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Optical spectroscopy and Fermi Surface studies of the Rashba spin-splitting compound BiTeI[1] CATALIN MARTIN, K.H. MILLER, S. BUVAEV, A.F. HEBARD, University of Florida, Gainesville, Florida, 32611, USA, E.D. MUN, V. ZAPF, National High Magnetic Field Laboratory, Los Alamos, NM, 87545, USA, H. BERGER, Ecole Polytechnique Federal de Lausanne, CH-1015 Lausanne, Switzerland, D.B. TANNER, University of Florida, Gainesville, Florida, 32611, USA
— We measured the temperature dependent optical reflectivity $R(\omega)$ and Shubnikov-de Haas oscillations in samples of BiTeI with different carrier concentrations. The electronic excitation spectrum, although consistent with Rashba spin-splitting of the bulk electronic bands, reveals additional features: a low energy excitation band and a larger number of phonons than expected from crystal structure. Some of the vibrational modes have strongly asymmetric line-shape. The period of quantum oscillations scales remarkably well with the component of magnetic field along the crystallographic c-axis and is rapidly suppressed when the field is tilted from this axis. We discuss our results in connection with possible charge accumulation at the surface of BiTeI.

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Catalin Martin
University of Florida

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