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Quasi-isentropic compressibility of deuterium at pressure region of ~12 TPa

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We report on the experimental results on the quasi-isentropic compressibility of a strongly non-ideal deuterium plasma compressed to the density ρ≈10 g/cc by pressure P=11400 GPa (114 Mbar) on a setup of spherical geometry. We describe the characteristics of the experimental setup, as well as the methods for the diagnostics and interpretation of the experimental results. The trajectory of metal shells that compress the deuterium plasma was detected using powerful pulsed X-ray sources with maximal electron energy of up to 60 MeV. The value of the plasma density ρ≈10 g/cc was determined from the measured value of the shell radius at the instant that it was stopped. The pressure of the compressed plasma was determined using gas dynamic calculations, taking into account the actual characteristics of the experimental setup. In the laboratory experiment on multiple shock loading of gaseous deuterium was achieved a state very close to that of planet-giants of the solar system, e.g. Jupiter and Saturn.

Biography

Mikhail A Mochalov has an ScD Degree in Physics and Mathematics. He is a High-Quality Expert in experimental investigations of thermal physical properties for plasma of cryogenic liquids (such as nitrogen, argon, krypton, and xenon), gaseous helium and deuterium at shock compression and quasi-isentropic compression in the megabar range of pressures. His obtained data are well-known in Russia and other countries. The data are unique and correspond to the world level of investigations in physics of high energy densities.

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