Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Sorting Category: 05.4 (T)

Effective theory of underdoped cuprates and the puzzle of superfluid density IGOR HERBUT, Simon Fraser University — I will discuss the recently proposed low-energy description of fluctuating d-wave superconductors (I. F. Herbut, PRL 94, 237001 (2005)), and its implications for the evolution of the superfluid density with doping and temperature. Recent experiments find that while the T=0 superfluid density becomes reduced by more than two orders of magnitude by going from optimal to extremely underdoped regime in single crystals of YBCO, the slope of the temperature dependence stays roughly the same. This apparent violation of the Ioffe-Larkin rule, argued otherwise rather generally to hold in the underdoped regime, is explained as being due to the particular form of the bosonic (fluctuation) term, which resembles the condensate of the weakly interacting layered Bose gas. This suggests that, its linear appearance notwithstanding, the reduction of the superfluid density with temperature in extremely underdoped cuprates may be due to phase fluctuations over most of the temperature range. Further experimental tests of this idea will be proposed.

[X] Prefer Oral Session
[ ] Prefer Poster Session

Igor Herbut
iherbut@sfu.ca
Simon Fraser University

Date submitted: 28 Nov 2005 Electronic form version 1.4