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Radiation reaction and resulting photon emission from laser-irradiated solid targets[1] DAVID STARK, ALEXEY AREFIEV, Institute for Fusion Studies, The University of Texas at Austin, MANUEL HEGELICH, Center for High Energy Density Science, Department of Physics, The University of Texas at Austin — Once completed, an ongoing upgrade of the Texas-PW laser system would allow us to achieve on-target laser intensities of up to 5×10^{22} W/cm^2. As experimental confirmation of the radiation reaction force and the variety of models describing it remains a challenge, here we present a scenario that would enable us to observe the effect by detecting the resulting photon emission. A laser with our planned intensity could accelerate an electron to hundreds of MeV, but the radiation reaction and thus the photon emission would be relatively weak if the electron co-propagates with the wave. We consider a solid density target irradiated by a laser beam so that strong fields are generated due to charge separation. These fields can alter the electron trajectories, leading to strong radiation reaction and photon emission in the focal spot. Simulating this interaction using the particle-in-cell code EPOCH, we perform a target density scan that allows us to optimize the fraction of the laser energy converted into photons and to determine the photon spectrum. Knowing the spectrum and the angular emission is critical for measurements in the lab, since these photons must be distinguished from those from other processes.

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