], the production of an electron-positron pair in the collision of two photons, is the simplest mechanism by which light can be transformed into matter. It is also of fundamental importance in high-energy astrophysics, both in the context of the dense radiation fields of compact objects [2] and the absorption of high-energy gamma rays travelling intergalactic distances [3]. However, in the 80 years since its theoretical prediction, this process has never been observed. Here, we present the design of a new class of photon-photon collider [4], which is capable of detecting significant numbers of Breit-Wheeler pairs using current-generation technology. We further show how our scheme could be implemented on existing laser facilities; successfully achieving this would represent the advent of a new type of high-energy physics experiment.

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