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Dual vortex theory of doped antiferromagnets SUBIR SACHDEV, Harvard University, LEON BALENTS, University of California, Santa Barbara —
We present a general framework for describing the quantum phases obtained by doping paramagnetic Mott insulators on the square lattice. The undoped insulators are efficiently characterized by the projective transformations of various fields under the square lattice space group (the PSG). We show that the PSG also imposes powerful constraints on the doped system, and enables derivation of an effective action for the vortex and Bogoliubov quasiparticle excitations of superconducting states. This action also describes transitions to supersolid or insulating states at nonzero doping. For the case of a valence bond solid (VBS) insulator, we show that the doped system has the same PSG as that of elementary bosons with density equal to the density of electron pairs. We also obtain the action for a d-wave superconductor obtained by doping a "staggered-flux" spin liquid state.

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