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Not so accidental degeneracies: origin of dimensional-reduction in the Quantum Spin Ice $Yb_2Ti_2O_7$ LUDOVIC JAUBERT, Okinawa Institute of Science and Technology, HAN YAN, Northwestern University, OWEN BENTON, NIC SHANNON, Okinawa Institute of Science and Technology — Despite being the best-characterised example of a "quantum spin ice" [1], $Yb_2Ti_2O_7$ remains an enigma. One of its most striking, and puzzling, features are the diffuse, rod-like structures seen in quasi-elastic neutron scattering [2]. These suggest that spin fluctuations in $Yb_2Ti_2O_7$ decouple into independent Kagome planes, even though magnetic ions occupy a fully three-dimensional pyrochlore lattice [3]. Here, we use a combination of lattice gauge theory, spin-wave calculations and Monte Carlo simulation, to show how the dimensional-reduction seen in $Yb_2Ti_2O_7$ follows from a two-dimensional branch of excitations "inherited" from a nearby phase transition. This analysis sheds new light on ground state selection in a wide range of rare-earth pyrochlore oxides, including the model "order-by-disorder" system $Er_2Ti_2O_7$.

[1] Ross, Savary, Gaulin & Balents, Phys. Rev. X **1**, 021002 (2011)
[2] Hodges *et al.*, Phys. Rev. Lett. **88**, 077204 (2002)
[3] Ross *et al.*, Phys. Rev. Lett. **103**, 227202 (2009)

Ludovic Jaubert
Okinawa Institute of Science and Technology

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