ABSTRACT

This thesis work explores the possibility of finding exotic superconducting states in the extended attractive Hubbard model. The model is studied within a mean-field Bogoliubov-de-Gennes approach focusing on the nature of different superconducting order parameters that can be energetically stable in different regimes of the parameter space. In addition to pure singlet and pure triplet superconducting order, mixed par- ity states are also allowed within the mean-field decoupling approach followed in this work. In addition to s-wave and d x 2 −y 2 -wave order, an exotic p x + ip y superconduct- ing state is found to exist. The influence of temperature and an external magnetic field is also studied. The transition between superconducting states with different order parameter symmetries is uncovered upon variations in temperature or external magnetic field. The details of the numerical methodology developed to investigate su- perconductivity in the extended attractive Hubbard model, and the characterization of the different superconducting states obtained in the study will be discussed.