NATIONAL NUCLEAR SECURITY ADMINISTRATION
OFFICE OF DEFENSE PROGRAMS

Computational Science Graduate Fellowship Program

July 25, 2013

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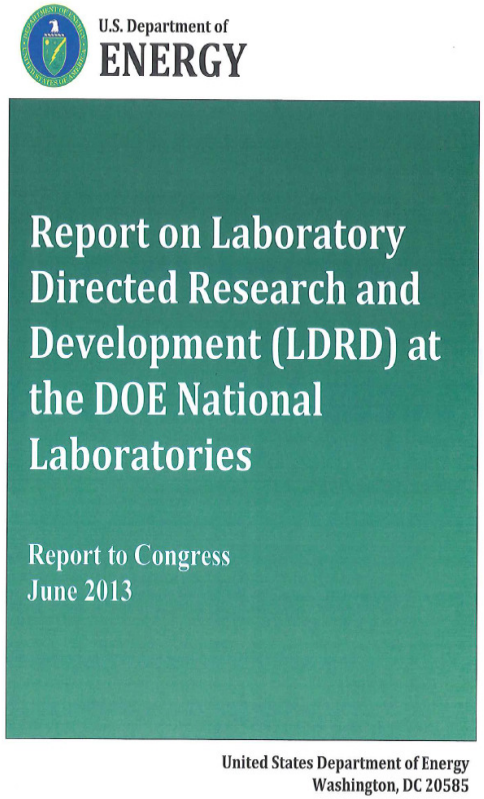
So, Why does DOE invest in CSGF?

- Help ensure an adequate supply of **scientists and engineers** appropriately trained to meet national workforce needs, including those of the DOE, **in computational sciences**.
- Make national DOE laboratories available for practical work experiences for fellows ensuring **cross-disciplinary experience** in highly productive work teams.
- Strengthen collaborative ties between the national **academic** community and DOE **laboratories** so that the multidisciplinary nature of the fellowship builds the **national community of scientists**.
- Raise the visibility of careers in the computational sciences and to **encourage talented students** to pursue such careers, thus building the **next generation of leaders in computational science**.

Laboratory Directed R & D--High-risk/High-reward projects through creative ideas

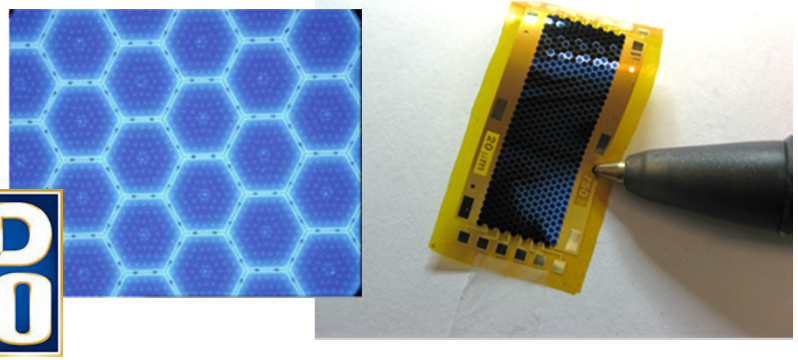


- Why LDRD?
  - Contributes to lab's **long-term viability** through an environment that encourages **creativity and innovation**
  - Develops unique **scientific and technical capabilities beyond the scope of academic and industrial institutions**
  - Advances DOE's **national security** mission
  - Responds to **Nation's future R&D** needs
- Fun Facts
  - 1,738 LDRD projects in FY12; $578.9M
  - 994 Postdoctoral Researchers supported
  - 1,869 Refereed Publications
  - 141 Patents Granted
  - 453 Invention Disclosures

LDRD offers an opportunity to take your research to new levels

Recent LDRD Examples

Flexible solar cells promise lightweight power generators and self-powered electrical devices



R&D 100

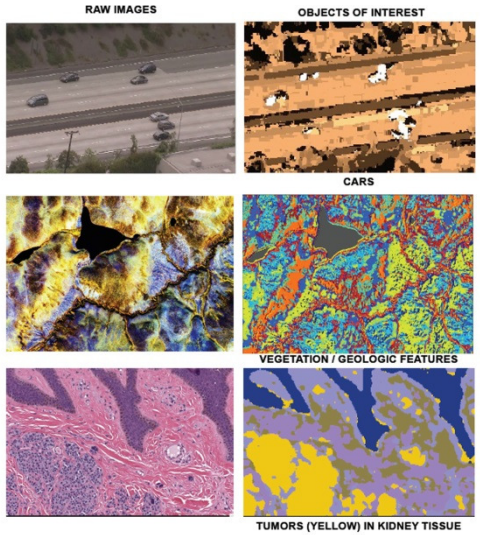
MANTEVO

First-ever integrated collection of full-featured miniapps that model full-scale application performance yet require a fraction of the code

R&D 100

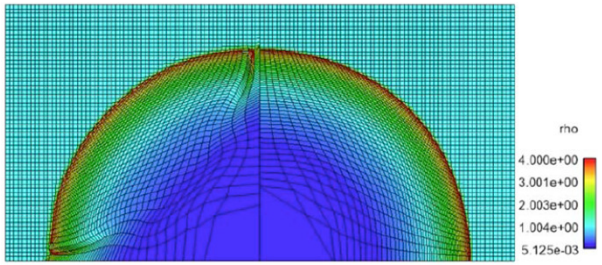
Laser-based optical diagnostic enables computational models for the simulation of fire environments

