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The role of spin fluctuations in the conductivity of CrO_2[1] KATE HEFFERNAN, D. TALBAYEV, Tulane University, XUEYU ZHANG, A. GUPTA, University of Alabama — Chromium dioxide is a half-metallic ferromagnet with T_C =390K. Below T_C, the conductivity of CrO_2 grows by two orders of magnitude and is temperature independent below about 30 K. It is believed that electron scattering by spin fluctuations is responsible for the strong temperature dependence of the conductivity. We performed time-resolved THz spectroscopy (TRTS) and time-resolved magneto-optical Kerr effect (TRMOKE) to study the role of spin fluctuations in electron conduction. A thin film CrO_2 sample was excited by an optical pump pulse. The induced conductivity changes were measured by TRTS and the induced spin response by TRMOKE. A fast and a slow component were observed in both responses. The fast component dominates the TRTS response, while the slow dominates the TRMOKE which we attribute to the spin demagnetization in CrO_2. Since the slow component contributes only a small fraction of the total conductivity change in TRTS, we conclude that spin fluctuations may not play the dominant role in the pump-induced conductivity change. We also observed that the film transmits less THz light after the pump excitation, which corresponds to it becoming more conductive. We will discuss the relationship of our observations to the electronic and optical properties of CrO_2.

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