Persistent Currents in Mesoscopic Superconducting Rings

We present a model within the BCS framework to describe the crossover from h/e-periodic Aharonov-Bohm type persistent currents in the normal state of a mesoscopic ring to the h/2e-periodic persistent currents in the superconducting state (Little-Parks oscillations). We pay special attention to d-wave superconductors, using the Bogoliubov - de Gennes equations for self consistent numerical calculations of the order parameter in ring geometries and show that due to the d-wave symmetry, a h/e-periodic component of the persistent current survives in the superconducting state for rings of any size.