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Dynamical strings in quantum spin ice YUAN WAN, OLEG TCHERNYSHYOV, Johns Hopkins University — Spin ice is a highly frustrated ferromagnet displaying rich emergent phenomena. Recently, new spin ice materials such as $Yb_2Ti_2O_7$ and $Pr_2Zr_2O_7$ have stood out as possible candidates for quantum spin ice, in which quantum fluctuations could play a major role. In this talk, we discuss new emergent phenomena in quantum spin ice in an external magnetic field applied along the (100) lattice direction. When quantum monopoles are confined by the external field, the open string binding a monopole pair (Dirac string) becomes a dynamical object with a field-dependent tension. The motion of an open string includes longitudinal expansion and contraction and transverse fluctuations. The emergent quantum string theory in this context allows for simple analytical solution and straightforward numerical simulation. Moreover, vibrational modes of the string can be detected by experimental techniques such as neutron scattering and THz spectroscopy.

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