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Crystal-like and plasma-like properties of the two-temperature WDM VLADIMIR STEGAILOV, GENRI NORMAN, SERGEY STARIKOV, Joint Institute for High Temperatures RAS — The two-temperature warm dense matter (WDM) is produced for short times at the interaction of fs and ps laser radiation with solid surfaces, propagation of a fast ion through condensed matter and at some other advanced experiments. The theory of such transient nonequilibrium WDM states is a challenging problem since electron temperature is about several eV, but ions remain to be cold and keep original crystallographic positions for several ps. Therefore the band structure survives but electron and phonon energy dispersions are changed due to the inverse influence of the electron excitation. Ion cores survive as well but their inner shells are partially excited and their populations follow plasma behavior. So the temporary WDM states considered demonstrate both crystal and plasma features like a crystal-plasma “centaur.” The methods of molecular dynamics and collisional-radiative kinetics are used to investigate the plasma properties of WDM. The transient but steady (quasi-stationary for a short time) state of non-equilibrium, uniform electron plasmas can be both strongly and weakly coupled. X-ray spectral lines are emitted by ion cores embedded in electron plasma environment which influences the spectra strongly.

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