Interaction of laser radiation with strongly coupled xenon and krypton plasma

Zaporozhets Yu B[1,@], Mintsev V B[1], Gryaznov V K[1], Karakhtanov V S[1], Reinholz H[2] and Röpke G[2]

[1] Institute of Problems of Chemical Physics of the Russian Academy of Sciences, Academician Semenov Avenue 1, Chernogolovka, Moscow Region 142432, Russia

[2] University of Rostock, Universitätsplatz 3, Rostock 18051, Germany

[@] yubz@icp.ac.ru

The study of the optics of a dynamic object is a powerful research tool, since optical properties are very sensitive to changes in the electronic subsystem of the medium. At the same time, the correct description of collision processes in a partially ionized dense plasma is possible only on the basis of sufficient information about its optical properties. The results of new experiments on the reflection of polarized light from shock-compressed dense xenon plasma and the first experiments with krypton are presented. The study of polarized reflectivity properties of xenon plasma was accomplished using laser light of the frequency $\nu_{\text{las}} = 4.33 \times 10^{14}$ s^{-1} at incident angles $\theta = 55$–$78°$, $\nu_{\text{las}} = 5.66 \times 10^{14}$ s^{-1} at incident angles $\theta = 0$–$20°$ and $\theta = 60$–$78°$. The first experiments to study the polarization properties of a nonideal krypton plasma were performed using laser light of the frequency $\nu_{\text{las}} = 2.83 \times 10^{14}$ s^{-1} at incident angles $\theta = 0$–$25°$. The optical properties of strongly correlated xenon and krypton plasma were studied at a plasma mass density $\rho = 0.83$ g/cm^3 and $\rho = 1.57$ g/cm^3, accordingly. The composition and thermodynamic parameters of the plasma were determined using the modified Saha IV code [1].

The authors acknowledge financial support by Russian Foundation for Basic Research (RFBR grant 19-52-12039).

[1] Gryaznov V K, Iosilevskiy I L and Fortov V E 2012 *AIP Conf. Proc.* **917** 1426