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Violation of the London law and Onsager–Feynman quantization in multicomponent superconductors EGOR BABAEV, University of Massachusetts Amherst, NEIL W. ASHCROFT, Cornell University — Non-classical response to rotation is a hallmark of quantum ordered states such as superconductors and superfluids. The rotational responses of all currently known single-component ‘super’ states of matter (superconductors, superfluids and supersolids) are largely described by two fundamental principles and fall into two categories according to whether the systems are composed of charged or neutral particles: the London law relating the angular velocity to a subsequently established magnetic field and the Onsager–Feynman quantization of superfluid velocity. These laws are theoretically shown to be violated in a two-component superconductor such as the projected liquid metallic states of hydrogen and deuterium at high pressures. The rotational responses of liquid metallic hydrogen or deuterium identify them as a new class of dissipationless states; they also directly point to a particular experimental route for verification of their existence.

Egor Babaev
University of Massachusetts Amherst

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