

**Department of Physics
MCMICKEN COLLEGE OF ARTS AND SCIENCES**

**SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN**

APPLICATION DEADLINE: March 2, 2009

The Department of Physics is pleased to offer the following research project for the summer of 2009. 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.

DYNAMIC CONDUCTANCE STUDIES IN SINGLE-ELECTRON DEVICES

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Project Description

Understanding properties of confined electrons is an important part of atomic physics, chemistry, and condensed matter physics. One can investigate these directly using Single-Electron transistors --- tiny "experimental cells" for working with a few electrons confined to a small region of space. Completely controllable, they are sometimes called "artificial atoms", because many aspects of behavior of electrons confined in an SET and a real atom are similar. In SETs, information about electrons is obtained from measurements of current through the transistor as function of voltage. This project aims to develop technology for measuring currents at very high frequencies (tens of gigahertz) through the SET, as opposed to DC or very low frequency AC (10 Hertz) with the goal to understand the intrinsic time scales of confined electrons and their interaction with other, free carriers.