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Anomalies in the magneto-optical conductivity of twisted multilayer epitaxial graphene ALEXEY B. KUZMENKO, IRIS CRASSEE, JULIEN LEVALLOIS, DIRK VAN DER MAREL, University of Geneva, Switzerland, ANDREW L. WALTER, Advanced Light Source, USA., THOMAS SEYLLER, University of Erlangen-Nuremberg, Germany — The nature of the electronic coupling between carbon layers in twisted multilayer graphene is an intriguing and hot-debated issue. We measured the Faraday rotation and optical absorption spectra of twisted graphene multilayers grown on the carbon face of SiC in the far-infrared range in magnetic fields up to 7 Tesla [1,2]. Multiple spectral components are identified, which include a quasi-classical cyclotron resonance, originating from the highly doped graphene layer closest to SiC, transitions between low-index Landau levels (LLs), which stem from quasineutral outer layers and a broad optical absorption background, which provenance is less obvious. Electron- and hole-type LL transitions are optically distinguished and shown to coexist. The variation of the Fermi velocity is about 10 percent across the layers. Our central observation is an anomalously small optical spectral weight of the individual LL transitions, which is likely caused by the unusual electronic coupling between randomly stacked graphene layers.

[1] I. Crassee *et al.* Nature Phys. **7**, 48 (2011).
[2] I. Crassee *et al.* Phys Rev B **84**, 035103 (2011).

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