MAR11-2010-004526

Abstract for an Invited Paper
for the MAR11 Meeting of
the American Physical Society

The spin density wave quantum phase transition in two dimensional metals

SUBIR SACHDEV, Harvard University

The mean-field theory for the onset of spin density wave order in a metal describes a quantum phase transition which reconstructs the "large" Fermi surface to small Fermi pockets. Fluctuations near this transition are described by a quantum field theory of fermions near the reconstruction points, and the bosonic order parameter. This field theory is shown to be strongly-coupled in two spatial dimensions. We find an instability near the quantum critical point to d-wave pairing: this is a "log-squared" instability, stronger than the familiar logarithmic BCS instability. A similar instability is also found towards a modulated bond order. We also discuss an alternative route for the onset of spin density wave order, via intermediate non-Fermi liquid phases which have small Fermi pockets but without long-range spin density wave order.

M. A. Metlitski and S. Sachdev, Physical Review B **82**, 075128 (2010)
S. Sachdev, M. A. Metlitski, Y. Qi, and C. Xu, Physical Review B **80**, 155129 (2009)