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Development of broadband circularly polarized Terahertz spectroscopy[1] ROLANDO VALDÉS AGUILAR, EVAN V. JASPER, THUC T. MAI, MATTHEW T. WARREN, DANIEL M. HELIGMAN, REBEKAH SMITH, Department of Physics. The Ohio State University. Columbus, OH 43210 — The development of polarization sensitive detection of THz picosecond pulses is being actively pursued with a variety of methods. However, highly sensitive techniques have only been developed with single frequency sources, such as far-infrared lasers, and only recently have similar techniques been shown to work with pulsed THz radiation. One of the jarring deficiencies is that of broadband circularly polarized THz pulses. This is mostly because circular polarization generation is based on birefringent materials that will only generate the right phase shift for a singular combination of thickness and frequency. We have overcome these deficiencies by using an array of Fresnel rhombs made of the plastic Topas. With its constant refractive index throughout the THz range and negligible absorption, it has allowed us to generate true broadband THz pulses. We use these arrays to study the magneto-optical properties of a 2D electron gas in a quantum well of GaAs-AlGaAs. We show explicitly the differences between cyclotron resonance active and inactive circular conductivities. We project that this technique will be extremely powerful in the study of novel states of matter in both 2D and 3D materials.

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