Numerical investigation of the dense photoionized aluminum plasma

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On the Linac Coherent Light Source (LCLS) X-ray laser facility the solid-density aluminum was irradiated with ultrashort high-intensity monochromatic beams of X-ray photons [1,2]. The measured spectra contain lines corresponding to K-shell emission which is explained by the Auger effect and the photoionization of electrons from the inner shell.

For the numerical simulation of this experiment, a physical model is required that will include both the nonstationary kinetics of the populations of ion species and the density effects.

The corresponding model was implemented in the THERMOS Toolkit [3], which made it possible to reproduce the measured spectra with good accuracy.

[1] Ciricosta O *et al* 2012 *Physical Review Letters* **109** 065002
[2] Vinko S M *et al* 2012 **482** 59–62
[3] THERMOS — Software package and database *http://keldysh.ru/thermos/en*