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Far-infrared Magneto-Spectroscopic Studies of $Ca_3Co_4O_9$ Thin Films and Single Crystals[1] JIUFENG TU, DIMITAR DIMITROV, CCNY, WEIDONG SI, QIANG LI, BNL — In recent years, the 2D-layered cobaltates have emerged as promising p-type thermoelectric materials due to their unique combinations of high thermo-coefficient and good metallic transport properties. These systems show high thermoelectric figure of merit and are ideal candidates as the materials of choice at elevated temperatures. We have carried out far- infrared magneto-spectroscopic studies of $Ca_3Co_4O_9$ thin films in Faraday geometry as a function of frequency, magnetic field and temperature with the emphasis on the coupling between the lattice, the charge and the spin degrees of freedom. Far infrared transmission reduces at low frequencies in the presence of magnetic field corresponding to negative magneto-resistance. Below 20K, hysterisis occurs. However, the spectral responses to magnetic field and temperature are different. This indicates that the negative magneto-resistance is due to reduced magnetic scattering when Co spins become aligned. Further infrared studies will be performed with magnetic field parallel to the CoO_2 layers. A good understanding of our infrared results should shed light on the origin of high thermo-power in these 2D-layered cobaltates.

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