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Doping the Kane-Mele-Hubbard model: A Slave-Boson Approach[1] JUN WEN, MEHDI KARGARIAN, University of Texas at Austin, ABOLHASSAN VAEZI, Institute for Research in Fundamental Sciences, IPM, 19395-5531, Iran; Department of Physics, Sharif University of Technology, Tehran 11155-9161, Iran, GREGORY FIETE, University of Texas at Austin — We study the Kane-Mele-Hubbard model both at half-filling and away from half-filling using a slave-boson mean-field approach at zero temperature. We obtain a phase diagram at half-filling and discuss its connection to recent results from quantum Monte Carlo, cellular dynamical mean field, slave-rotor, and Z_2 mean-field studies. In particular, we find a small window in parameter space where a spin liquid phase with gapped spin and charge excitations reside. Upon doping, we show the spin liquid state becomes a superconducting state by explicitly calculating the singlet pairing order parameters. Interestingly, we find an "optimal" doping for such superconductivity. Our work reveals some of the phenomenology associated with doping an interacting system with strong spin-orbit coupling and intermediate strength electron-electron interactions.

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