Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Power Law Liquid – A Unified Form of Low-Energy Nodal Electronic Interactions in Hole Doped Cuprate Superconductors DANIEL DESSAU, TED REBER, XIAOQING ZHOU, NICK PLUMB, STEPHEN PARHAM, JUSTIN WAUGH, YUE CAO, ZHE SUN, HAOXIANG LI, QIANG WANG, Univ of Colorado - Boulder, J.S. WEN, Z.J. XU, GENDA GU, Brookhaven National Labs, Y. YOSHIDA, HIROSHI EIASKI, AIST, Tsukuba, Japan, GERALD ARNOLD, Univ of Colorado - Boulder, UNIVERSITY OF COLORADO, BOULDER TEAM, BROOKHAVEN NATIONAL LABS TEAM, AIST, TSUKUBA, JAPAN TEAM — Based upon detailed ARPES measurements of Bi2Sr2CaCu2O8+δ over a wide range of doping levels, we present a new unifying phenomenology for the non-Fermi liquid normal-state interactions (scattering rates) in the nodal direction. This new phenomenology has a continuously varying power law exponent (hence named a Power Law Liquid or PLL), which with doping varies smoothly from a quadratic Fermi Liquid to a linear Marginal Fermi Liquid and beyond. Using the extracted PLL parameters we can calculate the optics and resistivity over a wide range of doping and normal-state temperature values, with the results closely matching the experimental curves. This agreement includes the presence of the T* "pseudogap" temperature scale observed in the resistivity curves including the apparent quantum critical point.

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Date submitted: 06 Nov 2015 Electronic form version 1.4