

Experimental evidence of radiation reaction effects in the collision of a high-intensity laser pulse with a laser-wakefield accelerated electron beam

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We present experimental evidence of radiation reaction in the collision of a highly relativistic electron beam generated by laser-wakefield acceleration ($\epsilon > 500$ MeV) with an intense laser pulse ($a_0 > 10$). This was recently published in [1]. We measure the electron and γ -ray spectra from inverse Compton scattering simultaneously to infer the conditions at the point of interaction independently. The energy loss in the electron spectrum after the collision and the γ -ray signal are correlated, consistent with a quantum description of radiation reaction. The generated γ -ray spectrum reaches a critical energy $\epsilon_{\text{crit}} > 30$ MeV, being the highest γ -ray energy from an all-optical inverse Compton scattering scheme reported so far [2,3,4].

[1] J. M. Cole et al., *Physical Review X* **8**, 011020 (2018)

[2] K. Ta Phuoc et al., *Nature Photonics* **6**, 308 (2012)

[3] N. D. Powers et al., *Nature Photonics* **8**, 28 (2014)

[4] G. Sarri et al., *Physical Review Letters* **113**, 1 (2014)