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Monopole Quasiparticle Dynamics in Spin Ice via SQUID Magnetometry KENNETH SCHLAX, Univ of Illinois - Urbana, LAURA TROYER, Greenville College, ALEX THALER, Oak Ridge National Laboratory, G. J. MACDOUGALL, D. J. VAN HARLINGEN, Univ of Illinois - Urbana — The spin ice pyrochlore class of frustrated magnets exhibits thermally-activated quasiparticle Dirac monopoles. We use SQUID magnetometry to measure magnetization fluctuations induced by the nucleation and diffusion of monopole/anti-monopole pairs in Dy₂Ti₂O₇ single crystals and thin films grown by pulsed laser ablation. To test aspects of the monopole picture, we also probe the non-equilibrium magnetization from the imbalance of opposite-polarity monopoles induced by the simultaneous application of a temperature gradient that creates a gradient in the monopole pair density and a magnetic field that drives monopole polarities in opposite directions. Under these conditions we seek to observe the monopolar distribution, dynamics, and relaxation in and out of the spin ice regime.

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