Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Scaling disparity between superconducting and pseudogap states in very low-T_c Bi-2201 cuprates VLADIMIR KRASNOV, Department of Physics, Stockholm University, AlbaNova University Center, SE-10691 Stockholm, Sweden — Interplay between the normal state pseudogap (PG) and superconductivity in cuprates remains a controversial issue. In this respect it is instructive to compare homologous series of cuprates with a different number of CuO planes. They have similar Fermi energies, resistivities and anisotropies, but exhibit a large variation of T_c. Since thermal fluctuations vanish at $T = 0$, they are less significant at $T \sim T_c$ in low-T_c cuprates. In this work we compare intrinsic tunneling characteristics of double-layer Bi-2212 (T_c=95 K) and single-layer Bi-2201 with a very low $T_c \sim 4$ K. We observe that: (i) The PG characteristics of both cuprates are identical despite a large difference in T_c. Thus, the PG phenomenon is universal irrespective of superconducting properties. (ii) In the low-T_c Bi-2201, all superconducting characteristics scale down with T_c in the same proportion as for high-T_c cuprates. This leads to a dramatic disparity between superconducting ($T_c = 4$ K, energy gap < 1 meV, $H_{c2} \sim 10$ T) and pseudogap (onset $T^* = 90 - 300$ K, PG energy ~ 40 meV, PG suppression field $H^* \sim 250$ T) characteristics in the studied low-Tc cuprate. The observed disparity of the superconducting and pseudogap scales clearly reveals their different origins.

Vladimir Krasnov
Department of Physics, Stockholm University,
AlbaNova University Center, SE-10691 Stockholm, Sweden

Date submitted: 30 Oct 2012 Electronic form version 1.4