

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

**SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN**

APPLICATION DEADLINE: March 3, 2008

The Department of Physics is pleased to offer the following research project for the summer of 2008. 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.

DEVELOPMENT OF A DYNAMIC PULMONARY FUNCTION MONITOR

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Project Description

Characterizing the complexity of pulmonary function in diagnosing and assessing potential treatments for asthma, chronic obstructive pulmonary disease, cystic fibrosis, and other respiratory diseases is important for improving patient treatment. Current technologies allow overall pulmonary impairment to be measured with order 10% precision. We are developing a non-invasive dynamic pulmonary function monitor (DPFM) that can identify and quantify partially blocked or constricted small airways related to respiratory pathology with order 1% precision. Ventilation inhomogeneities will be characterized in terms of two parameters: the fraction of the small airways that is impaired, and the level of impairment in that fraction. The DPFM is built around a mass spectrometer which precisely measures (physiologically) inert gas concentrations in exhaled breath. During the summer, we will be characterizing the performance of a mass spectrometer. The student will learn how a mass spectrometer works and how to analyze data. The student will learn some pulmonary physiology. There is also the possibility for the student to work on Monte Carlo (computer) simulations of the DPFM. No prior experience or knowledge is specifically required.