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Signatures of magnetic monopoles in spin ice[1]

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Following the original proposal of the existence of magnetic monopoles as emergent particles in spin ice, this talk focuses on possible experimental signatures of such quasiparticles in the spin ice compounds. In particular, it presents a theory of the low-temperature heat capacity for the gas of monopoles. It discusses direct detection of monopoles via zero-field NMR measurements, which can act as a local probe for the quasiparticle density. Finally, it shows that both the long- and short-range part of the Coulomb interaction between monopoles leaves characteristic traces in, among other quantitites, neutron scattering cross sections.

[1]in collaboration with Claudio Castelnovo (Oxford) and Shivaji Sondhi (Princeton)