

**Addressing the scale and complexity of the global energy challenge.**



## **ACOUSTIC APPROACH IN CONVERTING HEAT TO ELECTRICITY**

Condensed Matter Physics Seminar Series

Orest G. Symko, Professor of Physics

Department of Physics and Astronomy, University of Utah, Salt Lake City

Thursday, September 15, 2011

12:00 p.m., Physics Building (Gamow Tower), 11<sup>th</sup> Floor

**Summary:** A promising approach in converting heat or waste heat to electricity is in using the thermoacoustic effect. When heat generates a temperature gradient along a stack of large-surface area material inside an acoustic resonator, an intense sound can be generated. This type of energy converter, which is a self-sustained oscillator, has been developed so that the sound can be converted inside the unit to electricity using a piezoelectric device. Such devices are simple, and they have essentially no moving parts. They consist of an acoustic resonator which contains the stack and a heat exchanger at each end of the stack. The operating frequency is determined by the size of the resonator; frequencies are in the range of 2 kHz to 24 kHz. Power output can be increased by combining the devices into arrays. Important applications are in harvesting waste heat.

### **Orest G. Symko, Ph.D.**

Prof. Symko received his B.Sc. and M.Sc. degrees from the University of Ottawa and his D.Phil. from the University of Oxford, England. Before joining the University of Utah, he was a Research Assistant Professor at the University of California at San Diego, where he worked on low-temperature physics, superconducting devices, magnetism. In recent years Prof. Symko has been studying quasicrystal thin films and thermoacoustics and their applications. For many years he was the director of the Center of Acoustic Cooling Technologies. He is the author of a popular book, [The Physics of HI-FI, from Analog to Digital](#). Currently, Prof. Symko is in charge of the project TAPEC (Thermoacoustic Piezoelectric Energy Conversion).

Campus Map for Gamow Tower (Physics): <http://www.colorado.edu/campusmap/map.html?bldg=W-GT>

Recommended Parking: Euclid Avenue AutoPark