Department of Physics
COLLEGE OF ARTS AND SCIENCES

SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: March 2, 2015

The Department of Physics is pleased to offer the following research project for the summer of 2015. 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.

PROJECT TITLE: Fabrication and Study of Two Dimensional Electronic Materials

Professor Leigh M. Smith and Howard E. Jackson
Department of Physics
424 Geo/Physics Building
Cincinnati, OH 45221-0011 Tel:
(513) 556-0522
Fax: (513) 556-3425
Email: leigh.smith@uc.edu

Project Description

This research project is to study examples of the smallest electronic materials ever produced: two dimensional layers which are only one monolayer of atoms thick. Extremely profound changes in the physical properties are observed as these materials are produced. These materials are generally called van der Waals materials and are produced in nature as a bulk material similar to graphite, but can be exfoliated mechanically using scotch tape to produce macroscopic monolayers which can tens of microns wide. Materials to be considered in this WISE project are MoS2, WSe2, WS2 and others. Fabrication of monolayers will be confirmed using techniques such as photoluminescence, Raman scattering and atomic force microscopy. Extensions to this primary goal might be fabrication of single monolayer devices or creation of layered heterostructures such as MoS2/WSe2 . Such materials are of intense research interest in the past several years as can be seen in these review articles.

http://en.wikipedia.org/wiki/Transition_metal_dichalcogenide_monolayers

http://pubs.acs.org/doi/abs/10.1021/nn500064s

https://web.stanford.edu/group/cui_group/papers/2D_Materials_Review.pdf