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Radical electronic transformation of strongly coupled plasma at megabar pressure ionization, dielectrization and phase transitions VLADIMIR FORTOV, IHED RAS — The work presents new results of investigation of pressure and temperature ionization of coupled nonideal plasmas generated as a result of multiple shock compression of metals, H2, He, noble gases, S, I, fullerene C60, H2O in the megabar pressure range. The highly time-resolved diagnostics permit us to measure thermodynamical, radiative and mechanical properties of high pressure condensed matter in a broad region of the phase diagram. This data in combination with exploding wire conductivity measurements demonstrate an ionization rate increase up to ten orders of magnitude as a result of compression of degenerate plasmas at p 104-107 bars. Shock compression of H2, Ar, He, Kr, Ne, Xe in initially gaseous and cryogenic liquid state allows measuring the electrical conductivity, Hall effect parameters, equation of state, and emission spectra of strongly nonideal plasma. Thermal and pressure ionization of strongly coupled states of matter is the most prominent effects under the experimental conditions. It was shown that plasma compression strongly deforms the ionization potentials, emission spectra and scattering cross-sections of the neutrals and ions in the strongly coupled plasmas. In contrast to the plasma compression the multiple shock compression of solid Li, Na, Ca shows "dielectrization" of the elements. Phase transitions in strongly nonideal plasmas are discussed.

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