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Crystal-symmetry preserving Wannier states for fractional Chern insulators CHAO-MING JIAN, XIAO-LIANG QI, Department of Physics, Stanford University — Recently, many numerical evidences of fractional quantum anomalous states (FQAH states), i.e. the fractional quantum Hall states (FQH states) on lattice, when a band with non-zero Chern number (We refer to it as a Chern band) is partially filled. Some trial wavefunction of FQAH states can be obtained by mapping the FQH wavefunctions defined in the continuum onto the lattice through the scheme proposed in Ref. [1] in which the single particle Landau orbits in the Landau levels are mapped to the one dimensional Wannier wavefunctions (which is a plane wave on the other direction) of the Chern bands with Chern number C=1. However, this mapping will generically break the lattice rotational symmetry. In this talk, we shall present a modified scheme to accommodate the mapping with the lattice rotational symmetry. The wavefunctions constructed through this modified scheme should serve as better trial wavefunctions to compare with the numerics. The focus of the talk shall be mainly on the C4 rotational symmetry of square lattices. Related issues on C6 symmetry of honeycomb lattice and higher Chern number bands will be discussed. [1] X.-L. Qi, Phys. Rev. Lett. 107, 126803 (2011)

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