# Fall 2015 Joint Colloquium
# Materials Department & Materials Research Laboratory

**Professor Eric Toberer**
Dept. of Physics
Colorado School of Mines

Friday, October 16th, 2015
11:00 am, ESB 1001

Pizza served afterwards.

**New approaches to thermoelectric materials discovery and design**

This talk will focus on the development of advanced thermoelectric materials within the Materials Genome Initiative paradigm. These efforts are driven by a close coupling of theory, computation, and experimental validation. Our implementation of a high through-put search of known and hypothetical compounds for thermoelectric performance (NSF-DMREF) has led to the identification of new classes of materials with promise for thermoelectric performance. Further refinement of the search has recently involved: (a) identifying defects and alloying species with exceptionally strong phonon-point defect scattering cross-sections, (b) efficient routes to estimate phonon-phonon coupling strength, and (c) addressing thermoelectric performance in magnetic systems. Together, these efforts form the backbone of a material discovery program dedicated to enabling significant advancements in thermoelectric performance. The applicability of these techniques to other functional materials will be discussed (e.g. transparent conducting oxides, thermal barrier coatings).

**BIO** Eric Toberer is an Assistant Professor in the Physics Department at the Colorado School of Mines with a co-appointment at the National Renewable Energy Laboratory. Much of his current work is on the design of new semiconductors for energy applications, with a focus on photovoltaic and thermoelectric materials. Dr. Toberer is also committed to developing pedagogical approaches that enhance student learning; for these efforts he received the 2015 Cottrell Scholar Award. Prior to arriving in Colorado, he was a post-doc in Materials Science at Caltech. There, he worked with Jeff Snyder on thermoelectric materials, with a focus on new materials and structure-property relations. As a result of these efforts, Dr. Toberer received the 2011 International Thermoelectric Society Young Investigator Award. Dr. Toberer conducted his graduate work with Ram Seshadri at the University of California, Santa Barbara (2002–2006) on the synthesis of hierarchically porous materials.

**http://inside.mines.edu/~etoberer/index.html**

Hosted by Ram Seshadri