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Effective Spin-1/2 Model in Frustrated Magnetic Rare-Earth Pyrochlore Insulators

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Effective spin-1/2 degrees of freedom coupled by exchange-like interactions commonly arise in theoretical modeling of magnetic systems. A textbook example is the Mott-Hubbard model at half-filling which one can recast as a spin-1/2 model with exchange interactions supplemented by multiple-spin (ring-exchange) couplings. In this talk, I will discuss how in the past few years the description of frustrated magnetic rare-earth pyrochlores in terms of spin-1/2 degrees have allowed one to make steadfast progress in understanding the fascinating collective phenomena displayed by these materials.

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