

Abstract Submitted
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Phonon Drag in InSb: Experiment¹ JOSEPH P. HEREMANS, Dept. of Mechanical Engineering and Dept. of Physics, Ohio State University, Columbus, OH 43210, HYUNGYU JIN, CHRISTOPHER M. JAWORSKI, Department of Mechanical Engineering, Ohio State University, Columbus OH 43210, STEWART BARNES, Department of Physics, University of Miami, Coral Gables, FL 33124 — A thermoelectric power is reported in a thermocouple in which both arms are made of the same material (n-type InSb) with the same electron concentration, but the phonons have different mean free paths at cryogenic temperatures. This experiment, inspired by [1], isolates the phonon-drag contribution to the thermopower from the diffusion thermopower. The experiment decouples the behavior of the subthermal phonons that drag the electrons, and the thermal phonons that carry most heat. We add data on the contributions of both to the thermal conductivity. This sheds new light on the details of the physical mechanism behind the giant spin-Seebeck effect (GSSE) recently observed [2] on the same material. The GSSE signal was attributed to a combination of electron-phonon drag that pushes the electrons, which are spin-polarized by Zeeman splitting, far from thermal equilibrium, and strong spin-orbit interactions that make the Zeeman splitting sensitive to the electron momentum. Furthermore, we may have found experimental clues about the nature of the phonon force [3]. 1. T. H. Geballe and G. W. Hull, Conference de physique des basses temperatures, p 460, Paris, 1955 2. C.M. Jaworski et al. Nature 487, 210 (2012) 3. S. E. Barnes and S. Maekawa, Phys. Rev. Lett. 98 246601 (2007)

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