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Optical Birefringence and Dichroism of Cuprate Superconductors in the THz regime[1] Y. LUBASHEVSKY, LIDONG PAN, The Institute of Quantum Matter, Department of Physics and Astronomy, Johns Hopkins University, Baltimore, MD 21218, USA, T. KIRZHNER, G. KOREN, Department of Physics, Technion, Haifa 32000, Israel, N.P. ARMITAGE, The Institute of Quantum Matter, Department of Physics and Astronomy, Johns Hopkins University, Baltimore, MD 21218, USA — The presence of optical polarization anisotropies, such as Faraday/Kerr effects, linear birefringence, and magnetoelectric birefringence are evidence for broken symmetry states of matter. The recent discovery of a Kerr effect using near-IR light in the pseudogap phase of the cuprates can be regarded as a strong evidence for a spontaneous symmetry breaking and the existence of an anomalous long-range ordered state. In this work we present a high precision study of the polarimetry properties of the cuprates in the THz regime. While no Faraday effect was found in this frequency range to the limits of our experimental uncertainty (1.3 milli-radian or 0.07°), a small but significant polarization rotation was detected that derives from an anomalous linear dichroism. In $YBa_2Cu_3O_y$ the effect has a temperature onset that mirrors the pseudogap temperature T^* and is enhanced in magnitude in underdoped samples. In $x = 1/8$ $La_{2-x}Ba_xCuO_4$, the effect onsets above room temperature, but shows a dramatic enhancement near a temperature scale known to be associated with spin and charge ordered states. These features are consistent with a loss of both C_4 rotation and mirror symmetry in the electronic structure of the CuO_2 planes in the pseudogap state.

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