

## PHYSICS AND ASTRONOMY COLLOQUIUM

## Dr. Paul M. Goldbart

Georgia Institute of Technology

## "Strands of Superconductivity at the Nanoscale"

## Abstract

Superconducting circuitry can now be fabricated at the nanoscale, e.g., by depositing suitable materials on to single molecules, such as DNA or carbon nanotubes. I shall discuss various themes that arise when superconductivity is explored in this new regime, including the thermal passage over and quantum tunneling through barriers by the superconducting condensate as a whole, as well as a strange, hormetic effect that magnetism can have on nanoscale superconductors. I shall describe nanoscale superconducting quantum interference devices, which are subtly sensitivity to magnetic fields and patterns of supercurrent--features that hint at uses of superconducting nanocircuitry, e.g., in mapping quantum phase fields and testing for superconducting correlations in novel materials. I shall also mention settings in which superconducting nanosamples show a particular sensitivity to their geometry or topology, and shall conclude by touching on two emerging themes: the interplay between graphene and superconductivity, and what nanoprobes might be revealing about exotic forms of superconductivity.

Wednesday, November 13, 2013 3:30 p.m. Bob Wright Centre Room A104