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Warm dense matter in extremely small volume - hydrodynamics of nanofilms triggered by laser irradiation at diffraction limit NAIL INOGAMOV, Landau Institute for Theoretical Physics, Chernogolovka 142432, Russia, VASILY ZHAKHOVSKY, Dukhov Research Institute of Automatics, Moscow, 127055, Russia, VIKTOR KHOKHLOV, Landau Institute for Theoretical Physics, Chernogolovka 142432, Russia — Modern laser techniques combine sophisticated manipulations with photon bunch and refined target design together with ultrafast isochoric transfer of solid into WDM state. Photon bunch is just 10s micron long and one micron thick when it is focused in the diffraction limited regime onto a thin film of 10-100 nm thick. While the spherical or cylindrical lenses produces a hot spot with maximum in the central point, a spiral phase plate produces the illumination field with a hole in the center and also bears angular momentum to the target. To study the evolution of the targets a simulation package including two-temperature (immediately during and for some time after a fs pulse the electrons are much hotter than lattice) 2D hydrodynamics and MD code combined with Monte Carlo method for strong thermal conductivity in metal are utilized. The observed processes, including absorption, melting, capillary dynamics of hot melt and its freezing into solitary nanostructures, produced by such laser fields are discussed.

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