

Abstract Submitted
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Unconventional superfluidity with non-collinear orbital order HUBERT NGUYEN, ZI CAI, CONGJUN WU, UC San Diego — We propose an unconventional superfluid with spontaneous time-reversal symmetry breaking in p-orbital bands of cubic optical lattices. We find that in contrast to the square lattice which exhibits an antiferromagnetic orbital angular momentum (OAM), quantum fluctuations in the cubic lattice select an exotic superfluid state with non-collinear orderings of OAM moments. The collective excitations and phase transitions in this unconventional superfluid have also been discussed. This exotic superfluid state has no counterpart in solid state systems.

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