Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Extended frequency dependence of the infrared Hall Effect in electron-doped high $\mathbf{T}_c$ cuprate $\mathbf{Pr}_{2-x}\mathbf{Ce}_x\mathbf{CuO}_4$ M. HOUSEKNECHT, G. ACBAS, M.-H. YANG, J. CERNE, Physics Dept., Univ. at Buffalo, SUNY, Buffalo, NY, A. ZIMMERS, L. SHI, D.C. SCHMADEL, R.L. GREENE, H.D. DREW, Physics Dept., Univ. of Maryland, College Park, MD — Although the infrared longitudinal conductivity σ_{xx} in $Pr_{2-x}Ce_xCuO_4$ can be modeled using a Drude model which includes density wave (DW) excitations at low temperatures and low doping concentrations (Zimmers, PRB 2004), the infrared Hall conductivity σ_{xy} exhibits behavior (Zimmers, cond-mat/0510085) that is not consistent with this model even outside of the DW phase. By measuring the rotation and ellipticity of the polarization of transmitted light through a sample in magnetic fields up to 7 T, the infrared Faraday angle is determined in the 115 to 366 meV (930-3000 cm^{-1}) energy range. The Faraday angle is closely related to the Hall angle and σ_{xy}, which provide a sensitive test of the many-body interactions that could lead to deviations from Drude behavior. Three samples with doping levels of $x = 0.12$, 0.15 and 0.18 are probed at temperatures ranging from 50 K to 300 K. Non-Drude behavior is observed in the Faraday angle, which also changes sign as a function of frequency and temperature from electron-like to hole-like as expected from the hole-like underlying Fermi surface. Supported by the Research Corporation Cottrell Scholar Award (UB), NSF CAREER Award (UB), NSF DMR-0352735 (UMCP) and NSF DMR-0303112 (UMCP).

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Date submitted: 30 Nov 2005 Electronic form version 1.4