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Quantum oscillations and nodal pockets from Fermi surface reconstruction in the underdoped cuprates

NEIL HARRISON[1], Los Alamos National Laboratory

Fermiology in the underdoped high T_c cuprates presents us with unique challenges, requiring experimentalists to look deeper into the data than is normally required for clues. Recent measurements of an oscillatory chemical potential affecting the oscillations at high magnetic fields provide a strong indication of a single type of carrier pocket. When considered in conjunction with photoemission and specific heat measurements, a Fermi surface comprised almost entirely of nodal pockets is suggested. The mystery of the Fermi surface is deepened, however, by a near doping-independent Fermi surface cross-sectional area and negative Hall and Seebeck coefficients. We explore ways in which these findings can be reconciled, taking an important hint from the diverging effective mass yielded by quantum oscillations at low dopings. The author wishes to thank Suchitra Sebastian, Moaz Atarawneh, Doug Bonn, Walter Hardy, Ruixing Liang, Charles Mielke and Gilbert Lonzarich who have contributed to this work. The work is supported by the NSF through the NHMFL and by the DOE project "Science at 100 tesla."

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