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Multiferroic behavior in trimerized Mott insulators

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Los Alamos National Laboratory — We demonstrate multiferroic behavior in trimerized Mott insulators through the interplay between spins and electric dipole moments resulting from electronic charge fluctuations in frustrated units [L. N. Bulaevskii, C. D. Batista, M. V. Mostovoy, and D. I. Khomskii, Phys. Rev. B 78, 024402 (2008)]. The model consists of stacked triangular layers of trimers with small inter-trimer exchange interactions J' and J'' . We construct a phase diagram using a semi-classical approach. Ferroelectric states coexist with ferro- or antiferromagnetic orderings depending on the value of the magnetic field H and the sign of the inter-layer exchange J'' . The electric polarization undergoes abrupt changes as a function of H .

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