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DeHarak Receives NSF Grant for Research on Electron Scattering

Kim Hill
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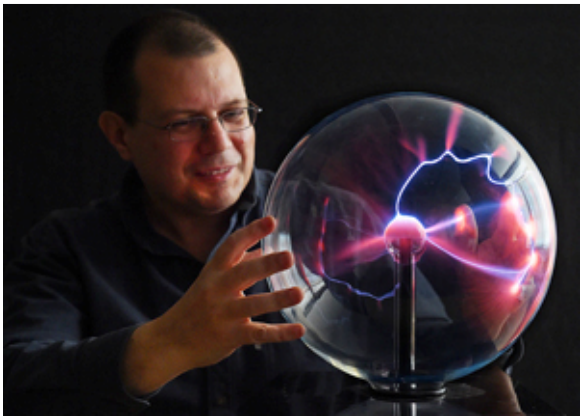
BLOOMINGTON, Ill.— Adding to the basic understanding of electron scattering processes will be the focus of a three-year National Science Foundation grant awarded to Illinois Wesleyan University Assistant Professor of **Physics** Bruno deHarak. The grant will fund 12 undergraduate research assistant positions in addition to equipment and supplies.



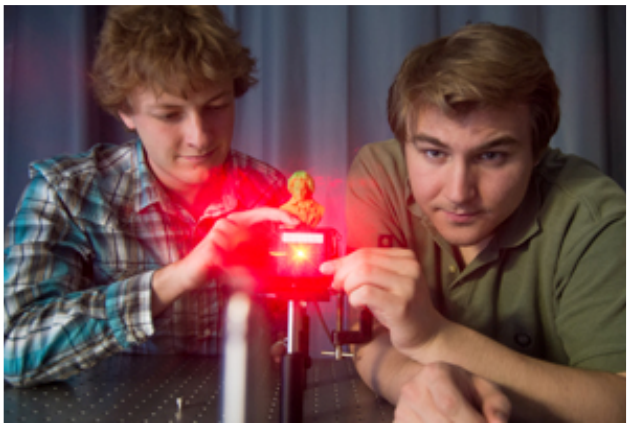
Bruno deHarak and a plasma globe

"The main goal of my research is to answer the simple question of what happens when an electron scatters from an atom or molecule in the presence of an electromagnetic field," said deHarak.

To answer the question, deHarak hits helium atoms with electrons and a powerful laser beam at the same time, then looks at the energy spectrum of the scattered electrons. The laser beam he uses has about one billion times the instantaneous power of a laser pointer.

With funding from the NSF grant, deHarak will perform experimental laser-assisted free-free (LAFF) studies. "The study of these processes is fundamental to our understanding of many aspects of astrophysics, astronomy and plasma physics.

"If theorists have a firm understanding of LAFF processes, then they should be able to do calculations that can predict, or agree with, experimental results," he added. "If they can do this, then we will probably assume the theory they are using describes the process, at least until something comes along to disprove it. There is a series of experiments that were done in the 1990s that produced results that theorists cannot explain. I hope my experiments will give theorists a better understanding of these processes."



Kyle Connour '15 (left) and Jonathan Gholson '15 align a set of apertures while doing an experiment to examine multi-slit interference in the course Experimental Physics. An NSF grant will support equipment and advanced lab exercises for this course and others.

The physicist joined the faculty at Illinois Wesleyan in 2009 after earning a Ph.D. from the University of Kentucky. Prior to beginning his graduate education, deHarak served in the United States Marine Corps and worked in electronics and systems programming at Lockheed Martin.

The three-year grant, "A Study of Laser-Assisted Electron-Atom Scattering," is part of the Research at Undergraduate Institutions program at NSF. This program supports faculty in research that engages them in their professional fields, builds capacity for research at their home institution and supports the integration of research and undergraduate education.

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