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Radiation damping induced electron trapping and positron creation[1] YANJUN GU, ONDREJ KLIMO, STEFAN WEBER, GEORG KORN, ELI-Beamlines, Institute of Physics, ASCR — High power laser facilities with intensities up to 10^{22} W/cm^2 have been realized and the forthcoming installations are expected to reach 10^{22-24} W/cm^2 or even higher. At these intensities, the radiation effects and quantum electrodynamics description come into play. The emitted photon momentum becomes comparable to the momentum of the emitting electrons. In this work, we propose a regime of electron self-injection and trapping in the ultra-high intensity laser-plasma interaction. The electrons accumulated at the head of the laser pulse are injected into the pulse centre due to the strong longitudinal electrostatic field created by the high density shell. These electrons, which experience a restoring force provided by the emitted photons, can be confined in the laser pulse for a long time. The corresponding photons are produced in the region where the laser field is strong. High energy and well collimated positron bunches are produced. This regime may be beneficial for the potential experiments to be carried out on large laser facilities such as ELI.

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