

# Solids underway to warm dense matter state

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The focus of this talk are diagnostics and modeling of radiation-induced structural transitions in solids. Two recent experiments are discussed in detail: (i) X-ray induced femtosecond graphitization of diamond [1], and (ii) amorphization of diamond by intense X-ray pulses [2,3]. Dedicated simulations reveal complex multistage evolution of these systems which diagnostics tools can confirm. Finally, challenges remaining for accurate modeling of transition of solids to warm dense matter state and the quest for further improvements of the necessary diagnostics tools are explored.

[1] F. Tavella et al., 'Soft x-ray induced femtosecond solid-to-solid phase transition', H. En. Dens. Phys 24, 22 (2017)

[2] I. Inoue et al., 'Observation of femtosecond X-ray interactions with matter using an X-ray-X-ray pump-probe scheme', PNAS 113 , 1492–7 (2016)

[3] N. Medvedev, B. Ziaja, 'Multistep transition of diamond to warm dense matter state revealed by femtosecond X-ray diffraction', submitted (2017)