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From pinch points to pinch lines: a new spin liquid on the pyrochlore lattice OWEN BENTON, LUDOVIC JAUBERT, HAN YAN, NIC SHANNON, Okinawa Inst of Sci Tech — One of the most fascinating disoveries in the study of spin liquids has been the existence of emergent gauge fields arising out of a disordered magnetic ground state. The best known example is provided by the spin ice pyrochlores $Ho_2Ti_2O_7$ and $Dy_2Ti_2O_7$, whose underlying gauge structure is revealed by the presence of pinch-point singularities in the neutron scattering response. Here we report the discovery of a new spin liquid on the pyrochlore lattice, the low temperature fluctuations of which are naturally described by the fluctuations of a tensor field with a continuous gauge freedom. This gauge structure underpins a novel form of spin correlations, giving rise to "pinch-line" singularities- line-like analogues of the pinch-point singularity extending along the $\langle 111 \rangle$ directions of reciprocal space. Remarkably, our theory reproduces several otherwise unaccounted for features of neutron scattering experiments on $Tb_2Ti_2O_7$.

Owen Benton
Okinawa Inst of Sci
Tech

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