**Name/Contact of Project:**

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**Project Name:**

Construction of an apparatus to monitor trapped particles in optical tweezers

**Project Description:**

In our lab, we have an optical tweezer system. Optical tweezers use the momentum carried by photons to exert forces on small micrometer-sized particles. These forces can be used to “grab” small objects with a laser beam, and then move these objects around. It is important to know whether or not we have grabbed a particle with the trap. Visually, it is often rather easy to make this determination using a conventional microscope and camera. However, this type of human visual determination cannot be used in an automated system. We would like to construct an automated system to tell us whether or not we have grabbed a particle in the trap.

The plan for how to accomplish this goal is to measure the scattering from a laser beam using a quadrant photodiode. The researcher on this project will work with a graduate student to design and assemble an optical system to detect scattered laser light from a trapped particle. He/she will then perform experiments that compare the electrical signals from the quadrant photodiode to movies captured in a microscope, in order to establish how accurately the electrical signals can be used to determine the number and/or sizes of particles in the optical trap.

**Required Skills:**

Understanding of voltage, current, and circuits; Desire to learn about optical alignment

**Ideal Skills:**

Experience using oscilloscopes to measure electrical signals; Familiarity with optical alignment;  
Familiarity with optical microscopes; Labview programming experience