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Hall scattering rates of doped GaAs and $Bi_2Sr_2CaCu_2O_{2+x}$ L. SHI, D.C SCHMADEL, H.D. DREW, Center for Superconductivity Research, Department of Physics, University of Maryland, College Park, MD 20742 — Magneto-optical measurement of infrared Hall effect provides important information about the Fermi surface topography and carrier scattering rates of metals. A recent study (Rigal et.al. Phys. Rev. Lett. vol 93, 137002 (2004)) of IR Hall effect of underdoped $YBa_2Cu_3O_{6+x}$ reveals a dramatic increase of the Hall frequency for underdoped samples, consistent with a partial gapping of the Fermi surface as predicted in density wave models. The scattering rates, or imaginary parts of self energies of quasiparticles of cuprate superconductors have been shown by various experimental techniques (transport, optical, APRES) to have a linear dependence on frequencies. The scattering rates measured by IR Hall effect, however, have been found to be frequency independent. In this study, we compare the infrared Hall response of doped GaAs with that of underdoped $Bi_2Sr_2CaCu_2O_{2+x}$ samples to investigate the origin of the apparent independence of Hall scattering rate of cuprate superconductors on frequency. The measurements are carried out from 900-1100 cm^{-1} in fields to 8 T and temperatures from 10 K to 300 K. The GaAs sample is Si doped at $6x10^6$ cm^{-3}. The Faraday angle gives a measure of the carrier density and the circular dichroism measures the carrier scattering rates. (Work supported by NSF grant DMR-0303112).

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