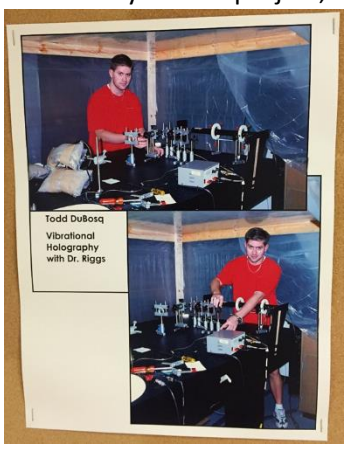
Todd Du Bosq ‘01

An open letter to Stetson physics majors

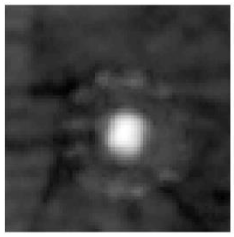
It is hard to believe that it has been 20 years since I stepped foot onto Stetson’s campus as a freshman. I had always been drawn to physics with the desire to understand how things work. It did not take long to realize that the Stetson Physics Department was the right place for me. While deciding my first semester class schedule, Dr. Glander suggested that I take Judo as an “applied physics” elective. It was very satisfying to throw someone with minimal effort by applying the physics of forces, torques, center of gravity, and rotational motion.

I can truly say that I would not be where I am today without the foundation I received from the Stetson physics department. The small classes ensured that none of my questions remained unanswered, while the lab experiments and demonstrations gave me the hands-on interactions to connect the classroom theory to the real world. Also, the senior project, starting with a proposal and culminating with a final research presentation gave me the perfect preparation for graduate school. For my senior project, I developed a TV holography system to analyze vibration patterns on percussion instruments. We were able to bring holography to the digital age. This was my first hands-on experience with optics and lasers and has shaped my entire career. It was not until later on in graduate school that I fully appreciated the additional preparation that I received at Stetson. During the senior project process, we presented our research multiple times giving us an opportunity to find our scientific voice, supplemented with constructive criticism from the faculty and peers. By my first presentation at a conference, I was well prepared for the task at hand. I also had the opportunity to apply and receive a research grant under the Stetson Undergraduate Research Experience (SURE) program. Navigating the process of securing funding while the stakes are still low is not a luxury that many experience.



With guidance from Dr. Riggs, I decided to attend the University of Central Florida to pursue my M.S. (2003) and Ph.D. (2007) in Physics specializing in Optics. This gave me the flexibility to build on my physics foundation while growing my optics experience at CREOL. My M.S. research focused on wavelength selection of a broadband far-infrared laser. Far-infrared (or Terahertz) light is used in astronomy to detect dust in the interstellar medium, in imaging to detect concealed weapons due to its high transmission through fabric and plastics, and in spectroscopy to identify compounds containing explosives or illicit drugs. In October 2004, I traveled to the Max Planck Institute for Extraterrestrial Physics in Garching, Germany. There, I helped calibrate the Photodetector Array Camera and Spectrometer (PACS) of the European Space Agency’s Herschel Space Observatory using our tunable far-infrared laser. This project helped me realize the impact that a master’s thesis could have on the world. This challenged me to focus my Ph.D. research on finding a means to detect plastic landmines which maim or kill people in over 60 countries.

My dissertation focused on landmine detection using millimeter wave imaging. My research found that soil was highly transparent using mmW, but they would reflect off of the plastic landmines that could not be detected using traditional metal detectors. Also, the mmW imaging system was able to produce an image of the landmine, reducing time consuming and expensive false alarms. Further research revealed that mmW imaging was useful for identifying objects behind drywall. These early experiences inspired me to work for the U.S. Army.



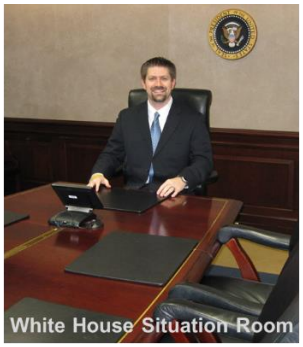
In 2007, I started working in the Modeling and Simulation Division at the U.S. Army CERDEC Night Vision and Electronic Sensors Directorate (NVESD) in Northern Virginia. NVESD conducts research and development in order to provide U.S. Warfighters with advanced sensor technology on the battlefield for day and night operations. As a member of the Modeling and Simulation Division, I develop physics-based models and simulations to assess the performance of existing and future sensor systems under battlefield conditions.

