

A proposal for detecting the spin of a single electron in superfluid helium

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The electron bubble in superfluid helium has two degrees of freedom that may offer exceptionally low dissipation: the electron's spin and the bubble's motion. If these degrees of freedom can be read out and controlled with sufficient sensitivity, they would provide a novel platform for realizing a range of quantum technologies and for exploring open questions in the physics of superfluid helium. We will describe a promising scheme for accomplishing this by trapping an electron bubble inside a superfluid-filled opto-acoustic cavity and reading out its spin using techniques of MRFM (Magnetic Resonance Force Microscopy).

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