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The mid-infrared Hall effect in optimally-doped $Bi_2Sr_2CaCu_2O_{8+\delta}$[1] DON SCHMADEL, Department of Physics, University of Maryland, College Park, Maryland 20742 USA, GENDA GU, Department of Physics, Brookhaven National Laboratory, Upton, New York 11973 USA, H.D. DREW, Department of Physics, University of Maryland, College Park, Maryland 20742 USA — Heterodyne polarometry is used to measure the frequency dependence in the mid IR from 900 to 1100 cm$^-$1 and temperature dependence from 35 to 330 K of the normal state Hall transport in single crystal, optimally doped $Bi_2Sr_2CaCu_2O_{8+\delta}$. The results show a simple Drude behavior in the Hall conductivity σ_{xy} which stands in contrast to the more complex, extended Drude behavior for the longitudinal conductivity σ_{xx}. The mid IR Hall scattering rate γ_{xy} increases linearly with temperature and has a small, positive, projected intercept at $T = 0$. The longitudinal scatter rate, in contrast, is much larger and exhibits very little temperature dependnece. The Hall frequency indicates a carrier mass which is 6.7 times the band mass and which decrease slighly with increasing frequency. These disparate behaviors are consistent with calculations based on the fluctuation-exchange interaction using current vertex corrections (H Kontani, cond-mat/0507664).

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Don Schmadel
Department of Physics, University of Maryland, College Park, Maryland 20742 USA

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