Abstract Submitted
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Magneto-optical reflectance studies of a quasi-one-dimensional topological insulator $\alpha - Bi_4I_4$ YOUCHENG WANG, National High Magnetic Field Laboratory, NIKHIL DHALE, HANLIN WU, BING LV, FAN ZHANG, University of Texas at Dallas, GUANGXIN NI, National High Magnetic Field Laboratory, Florida State University — $\alpha - Bi_4I_4$, a small-bandgap, quasi-one-dimensional topological insulator, was predicted to host a rare high-order-topological order and helical hinge states. Recent high-resolution ARPES measurements found that the quasi-1D Dirac-like surface state on the (100) surface opens a gap of $\approx$ 35 meV within the bulk bandgap, consistent with the theoretic predictions. Here we report high-magnetic-field optical reflectance measurements of the (100) surfaces in the Voigt geometry ($B//E//(100)$) at liquid helium temperatures. The reflectance referenced to the zero-field data exhibits multiple prominent inter-band transitions both in the far-infrared and mid-infrared range, with constant, linear, quadratic, or non-monotonic dependences on the magnetic field. This allows the identification of Landau level dispersions and inverted band gaps. The observation of the two lowest energy band transitions at 14.2 meV and 16.4 meV may be related to the topological surface states.

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