

Abstract for an Invited Paper
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Shock Experiments on Pre-Compressed Fluid Helium¹

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Hugoniot data were obtained for fluid He in the 100 GPa pressure range by shock compression of samples statically pre-compressed in diamond-anvil cells. The initial (pre-compressed) He density for each experiment was tuned to a value between 1 and 3.3 times the cryogenic liquid density. Maximum observed shock-compression ratios range from 4 to 6 and show an increase in compressibility at the onset of ionization, similar to theoretical predictions. Simultaneous temperature and reflectivity data suggest that ionization is primarily temperature driven, but has an identifiable and significant density component. Fits to a modified Drude model to allow for forbidden electronic energy gaps suggest that the energy gap is relatively independent of temperature and closes with density at about 1.8 g/cc.

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