Imaging magnetic fluctuations in spin ice $\text{Ho}_2\text{Ti}_2\text{O}_7$

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Theoretically, a special form of spin frustration in classical spin ices results in emergence of excitations that are directly mapped to magnetic monopoles. Experimentally, many aspects of the energetics of the magnetic excitations in spin ices are still not well understood, in part, because of scarcity of experimental tools that can explicitly and directly test for monopole dynamics. Using scanning Superconducting QUantum Interference Device (SQUID) microscopy we obtain real time images of spontaneous magnetic field fluctuations in the spin ice $\text{Ho}_2\text{Ti}_2\text{O}_7$. We determine a distribution of activation energies of spontaneous magnetic excitations from the temperature and frequency dependence of the observed field fluctuations. We compare the extracted energy distributions to the expected ones for monopoles excitations.