

Title: Squeezing new physics out of old materials with applied pressure

Abstract: There is an old piece of wisdom in condensed matter physics that new materials should always be subjected to measurements at low temperatures. Improvements in high pressure technology have led an increasing number of researchers to apply this old wisdom to another fundamental thermodynamic variable: pressure. While lowering the temperature reveals the underlying quantum ground state, applying high pressure often induces the emergence of entirely new ground states. In this talk I will provide an overview of experiments that we have performed using pressures that span the range from kilobars (the pressure at the bottom of the ocean) to megabars (the pressure at the core of the earth). In particular, I will present the results of recent high pressure experiments focused on two goals: 1. Discovering new (possibly metastable) superconductors, and 2. Understanding the transition between topologically trivial and non-trivial states of matter.