

Modelling the evolution of X-ray free-electron-laser irradiated solids towards warm-dense-matter state

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Structural transitions in solids induced by intense femtosecond pulses from X-ray free-electron laser are in the focus of this talk. Depending on the dose absorbed, the irradiation can trigger an ultrafast electronic or structural transition in these materials. For very high doses, transition from the solid to warm-dense-matter or to plasma state follows. Dedicated theoretical modeling tools reveal complex multistage evolution of the irradiated systems, confirmed by experimental measurements performed at X-ray free-electron-laser facilities. Challenges remaining for the modeling and possible further model developments are discussed.

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