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Quantum Interference Effects In Radiation From Atomic Ionization In Ultrahigh Fields ISAAC GHEBREGZIABHER, B.C. WALKER, Department of Physics and Astronomy, University of Delaware, Newark, DE 19716 — We quantify electron wavefunction interference effects on radiation by calculating the angle- and energy-resolved Larmor radiation from atomic ionization in the focus of ultra-intense field. Our calculations use a semi-classical, trajectory ensemble model of ionization for intensities in the range of 10^{16} to 10^{20} W/cm^2. For non-relativistic intensities, wave function interference leads to a negligible effect on radiation which decreased by less than 50% from that of a classical electron calculation. For relativistic intensities, including the quantum nature of ionization decreases the radiation by an order of magnitude due to destructive interference effects in the extended probability of the electron wavefunction and the quantum nature of ionization. The interference effect is largest for high energy photons since ionization extends to a spatial width of $\sim$300nm and electron quiver width is $\sim 1\mu$m. Our results also show the decrease in radiation due to the quantum nature of an electron is larger when emitted photons are observed in the laser polarization direction than in the propagation direction.

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