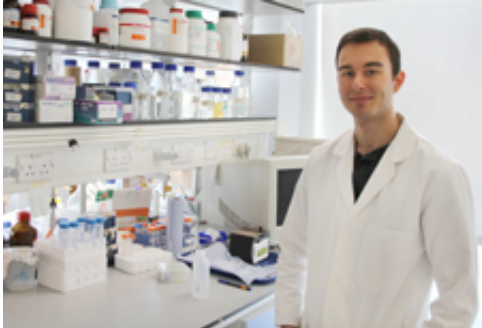


Shedding light on a protein, and a future

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Senior Brendon Kellner worked on co-op in London in a lab at Imperial College.
Photo by Joe Case

While on a research co-op in London, Northeastern University senior Brendon Kellner investigated the inner workings of certain proteins through state-of-the-art ultrafast lasers. These lasers generate light pulses for only a tiny fraction of a second, but the impact of his experiential learning opportunity will last far longer.

Kellner, a dual major in physics and philosophy, worked in the Division of [Molecular Biology](#) at Imperial College London, in a new lab designed to analyze the [molecular dynamics](#) of light-activated proteins and processes such as [photosynthesis](#).

One protein Kellner has studied is phytochrome, which senses light in plants and some bacteria. He measured the excited-state electronic pathways in hopes of understanding how the protein changes shape once

it has absorbed light. Kellner also spent a month growing *E. coli* that had been genetically transformed to express a [green fluorescent protein](#) from [jellyfish](#)—a protein often used as a marker in biological studies—and purifying it for similar spectroscopy experiments.

“It’s great to work with state-of-the-art equipment, and push against fundamental physical limits,” Kellner said.

He not only learned high-end science, but he also absorbed the intricacies of the technology that yield such discoveries. Developing the [laser](#) apparatus and characterizing its vibrational noise, for instance, has exposed him to 3D drafting software, signal processing, and general applied optical principles. He also was able to build on his lab work from a previous co-op at the Leibniz Universität in Hannover, Germany, where he researched pea plant genetic transformation systems.

“It was a nice broadening of my abilities and connection of multiple interests,” he said.

Kellner credits Professor Paul Champion, interim chair of the physics department, with helping him get the opportunity at Imperial College. Kellner has done research work in Champion’s lab, and Champion, in turn, has collaborated with Imperial College researcher Jasper van Thor.

“He is really industrious, and he’s done very well,” Champion said of Kellner.

Since arriving at Northeastern, Kellner has considered majoring in political science and engineering. But upon reflection, he said his decision to ultimately dual major in physics and philosophy stems from his “drive to gain a fundamental understanding of our world.”

Upon graduation in the spring, he plans to pursue his PhD in systems

engineering. “Physics is an excellent background and has given me a powerful analytical methodology, but I want to work on larger- scale problems,” he said.

Provided by Northeastern University

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