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Witnessing the Quantum Spin Liquid in Herbertsmithite

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Herbertsmithite is a leading candidate to host a quantum spin liquid – a long sought state of matter featuring long-range quantum entanglement and fractionalised 'spinon' excitations. However, despite two decades' work, definitive evidence remains lacking. One complicating factor is that the material features significant disorder in the form of magnetic impurities.

I will outline recent work in which we utilise these impurities as 'witnesses' to probe the quantum spin liquid. Using spin noise spectroscopy to measure magnetization fluctuations originating from witnesses, we find unusual 1/f noise developing below a cusp in DC magnetic susceptibility at 260mK. Ageing effects confirm spin glass formation among witnesses.

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