Abstract Submitted
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Laser impact: from two-temperature warm dense matter to crystallized surface structures[1] NAIL INOGAMOV, Landau Institute for Theoretical Physics of Russian Academy of Sciences, Chernogolovka 142432, Moscow region, Russia, VASILY ZHAKHOVSKY, Dukhov Research Institute of Automatics, Rosatom, Moscow 127055, Russia, VIKTOR KHOKHLOV, Landau Institute for Theoretical Physics of Russian Academy of Sciences, Chernogolovka 142432, Moscow region, Russia — We consider laser ablation dynamics of thin films mounted on substrate or freestanding. Optical or X-ray lasers are used. Focusing systems are based on a high aperture lens or on a phase plate. Thus or diffraction limited focal spot with maximum in the center and approximately Gaussian fluence distribution around, or ring type distribution with zero of fluence in a center are formed. Topologically different cupola like or torus like structures made from a deformed film are created under these two focusing conditions. We develop a wide set of techniques to describe thermodynamic, transport, and kinetic properties of isothermal ($T_e = T_i$) and non-isothermal ($T_e \ll T_i$) condensed matter in high energy density states: $T_e \sim (1 \div 10)$ eV, $T_i \sim 1 - 10$ kK. The set includes DFT, QMD, and kinetic equations techniques that gives us equation of state, thermal conductivity, electron-ion coupling parameter. Hydrodynamics and molecular dynamics simulations give us detailed view on thermal and dynamical processes leading to melting, motion, deformation, fraction, and final solidification of material in form of cupola like or torus like structures.

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