

Abstract Submitted
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Observability of a projected new state of matter: a metallic superfluid hydrogen¹ EGOR BABAEV, Cornell University, ASLE SUDBO, NTNU Trondheim, N.W. ASHCROFT, Cornell University — Dissipationless quantum states, such as superconductivity and superfluidity, have attracted interest for almost a century. A variety of systems exhibit these macroscopic quantum phenomena, ranging from superconducting electrons in metals to superfluid liquids, atomic vapours, and even large nuclei. It was recently suggested that liquid metallic hydrogen could form two new unusual dissipationless quantum states, namely the metallic superfluid and the superconducting superfluid. Liquid metallic hydrogen is projected to occur only at an extremely high pressure of about 400 GPa, while pressures on hydrogen of 320 GPa having already been reported. The issue to be addressed is if this state could be experimentally observable in principle. We propose experimental probes for detecting it and discuss recent developments in superconducting/superfluid properties of the projected metallic state of hydrogen or its isotopes.

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