Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Deviations from Drude response in $CaRuO_3$ SAEID KAMAL, STEVE DODGE, Department of Physics, Simon Fraser University, B.C., V5A-1S6, Canada, DONG-MIN KIM, CHANG-BEOM EOM, Department of Materials Science and Engineering, University of Wisconsin-Madison, Madison, Wisconsin 53706 — We report on the low frequency optical conductivity measurements of epitaxial thin films of $CaRuO_3$, obtained with time-domain terahertz spectroscopy. We find that the conductivity does not follow a simple Drude form, even at low temperatures and frequencies; alternative power-law forms also fail to describe it adequately. To achieve a good fit to the experimental data, we find it necessary to use a multi-component model consisting of multiple *Drude* terms and a finite frequency Lorentzian. This parameterization allows us to set an upper bound on the free-carrier spectral weight, from which we can set a lower bound on the renormalized mass of $m^*/m \cong 10$. If the scattering is assumed to be isotropic, our results imply a frequency dependence in the mass enhancement and scattering rate that extends well below terahertz frequencies. However, our results are also consistent with frequency-independent carrier dynamics that vary strongly over the Fermi surface.

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Date submitted: 30 Nov 2005 Electronic form version 1.4