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Observing the two-photon Breit-Wheeler process for the first time

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The Breit-Wheeler process—the formation of an electron-positron pair in the collision of two photons—is the simplest way in which matter can be made from light. As the inverse process of two-photon annihilation, it is one of the most basic processes in quantum electrodynamics, as well as being ubiquitous in high-energy astrophysics. However, in the 80 years since it was predicted theoretically, this interaction has never been directly observed. Here, I present the design of a new class of photon-photon collider [O. J. Pike et al, Nature Photonics 8, 434 (2014)], which is capable of detecting significant numbers of Breit-Wheeler pairs on current-generation laser facilities. I further discuss our ongoing efforts to implement this scheme in practice.

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