



**Thursday**

**January 17**

**4:00 P.M.**

**Rm 118 NSH**

## **Semimetals Unlimited: How new materials are redefining what is possible in solid state electronics**

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Modern electronics is built on semiconductors, whose usefulness comes from their ability to switch between acting like a metal and acting like an insulator. For practical applications, however, semiconductors face certain unavoidable limitations imposed by the physics of localization and by the disorder introduced whenever additional electrons are injected. In this talk I discuss whether these same limitations apply to nodal semimetals, which are a novel class of three-dimensional materials that can be thought of as intermediate between metals and semiconductors. I show that, surprisingly, in a certain class of nodal semimetals the electronic mobility can far exceed the fundamental bound that constrains semiconductors. I then discuss the thermoelectric effect in semimetals, and show how the thermopower can grow without bound under the influence of a strong magnetic field. This large thermopower apparently enables the development of thermoelectric generators and refrigerators with record-large efficiency.