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Pressing Hydrogen into an Atomic Metallic Phase: Implications for Superconductivity:

ISAAC F. SILVERA, Harvard University

One of the great challenges to condensed matter physics is transforming solid molecular hydrogen to the atomic metallic phase predicted by Wigner and Huntington over 80 years ago. We have succeeded in producing metallic hydrogen in a diamond anvil cell at a pressure of 495 GPa. This is the highest pressure ever achieved on hydrogen and we shall discuss the measures taken to achieve this holy grail of high pressure physics. Metallic hydrogen was predicted to be a high temperature superconductor, years ago by Ashcroft; modern calculations predict the possibility of critical temperatures higher than room temperature. Recent high pressure experiments on hydrogen-rich hydrogen sulfide found a critical temperature above 200 K. The future will tell us if the pure substance, atomic metallic hydrogen, will finally achieve the goal of room temperature superconductivity.