

D-WAVE PAIRING AND DENSITY WAVES FOR BCS-LIKE MODELS

M. Engelmann

Department of Mathematics, Aarhus University

Unlike the theory of conventional superconductors, where the BCS-theory can explain the emergence of a superconducting state, the mechanism leading to high T_c superconductivity does not seem to be fully understood. Experimental physics however provides a variety of characteristic properties of these materials such as the restriction of the superconducting phenomena to a two dimensional plane, periodic charge modulation and d-wave superconductivity. In this talk I will present a class of BCS-like interactions for a high T_c superconductor on a two dimensional lattice and specify on how these characteristic properties can be modeled from a mathematical viewpoint. Furthermore, I will prove that for any temperature T there exists an interaction Φ within this class such that the free energy density functional $f(\Phi)$ at inverse temperature $\beta = \frac{1}{T}$ has a minimizer ρ such that the expectation values taken with respect to ρ satisfy the mathematical properties stated at the beginning.