I was surprised just how international the job of an Army physicist would become. In 2013, I was nominated as the chairman for the NATO group on "Computational Imaging and Compressive Sensing for EO/IR Systems," with representatives from the Netherlands, Germany, UK, Canada, Turkey, and the U.S. As the chair of a NATO group, I work directly with world class scientists to develop technologies to solve challenging problems with the added bonus of trips to Europe twice a year. In 2014, I was selected for the U.S. Army Engineer and Scientist Exchange Program (ESEP). The ESEP is a highly competitive professional-development assignment to promote international research cooperation and bolster relationships with foreign partners. For one year, I worked at the Fraunhofer Institute of Optronics, System Technologies, and Image Exploitation (IOSB) in Ettlingen, Germany developing an atmospheric turbulence simulation. Living in the Black Forest of Germany, basically in the center of Europe, allowed my family the opportunity to explore someplace new every weekend. In one year, we traveled to 65 cities in 12 countries with a two year old in tow. My German colleagues would joke that I knew more about the surrounding German towns than they did. When you have a lifetime to do something, life finds a way to delay it, but when you have a finite amount of time, it becomes a priority. To top the amazing year off, we arrived back in the U.S. in time for our son to be born and to be graciously awarded the Stetson University Distinguished Alumni Award.

I have five pieces of advice for the current students at Stetson. The first is to share your love for physics with others. Since graduate school, I have performed optics lessons for elementary schools each year. It is always an extremely rewarding experience to expose these young minds to the exciting world of physics. Many times I am the first scientist that they have ever met in person. I stress that they too can be a scientist, especially the girls in the class. Most of the meetings and conferences that I attend rarely have more than 10% of women in attendance. As a father to an amazing daughter, I hope to share this love of physics with these kids at a young age to encourage the next generation of scientists that anything is possible.

My second piece of advice is to build a strong business acumen. As scientists, we should not underestimate the importance of business expertise including leadership skills, managing a team, dealing with financials, and PowerPoint engineering. I have found that promotion opportunities often favor those with exceptional scientific achievements AND excellent business skills.

Thirdly, I would highly encourage all of you to take a public speaking class. We become the experts in our field and it is up to us to share that knowledge. It is important to inform, convince, and persuade the audience about your topic. This occurs at conferences, while pitching proposals, during seminars, and while teaching classes. I was very grateful that the Physics department incorporated public speaking into our senior research projects and that I was able to refine that skill further in graduate school.



My fourth piece of advice is to make connections early and often. The scientific community is quite small, especially once a specialty area is determined. I tend to see the same people at all of the meetings, conferences, and seminars that I attend. These connections are critical for research collaborations, job connections, and funding sources. The Stetson Physics Department cultivates a strong connection between the students and I would encourage you to extend that cohort beyond Stetson. Through a professional connection, my wife and I had the opportunity to tour the west wing, including the situation room, which is not open to the public. Without that connection, I would have never had the chance to sit in President Obama's chair just hours after he did on the day protests kicked off in Egypt during the Arab Spring of 2011.

Finally, I would encourage you to take risks. When the exchange scientist opportunity came along, I jumped in head first. Moving to a non-English speaking country for a year was intimidating. It was compounded by the fact that we did not speak any German; we were bringing our two year old daughter; my wife's job would be changing; we were entering into a new culture with no support; and we had to navigate a new system of doctors, pediatricians, and an all-German daycare. This was all while doing research at a world class institution. After all that, it was the best decision I have ever made. We were able to build a support system in Germany and they helped us navigate over every hurdle. With their help, we created memories to last a lifetime. Lastly, I experimentally determined that the maximum speed of a Camry Hybrid is 122 mph while legally driving on the Autobahn.