

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**The ground state of the quasi-one-dimensional cuprate  $\text{PrBa}_2\text{Cu}_4\text{O}_8$ : field-induced dimensional crossovers and disorder-induced one-dimensionality** ALESSANDRO NARDUZZO, ARAZ ENAYATI-RAD, University of Bristol, SHIGERU HORII, University of Tokyo, FEDOR BALAKIREV, Los Alamos National Laboratory, NIGEL HUSSEY, University of Bristol —  $\text{PrBa}_2\text{Cu}_4\text{O}_8$ , the non-superconducting analogue of the high- $T_c$  cuprate  $\text{YBa}_2\text{Cu}_4\text{O}_8$ , is an extremely anisotropic quasi-one-dimensional (Q1D) metal ( $t_b^2: t_a^2: t_c^2 \sim 4000: 2: 1$ ). The in-chain ( $b$ -axis) charge dynamics were investigated as a function of temperature and applied magnetic field for several samples of different disorder content. Measurements in magnetic fields up to 65 T confirm the correspondence between dimensional crossovers due to magnetic field carrier confinement and temperature-induced decoherence, opening the possibility of accessing the Tomonaga-Luttinger liquid state in this material. A metal-insulator transition is observed with increasing disorder concentration for samples with nominal mean free path of  $\sim 100b$ . The onset of this remarkable localisation phenomenon reveals a striking correlation between the scattering rate and the interchain hopping rate(s), suggesting a *disorder*-induced crossover to a one-dimensional (1D) ground state.  $b$ -axis magnetoresistance measurements were performed in order to identify the nature and properties of the Q1D metallic and disorder-induced 1D insulating states.

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Date submitted: 04 Dec 2005

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