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Magneto-transport Characterization of Thin Film In-plane and Cross-plane Conductivity[1] YANG TANG, MATTHEW GRAYSON, Northwestern Univ — Thin films with highly anisotropic in-plane and cross-plane conductivities are widely used in devices, such as infrared emitters and detectors, and the proper magneto-transport characterization in both directions can reveal information about the doping density, impurities, carrier life times and band structure. This work introduces a novel method for deducing the complete anisotropic electrical conductivity tensor of such an anisotropic resistive layer atop a highly conducting bottom contact, which is a standard part of the device structure. Three strip-line contacts separated by a length scale comparable to the film thickness are applied atop the resistive thin film layer of interest, with the highly conducting back-plane as a back-contact. The potential distribution in the device is modeled, using both scaling and conformal transformation to minimize the calculated volume. As a proof of concept, triple strip-line devices for GaAs and GaAs/AlGaAs superlattice thin films are fabricated. To achieve narrow strip-line contacts with sub-micron scale widths, non-annealed Ni/Au contacts form ohmic contacts to a patterned n^+-GaAs cap layer atop the anisotropic thin films. Preliminary experimental data will be presented as a validation of this method.

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