

General Audience Abstract

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At Sandia National Laboratories, I spent the summer of 2016 interning at the Combustion Research Facility. As the title suggests, the main goal of the facility is to investigate combustion with the goal of optimizing engine efficiency and reducing pollutants and emissions. At the lab, I worked in the field of spectroscopy, lasers and optics. Specifically, I was involved in a research group that investigated innovative methods of probing matter and chemical reactions with laser light.

My project for the summer was to build what is called a vibrational sum frequency generation spectroscopic microscope. Whereas a normal microscope uses white light to resolve an image of an object, such as a plant cell, this device would resolve images using light created by the sum frequency generation phenomenon. For visible light, this phenomenon takes place when two laser beams of different colors strike a surface at the same point. If the beams are intense enough, a third beam of light with a different color will result. By striking a sample with two laser beams and collecting the third beam, an image may be resolved of the sample that holds more information—such as chemical composition—than a normal microscope image.

When not working on the project, I had the chance to explore Sandia and see how science is performed in the national lab setting. Having just finished my undergraduate degree in chemistry, it was very interesting seeing how the field was applied towards addressing national issues such as energy, counterterrorism, and nuclear non-proliferation. Not only did this internship allow me to learn a lot about unique forms of spectroscopy but also about the possibility of pursuing a national lab career track—one which in fact is a sort of niche market compared to the much larger academic and industry tracks. Even though this internship was not always smooth sailing, I definitely enjoyed my time at Sandia.

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