Classification of Spin Ordering of Fermions with Large Spin BIAO HUANG, TIN-LUN HO, Ohio State Univ - Columbus — Cold atom research provides a unique opportunity for studying the physics of high spin particles, as most bosonic atoms have non-zero spin, and most fermionic atoms have spin larger than 1/2. While there have been many experiments of large spin bosons, there are few experimental studies of large spin fermions. Here, we present a general scheme for classifying the spin ordering of fermions with arbitrary spins by studying the symmetry of their single particle density matrices. Our scheme is based on the Majorana representation of spins, which provides a geometric representation of the ordering in spin space. It readily concludes that there are no spin orders with tetrahedron symmetry. We have also used mean field theory to illustrate the emergence of various type of spin ordering.

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