LDRD@SNL

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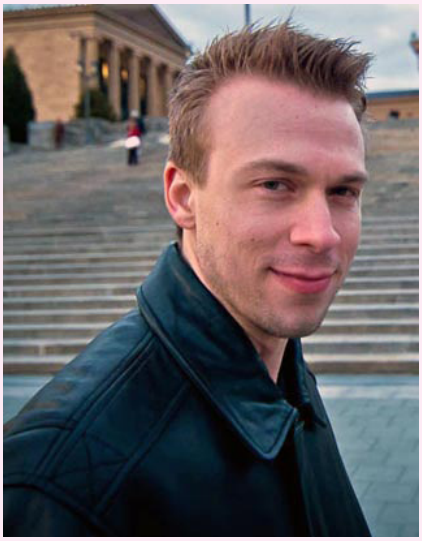
Sandia National Laboratories
Laboratory Directed Research and Development

We welcome your questions, comments, and ideas for future LDRD projects to feature! Email your feedback to Marie Arrowsmith, mdarrow@sandia.gov

## Sandia's 2013 Truman Scholar Paul Schmit and Sasha Velikovich's (Naval Research Lab) model of complex turbulent instability in imploding shells expected to help inform US Inertial Confinement Fusion programs.



*2013 Truman Fellow Paul Schmit received his BS in physics at ASU and his PhD in plasma physics at Princeton.*

The President Harry S. Truman Fellowship in National Security Science and Engineering provides an opportunity for exceptional scholars to pursue independent research at Sandia that supports Sandia's national security mission. These three-year fellowships are funded through Sandia's Laboratory Directed Research and Development Program. Paul Schmit (BS, physics, ASU; PhD, plasma physics, Princeton) began his term as a 2013 Truman Fellow in Sandia's Inertial Confinement Fusion (ICF) Target Design Division, intent on using his background in kinetic plasma physics to shed new light on physics issues faced by the ICF community. During his tenure as a Truman Fellow (ending FY15), Paul's emphasis on kinetic physics and wave-particle interactions enabled him to discover a mechanism for using waves as a switch to drive energetic beams and current, a process to enhance the performance of plasma-based particle accelerators, and many effects illuminating the basic science associated with wave dynamics in non-stationary media.

In collaboration with Sasha Velikovich (Naval Research Lab), Paul recently published Bell-Plesset effects in Rayleigh-Taylor instability of finite-thickness spherical and cylindrical shells in Physics of Plasmas, an effort representing a significant piece of his Truman research results. Sasha and Paul derived a new self-consistent model of a ubiquitous and damaging hydrodynamic instability, the Rayleigh-Taylor instability, in imploding spherical and cylindrical shells. For the first time, they simultaneously account both for the finite thickness of the shells as well as their (often large) implosion velocities—two characteristics often ignored due to the added mathematical complexity involved in the calculations. They obtained exact and approximate solutions using conventional, widely accepted approaches, and also show when the approximate approaches become invalid. The results should inform experimental and theoretical work across the ICF community, including efforts at all three major US ICF facilities. Additionally, by being as rigorous and inclusive as they could mathematically, their work also serves to connect/unify several decades of theoretical work by other authors in the published literature. As a new staff member in Sandia's Radiation and ICF Target Design Department, Paul hopes to use this new model as a starting point to find ways to mitigate RT instabilities in Sandia's MagLIF regime.

## Popular Science named Sandia-based, LDRD-developed anthrax detector technology one of 100 best innovations of 2015.

Read more at: http://www.sandia.gov/news/publications/labnews/articles/2015/11-12/badx-popsci.html


*2014 R&D100 Winner BaDx named one of Popular Science Magazine's 100 Greatest Innovations.*

## LDRD PROJECTED BUDGET AND STATUS

FY16 Q1 $155 MILLION 332 PROJECTS FUNDED AT $144.4 MILLION

## Upcoming Events (2016)

Jan 25 - DS&A Info Session  Jan 26 - EC Info Session
Jan 27 - Nanomaterials Info Session  Jan 28 - Geoscience Info Session
**Feb 3 - FY2017 LDRD Program Town Hall**
Feb 3 - Grand Challenge, New Ideas, Exploratory Express Info Sessions

Sandia National Laboratories

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