Stochastic electron dynamics in microdroplet plasma irradiated by an ultrashort, intense laser pulse

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The use of sub-micro-sized mass limited targets in interaction with intense ultrashort femtosecond laser pulses is considered to be uniquely convenient approach for the development of a compact versatile pulsed source of secondary radiation. Innovative nano- and micro-sized targets, including droplets and micro clusters, allow effectively absorb laser energy, generate high energy electrons and, as a result, increase the production of accelerated ions, x-rays, neutrons, etc. In the case of the interaction of a laser pulse with nano/micro-sized targets, the determining mechanism of a large energy gain by electrons is the stochastic heating in the combined field of the laser pulse and the Coulomb field of the droplets. We focus on study of hot electron generation and particle acceleration to energies beyond the ponderomotive limit. The model describes the high energy particle generation as a result of multiple elastic electron scattering on an expanding charged cluster. The expected appearance of supra-ponderomotive electrons should lead to an increase in the hardness of x-ray radiation.
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