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The Effect Of Focal Geometry On Radiation From Atomic Ionization In An Ultrastrong/Ultrafast Laser Field ISAAC GHEBREGZIABHER, B.C. WALKER, Department of Physics and Astronomy, University of Delaware, Newark, DE 19716 — We use a tunneling-Monte-Carlo model to calculate the dynamics and emitted Larmor radiation from electrons ionized in an ultrashort/ultraintense pulsed laser focus over the intensity range from 10^{17} to 10^{20} W/cm^2. We find the spatial variation of a laser field can no longer be neglected at laser intensities leading to relativistic effects. Adopting a one-dimensional or plane wave approximation overestimates the total radiated energy by a factor as high as two orders of magnitude. Despite this, the spectral amplitude of the radiated high-energy photons from ionization in a laser focus is as high as that in the plane wave case since the laser focus imparts an extra boost of speed for electrons exiting the focus. Moreover, ionization in a laser focus limits the effective radiation volume to a few fraction of μm^3 leading to more coherent radiation. For the ionization of Na^{10+} in a laser focus of intensity 1.22 10^{20} W/cm^2, we find the peak radiation yield extending to photon energies of 580eV. In the plane wave case, we find radiation extending to photon energies of 560eV.

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