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Topological Insulator and Thermoelectric Effects YONG XU, Department of Physics, Tsinghua University, Beijing 100084, China — The recent discovery of topological insulator (TI) offers new opportunities for the development of thermoelectricity, because many TIs (like Bi_2Te_3) are excellent thermoelectric materials. In this talk, I will first introduce our theoretical predictions of anomalous Seebeck effect and strong size effect in TI [PRL 112, 226801 (2014)]. Then I will report our recent proof experiments, which find in TI thin films that (i) the hole-type Seebeck effect and the electron-type Hall effect coexist in the same TI sample for all the measured temperatures (up to 300 K), and (ii) the thermoelectric properties depend sensitively on the film thickness. The unconventional phenomena are revealed to be closely related to the topological nature of the material. These findings may inspire new ideas for designing TI-based high-efficiency thermoelectric devices.

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