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Metallic Hydrogen: A Liquid Superconductor?¹ CRAIG TENNEY, ZACHARY CROFT, JEFFERY MCMAHON, Washington State University — High- and room-temperature superconductivity and metallic hydrogen have been singled out as two of the top three problems in all of physics. Both of these involve dense hydrogen. It is expected that at high pressures, hydrogen becomes metallic, and a superconductor. Recent calculations predict that the critical temperature is above room temperature; and thus that of melting. This suggests that hydrogen may remain superconducting in the liquid phase. In this presentation, we investigate this possibility. Results from first-principles simulations are presented and discussed. Our results show that the critical temperature remains high in the liquid phase, and above that of melting. Metallic hydrogen is therefore expected to be a liquid superconductor. These results significantly improve our understanding of fundamental interactions in condensed matter.

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