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### **Monopole and Dirac string Dynamics in Spin Ice**

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Magnetic frustration in spin ice gives rise to a highly degenerate Coulomb phase ground state with algebraically decaying spin correlations [1], that acts as a vacuum for local *magnetic monopole* excitations [2]. We shall present how the previously unexplained temperature dependence of the time relaxation for a spin ice material  $\text{Dy}_2\text{Ti}_2\text{O}_7$  [3] can be understood in the light of these emergent quasi-particles connected by a network of classical analogues of *Dirac strings* [4]. These experimental data [3] give a clear signature of fractionalised excitations into pairs of opposite magnetic charges, and the dynamical slow down appears as a consequence of the rarefaction of monopoles at low temperature, strengthened by the influence of the Coulomb interactions on the chemical potential of these quasi-particles.

[1] C. Henley Phys. Rev. B **71**, 014424 (2005).

[2] C. Castelnovo & al. Nature **451**, 42-45 (2008).

[3] J. Snyder & al. Phys. Rev. B **69**, 064414 (2004).

[4] L.D.C. Jaubert & P.C.W. Holdsworth, Nat. Phys. **5**, 258 (2009).