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Internal field distribution in spin ice materials CLAUDIO CASTELNOVO, GABRIELE SALA, Royal Holloway University, RODERICH MOESSNER, Max Planck Institute for the Physics of Complex Systems, SHIVAJI SONDHI, Princeton University — At low temperatures, spin ice is populated by a finite density of magnetic monopoles — point like topological defects with a mutual magnetic Coulomb interaction. Here we study the distribution of magnetic fields inside spin ice. This is of conceptual importance as it reflects the monopolar fields set up by defects in a spin ice configuration. We discuss its manifestations in experiments involving local field probes, such as NMR or muon spin rotation. Averaged over the bulk of the sample, this distribution resembles one set up by a random spin arrangement. However, somewhat counter intuitively, the density of low-field locations decreases as the local ferromagnetic correlations imposed by the ice rules develop. The $1/r^2$ Coulomb field of a single monopole is visible in (magnetic) voids of the lattice where lattice-scale effects due to the immediate proximity of other spins are supressed.

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