

**Dr. James Girard Summer Undergraduate Research Program  
Faculty Mentor – Project Application**

**Due Date: *January 17, 2020 by 5pm***

**Faculty Name: Dr. John Parker**

**Department: Physics and Chemistry**

**Research Project Title: Precision Displacement Measurement Using Dual Wavelength Laser Interferometry**

**Research Project Abstract (Please provide an overview of your project -- this will be shared with students as a project description; maximum 250 words):**

The wavelength of light provides an exceedingly precise measure of distance and is the foundation for commercial interferometric measurement tools that monitor object positions with a resolution better than 1 nm for objects traveling at 2 m/s. A wide range of applications include machine tool stage positioning and distance monitoring over length scales from a few millimeters to hundreds of kilometers in space-based systems. Displacement measuring interferometry or DMI enjoys multiple advantages with respect to other methods of position monitoring, including high resolution (below 1 nm), wide measurement range, and fast response. This SURE project will examine the construction and development of a DMI system using optics and tooling acquired from a collaboration with Argonne National Laboratory. The successful construction of the DMI will be useful to the process of capillary lithography and the building of nanophotonic devices. In addition, the DMI can be used in the study of self-assembly, which is prevalent in physical-chemical and biological systems.