Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

From Fermi Arcs to Nodal Metal: Scaling of the Pseudogap with Temperature and Doping AMIT KANIGEL, Univ. of Illinois at Chicago, M.R. NORAMN, Materials Science Div., ANL, M. RANDERIA, Dept. of Physics, Ohio State Univ., U. CHATERJEE, Dept. of Physics, Univ. of Illinois at Chicago, A. KAMINSKI, H.M. FRETWELL, Ames Laboratory and Dept. of Physics and Astronomy, Iowa State Univ., S. ROSENKRANZ, Materials Science Div., ANL, M. SHI, Dept. of Physics, Univ. of Illinois at Chicago, T. SATO, T. TAKAHASHI, Dept. of Physics, Tohoku Univ., Japan, Z.Z. LI, H. RAFFY, Laboratorie de Physique des Solides, Universite Paris-Sud, France, K. KADWAKI, Inst. of Materials Science, Univ. of Tsukuba, Japan, J.C. CAMPUZANO, Dept. of Physics, Univ. of Illinois at Chicago — The pseudogap phase in the cuprates is a most unusual state of matter[1−4]: it is a metal, but its Fermi surface is broken up into disconnected segments known as Fermi arcs[5]. Using angle resolved photoemission spectroscopy, we show that the anisotropy of the pseudogap in momentum space and the resulting arcs depend only on the ratio $T/T^*(x)$, where $T^*(x)$ is the temperature below which the pseudogap first develops at a given hole doping, x. In particular, the arcs, which extend at T^* to the hot spots where the antiferromagnetic zone boundary crosses the Fermi surface, collapse linearly with T/T^* and extrapolate to zero extent as T 0. This suggests that the $T = 0$ state is a nodal liquid, a strange metallic state whose gapless excitations are located only at points in momentum space, just as for a *d-wave* superconductor.

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Date submitted: 04 Dec 2005 Electronic form version 1.4