Abstract Submitted
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A pressure induced insulator-to-metal critical point in the copper-oxides[1] TANJA CUK, Stanford University, VIKTOR STRUZHKIN, Carnegie Institution of Washington, THOMAS DEVEREAUX, University of Waterloo, ALEXANDER GONCHAROV, Carnegie Institution of Washington, CHRISTOPHER KENDZIORA, Naval Reseach Laboratory, HIROSHI EISAKI, National Insitute of Advanced Industrial Science and Technology, HO-KWANG MAO, Carnegie Institution of Washington, ZHI-XUN SHEN, Stanford University — The presence of a quantum critical point inside the superconducting dome is a novel ideal unifying high-Tc superconductivity in the copper-oxides with that of other unconventional superconductors in strongly correlated materials. Experimental progress, however, has been difficult since superconductivity protects it from most direct measurements. Yet, the tuning parameter of all efforts to date has been chemical doping, which varies crystal fields, electron-phonon, and electron-electron interactions with potentially very different physical metrics. We report pressure tuned Raman and x-ray scattering data revealing an insulator-to-metal critical point near 20GPa with anomalies in six physical quantities: electronic Raman background, phonon lineshape and temperature dependence, density dependent behaviour of phonon and magnon frequencies, and a subtle structural change in the c-axis. We also suggest why this critical point may be near optimal doping in the high-Tc phase diagram.

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