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Chiral magnetism and spin liquid Mott insulators induced by synthetic gauge fields ARUN PARAMEKANTI, CIARAN HICKEY, University of Toronto, LUKASZ CINCIO, Perimeter Institute, ZLATKO PAPIC, University of Leeds, ARUN VELLAT-SADASHIVAN, RAMANJIT SOHAL, University of Toronto — Recent experiments using Raman-assisted tunneling or lattice-shaking have realized synthetic gauge fields and optical lattice bands with nontrivial band topology. Here we examine the effect of particle interactions in such bands, focussing on two-component fermions with local Hubbard repulsion. We show that interactions can drive the integer quantum Hall insulator into Mott insulating states which possess noncoplanar chiral magnetic textures and even chiral spin liquids with many-body topological order. We establish our results using a combination of mean field theory, strong coupling expansions, numerical exact diagonalization and DMRG methods. We also discuss possible signatures of such non-coplanar orders in Bragg scattering and noise measurements.

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