Department of Physics
COLLEGE OF ARTS & SCIENCES

SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: March 1, 2013

The Department of Physics is pleased to offer the following research project for the summer of 2013. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and, if possible, develop a timetable for the twelve-week research period.

Advanced Computer Simulations of Superconducting Electron Fluids

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Project Description

Superconducting materials are widely used in the fabrication of advanced medical-diagnostic devices, and are also making inroads as viable components for electronic applications and electric-power-transmission technologies. Computer-Aided Superconductor Modeling, the numerical simulation of realistic superconducting systems, is considered a grand-challenge problem for high-performance computing. This project will explore the ways of implementing parallel solvers for the differential equations that describe the macroscopic dynamics of the electron superfluid (the Time-Dependent Ginzburg-Landau equations or TDGL). For an example of recent related work, see: *Numerical simulation of the Nernst effect in extreme type-II superconductors: A negative Nernst signal and its noise power spectra* by S.S. Chung, P. Kakashvili and C.J. Bolech, Phys. Rev. B 86, 134525 (2012).