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Radiative reflection: high frequency radiation emission using evanescent light waves in plasma mirrors MIGUEL PARDAL, GoLP/IPFN, Instituto Superior Tcnico, U. Lisboa, Lisbon, Portugal, RICARDO FONSECA, ISCTE, Lisbon University Institute, JORGE VIEIRA, GoLP/IPFN, Instituto Superior Tcnico, U. Lisboa, Lisbon, Portugal — Thomson scattering is a laser-particle interaction mechanism that leads to the emission of radiation due to the oscillations of the particles in the laser field. The emitted radiation is composed of harmonics of laser frequency, but high harmonics at the x-ray frequency usually require ultra-intense lasers (a0>>1). By using a plasma mirror to separate the laser and particle beams we are able to induce a huge deceleration in the particle beam at the vacuum-plasma surface interface as the laser gets reflected. In this case, the emitted radiation pulse can be as short as the skin depth of the plasma divided by the Lorentz factor of the radiating particles, squared, and the pulse-length does not depend on the laser intensity. This result opens an unprecedented pathway to produce ultra-short, high-frequency radiation. Using typical solid density plasma could then lead to broad-band x-ray emission with low-intensity lasers (a0<<1). In this work, we explore the fundamental physics behind this scenario using the recently developed radiation diagnostic for OSIRIS (RaDiO), that captures the spatiotemporal properties of the radiation emitted by charged particles with built-in spatial and temporal coherence and its integration in the standard PIC algorithm.

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