Abstract Submitted
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Observation of a magnetic field dependence of the lattice thermal conductivity[1] HYUNGYU JIN, Department of Mechanical and Aerospace Engineering, The Ohio State University, Columbus, OH 43210, OSCAR RESTREPO, NIKOLAS ANTOLIN, WOLFGANG WINDL, Department of Materials Science and Engineering, The Ohio State University, Columbus, OH 43210, STEWART BARNES, Department of Physics, University of Miami, Coral Gables, FL 33124, JOSEPH HEREMANS, Department of Mechanical and Aerospace Engineering, The Ohio State University, Columbus, OH 43210 — Can phonons respond to magnetic fields? From the simple point of view of the classical lattice vibrations, there is no clue that phonons possess any magnetic characteristics. Here, we report for the first time that the lattice thermal conductivity can show a response to an external magnetic field in a non-magnetic semiconductor crystal. We observe a magnetic field dependence of the lattice thermal conductivity in a high quality 2x10^{15} Te doped single crystal of InSb. The electronic contribution is over 10^6 times smaller than the lattice. The effect is observed in the temperature regime where the Umklapp processes start appearing, and still mainly involve phonons with long mean free paths. A special thermal design is employed to obtain a high accuracy heat flux measurement. Detailed experimental procedures and results are presented along with a brief discussion about possible origins of the effect.

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