Sample: Individual Falcon Travel Grant Application

Department: Physics

Funding Category: For URSCA students who are **PRESENTING** authors, program participants, or displaying their original research

Title: Exploration of Whispering Gallery Modes in an Optically Trapped Aerosol Droplet

Abstract / Description: Optical traps use a laser beam to catch and hold small transparent objects. Past observations of optically trapped aqueous aerosol droplets have shown that the droplet moves between two or more stable positions depending upon the power of the trapping laser. It is hypothesized that this movement coincides with a resonance of the laser light with the droplet called a Whispering Gallery Mode. When the resonance occurs, additional forces act on the droplet.

To investigate this behavior, Raman scattered light from the droplet is measured using a spectrometer while simultaneously recording the droplet's position. The Raman spectrum exhibits a series of peaks that appear due to the very spherical shape of the droplet called Cavity Enhanced Raman Spectroscopy. The location and spacing of the peaks are related to the diameter and the optical properties of the droplet. In order to achieve an accurate determination of the radius from this spectrum, the magnitude of the electric and magnetic fields of the light scattered off the droplet are calculated. Using a code that I devised, I was able to precisely measure the droplet's radius at the moment that the droplet moved between stable positions.

Identify the most appropriate category for your presentation: Oral Presentation

Significance of project to field: An aerosol is a mix of small liquid droplets or small solid particles suspended in a gas. A naturally occurring example is a cloud. Clouds both reflect and absorb sunlight, but the amount of reflection and absorption depends on the substances in the water droplets of the cloud. Pollutants have a major effect on this phenomenon and therefore on the Earth's climate. To better understand these processes, atmospheric scientists study individual water droplets in a laboratory environment using Optical Tweezers. My project is attempting to replicate the behavior of aerosol droplets in our atmosphere in order to study their physical properties and how they behave under the influence of light.

Name of professional conference: American Physical Society March Meeting 2015

Location: Henry B. Gonzalez Convention Center; San Antonio, Texas

Date: March 1 – March 4, 2015

Conference classification: International Conference

Importance of Conference to Your Education and Career Development: I plan to attend graduate school and earn a PhD in physics, specifically in the field of condensed matter and optical physics. To prepare for this, it is critical that I have research experience and also that I gain experience in presenting my research to peers. Presenting research develops skills in delivering complicated and technical material in a concise and understandable manner to an audience unfamiliar with the details and background of the project. This also enabled me to gain a deeper understanding of my project. The American Physical Society March Meeting 2015 brought together 10,000 physicists to share research from industry, universities, and major labs all over the world. It is one of their largest annual meetings. In addition to being able to present, the APS March Meeting enabled me to attend presentations on topics of interest to me as possible career fields, and provided me an opportunity meet other physicists. My presentation won an Outstanding Presentation Award from the Society of Physics Students.

Itemized budget:

Conference Registration:		\$ 25.00
Air Travel:	Southwest Airlines	\$303.20
Hotel:	Best Western Plus Sunset Suites- Riverwalk	100
	Nightly Rate:	\$94.99
	Reservation Amount (\$94.99 x3 nights):	\$284.97
	Other taxes & Fees:	\$102.32
	Total Cost of Lodging for Duration of Trip:	\$387.29
Shuttle to/from Airport: GO Airport Shuttle		\$ 25.00
Total budget requested:		\$740.49