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 ($\varepsilon > 500$ MeV) with an intense laser pulse ($a_0 > 10$). This was recently published in [1]. We measure the electron and $\gamma$-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 $\gamma$-ray signal are correlated, consistent with a quantum description of radiation reaction. The generated $\gamma$-ray spectrum reaches a critical energy $\varepsilon_{\text{crit}} > 30$ MeV, being the highest $\gamma$-ray energy from an all-optical inverse Compton scattering scheme reported so far [2,3,4].