Abstract Submitted
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Radiation Rebound and Quantum Splash in Electron Laser Collision[1] RONGHAO HU, JINQING YU, YINREN SHOU, XUEQING YAN, Peking University, ALEXEY AREFIEV, University of California San Diego, ZHENG GONG, The University of Texas at Austin — The radiation reaction (RR) is expected to play a significant role in light-matter interactions at extreme intensity. Utilizing the theoretical analyses and numerical simulations, we demonstrate that electron reflection, induced by the RR in a head-on collision with an intense laser pulse, can provide pronounced signatures to discern the classical and quantum RR. In classical regime, there is a precipitous threshold of laser intensity to achieve the whole electron bunch rebound. However, this threshold becomes a gradual transition in the quantum regime, where the electron bunch is quasi-isotropically scattered by the laser pulse and this process resembles a water splash. Based on the derived dependence of classical radiation rebound on the parameters of laser pulses and electron bunches, a practical detecting method is proposed to distinguish the quantum discrete recoil and classical continuous RR force.

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