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**Infrared Magnetospectroscopy of Dirac Plasmons in Topological Insulator Ribbons** YUXUAN JIANG, WENLONG YU, Georgia Tech, JEAN-MARIE POUMIROL, National High Magnetic Field Laboratory, MATTHEW BRAHLEK, Rutgers University, NIKESH KOIRALA, SEONGSHIK OH, Rutgers University, WEI PAN, Sandia National Laboratories, DMITRY SMIRNOV, National High Magnetic Field Laboratory, ZHIGANG JIANG, Georgia Tech — We present the infrared spectroscopy study of magnetoplasmons in patterned topological insulator ( $\text{Bi}_2\text{Se}_3$ ) ribbon arrays. The measurement is performed in Faraday configuration with incident infrared light polarized parallel or perpendicular to the ribbon direction and in a high magnetic field up to 18 T. We demonstrate that the collective oscillations of Dirac fermions (i.e., plasmons) in topological insulators can be coupled with the cyclotron resonance, forming the so-called upper-hybrid-mode. This mode exhibits a characteristic magnetic field dependence, with an effective mass consistent with that obtained from the unpatterned two-dimensional sample. Due to the high quality of the MBE grown topological insulator thin films, a higher order plasmon mode is also evidenced in our measurements. This work is supported by the DOE (DE-FG02-07ER46451), the NSF (DMR-0845464), and the ONR (N000141210456).

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