Recent LDRD Examples



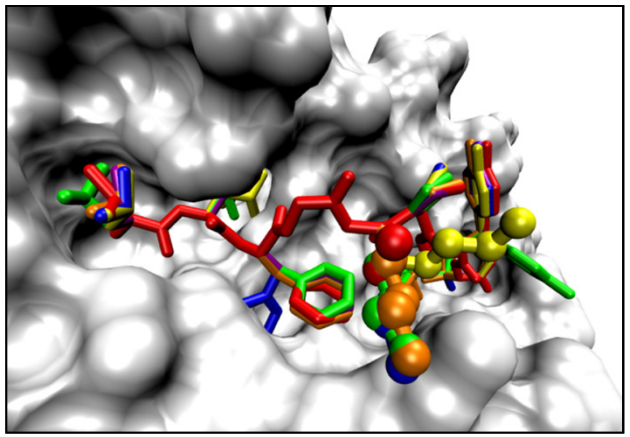
A neuroscience-inspired computer vision system processes video as accurately, and more quickly, than human analysts

Evolutionary theory and web-search technology combine for DNA analysis software--one human genome's worth of DNA analysis in 30 minutes on laptop

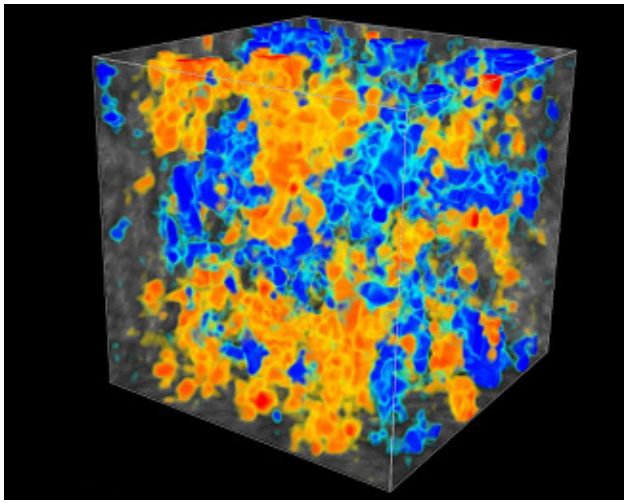


A novel algorithmic approach called cell-centered hydro has proven to be superior for preserving known symmetries in energetic implosions

Recent LDRD Examples



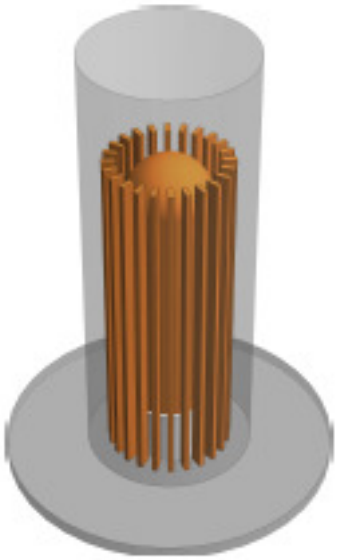
Computational Advancements in Countermeasures for Emerging Biothreats –simulate drug target docking at the molecular level



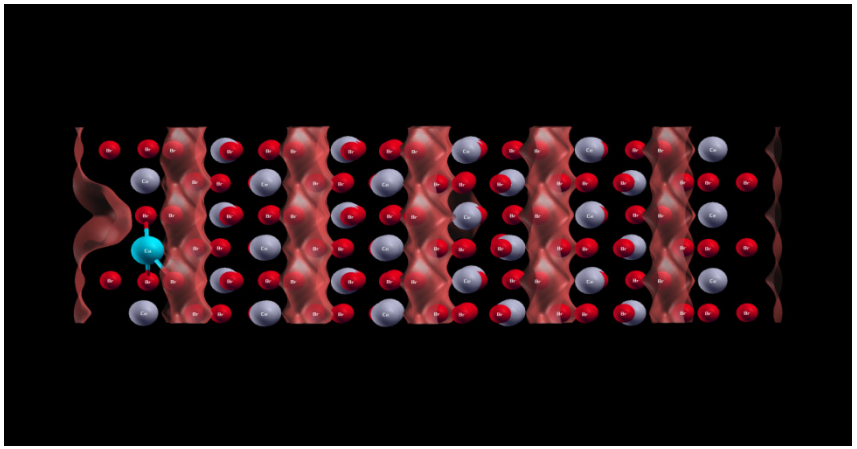
Plasma Physics
Critical to Stockpile Stewardship and NIF experiments by simulating complex plasma physics central to the emerging field of high energy density science

Recent LDRD Examples

A Dense Plasma Focus pulsed power fusion reactor that is used for stockpile stewardship, radiation diagnostics, nuclear forensics, and neutron tomography



Structural, electronic, and optical properties of $CeBr_3$:Ca crystals investigated using the density functional theory (DFT) leading to production of a $CeBr_3$ alloy with a record good energy resolution in Gamma Detectors



Why are we investing in you?

HPC-enabled innovation is critical to the nation's security and economic competitiveness

Given the 20 year history of CSGF and other initiatives you are still at the bleeding edge of Computational Science at extreme scales

You are the leaders in a race we can't afford to lose