Dr. Timothy Grove (fall, 2017) and Dr. Mark Masters (spring, 2018)

**Dr. Grove** is an atomic, molecular, and optical physicist. Many of his current research projects involve light, lasers, and/or sound. Students exploring these projects would likely gain experience with a combination of optics, sound, lasers, and/or computer programming.

- Low budget but high accuracy spectroscopy: This project began as a low budget way to do spectrographic investigations in high schools. The low budget spectrographs that were initially made are composed of scrap corrugated cardboard, duct tape, a DVD fragment, and a webcam. Despite the low quality parts, we were able to measure wavelengths of light to roughly 1.5 nanometers.
- Recording sound using interference of light: This project began when a student asked me whether one could use a reflected laser beam from an office building window to record a conversation inside that office. At present, a signal from a photodetector (measures brightness) has been used to reproduce the sound signal. [http://users.ipfw.edu/grovet/](http://users.ipfw.edu/grovet/)

**Dr. Masters** - I have a lot of different interests which allows me to have many projects. These projects vary from the esoteric to the educational to the applied. I have projects on single photon imaging to educational experiments to laser engineering, to development of low cost scientific and educational instrumentation. I will endeavor to describe a few of the more major projects.

- Single photon imaging and quantum optics – We are examining what optical information we can determine with single photons as they interact with a medium. We are also looking at how single photons “interfere” with themselves.
- Size determination of argon microclusters - A cluster is a large molecule of several thousand atoms. There is little experimental data in determining the size of these clusters. We have developed a technique to measure the size of atomic argon clusters using scattering of light and interferometry.
- Aerogels - Aerogels are a porous glass-like solid. They are often known as “solid smoke” because they have such a low density. We are endeavoring to measure pore size of aerogels and see whether we can use aerogels as a detector and in lasers. [http://users.ipfw.edu/masters/](http://users.ipfw.edu/masters/)