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**Engineering order–from–disorder** YUKITOSHI MOTOME, RIKEN  
(The Institute of Physical and Chemical Research), KARLO PENC, Research Institute for Solid State Physics and Optics, NIC SHANNON, H. H. Wills Physics Laboratory, University of Bristol — One of the most intriguing features of frustrated magnetism is the prevalence of *order–from–disorder* effects, where fluctuations conspire to select a unique state from a disordered manifold of degenerate classical ground states. Quite generally, order–from–disorder effects favour collinear spin configurations, and therefore lead to magnetization plateaux in many two–dimensional frustrated spin systems. Much less is known about order from disorder in three dimensions. Here we use classical Monte Carlo and low–T expansion techniques to show how thermal fluctuations stabilize a half–magnetization plateau in a Heisenberg model on the highly frustrated, three–dimensional Pyrochlore lattice if — and only if — they are given a “helping hand” by additional longer–ranged interactions. Our results provide the first example of fluctuation–driven magnetization plateau which can be tuned at will between different ordered states.

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