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Transport in Old and New Thermoelectric Materials¹

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There is increasing interest in thermoelectric materials motivated in part by recent progress and in part by the potential of these materials in various energy technologies. Thermoelectric performance is a multiply contra-indicated property of matter. For example, it requires (1) high thermopower and high electrical conductivity, (2) high electrical conductivity and low thermal conductivity and (3) low thermal conductivity and high melting point. The key is finding an optimal balance. In this talk, I discuss some of the issues involved in the context of recent results. These include the surprising doping dependence of the thermopower in PbTe and PbSe, and the interplay between acoustic and optical phonons in PbTe. The potential of some new materials is discussed. This work was done in collaboration with David Parker, Olivier Delaire and Mao-Hua Du.

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