

Abstract Submitted
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A Transition to Metallic Hydrogen: Evidence of the Plasma Phase Transition¹ ISAAC SILVERA, MOHAMED ZAGHOO, Lyman Laboratory of Physics, Harvard University, Cambridge, MA 02138, ASHKAN SALAMAT, Department of Physics, Univ. of Nevada at Las Vegas — The insulator-metal transition in hydrogen is one of the most outstanding problems in condensed matter physics. The high-pressure metallic phase is now predicted to be liquid atomic from $T=0$ K to very high temperatures. We have conducted measurements of optical properties of hot dense hydrogen in the region of 1.1-1.7 Mbar and up to 2200 K in a diamond anvil cell using pulsed laser heating of the sample. We present evidence in two forms: a plateau in the heating curves (average laser power vs temperature) characteristic of a first-order phase transition with latent heat, and changes in transmittance and reflectance characteristic of a metal for temperatures above the plateau temperature. For thick films the reflectance saturates at ~ 0.5 . The phase line of this transition has a negative slope in agreement with theories of the so-called plasma phase transition.

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