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**Spin-dependent Peltier effect in 3D topological insulators** PARIJAT SENGUPTA, TILLMANN KUBIS, MICHAEL POVOLOTSKYI, GERHARD KLIMECK, Purdue University — The Peltier effect represents the heat carrying capacity of a certain material when current passes through it. When two materials with different Peltier coefficients are placed together, the Peltier effect causes heat to flow either towards or away from the interface between them. This work utilizes the spin-polarized property of 3D topological insulator (TI) surface states to describe the transport of heat through the spin-up and spin-down channels. It has been observed that the spin channels are able to carry heat independently of each other. Spin currents can therefore be employed to supply or extract heat from an interface between materials with spin-dependent Peltier coefficients. The device is composed of a thin film of Bi2Se3 sandwiched between two layers of Bi2Te3. The thin film of Bi2Se3 serves both as a normal and topological insulator. It is a normal insulator when its surfaces overlap to produce a finite band-gap. Using an external gate, Bi2Se3 film can be again tuned in to a TI. Sufficiently thick Bi2Te3 always retain TI behavior. Spin-dependent Peltier coefficients are obtained and the spin Nernst effect in TIs is shown by controlling the temperature gradient to convert charge current to spin current.

Parijat Sengupta
Purdue University

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