INCITE Overview
April 18, 2012

Julia C. White, INCITE Manager
Presentation to HPC User Forum
DOE-SC operates leadership computing facilities (LCFs)

**Top500 List (Nov 2011)**

#3  Cray XT “Jaguar” at the Oak Ridge Leadership Computing Facility (OLCF)

#23  IBM BG/P “Intrepid” at the Argonne Leadership Computing Facility (ALCF)

*Both LCFs are carrying out system upgrades, to be completed in 2013: 10-petaflop IBM BG/Q “Mira” and 20-petaflop Cray XK6 “Titan”*
Access to LCFs: More than 2.7 billion core hours awarded in 2012

60% INCITE 1.7 billion core-hours

30% ALCC Up to 810 million core-hours

10% Director’s Discretionary 270 million core-hours
INCITE seeks computationally intensive, large-scale research projects with the potential to significantly advance key areas in science and engineering.

<table>
<thead>
<tr>
<th>Impact criterion</th>
<th>High-impact science and engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computational leadership criterion</td>
<td>Computationally intensive runs that cannot be done anywhere else</td>
</tr>
<tr>
<td>Eligibility criterion</td>
<td>INCITE grants allocations regardless of funding source (ex. DOE, NSF, private, etc)</td>
</tr>
<tr>
<td></td>
<td>Non-US-based researchers are welcome to apply</td>
</tr>
</tbody>
</table>

Call for 2013 proposals opens in Spring 2012

The INCITE program seeks proposals for high-impact science and technology research challenges that require the power of the leadership-class systems.
INCITE awards history

20X growth in number of projects

... but 1000X growth in core-hours

<table>
<thead>
<tr>
<th>Projects</th>
<th>3</th>
<th>3</th>
<th>15</th>
<th>45</th>
<th>55</th>
<th>66</th>
<th>69</th>
<th>57</th>
<th>60</th>
<th>TBD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours allocated</td>
<td>4.9M</td>
<td>6.5M</td>
<td>18.2M</td>
<td>95M</td>
<td>268M</td>
<td>889M</td>
<td>1.6B</td>
<td>1.7B</td>
<td>1.7B</td>
<td>5B</td>
</tr>
</tbody>
</table>

NERSC: 3 projects and 4.9M hours awarded
ALCF, OLCF, PNNL join INCITE
INCITE management by ALCF and OLCF; PNNL and NERSC transition out at end of 2009*
ALCF and OLCF: Mira and Titan
2012 INCITE allocations
28 new projects, 32 renewals
Acceptance rate: 33% for new proposals, 91% for renewals

Distribution of INCITE time by science domain

- **Astrophysics**: 10%
- **Biology**: 6%
- **Chemical Science**: 15%
- **Computer Science**: 3%
- **Earth Science**: 10%
- **Engineering**: 16%
- **Materials**: 17%
- **Nuclear**: 12%
- **Plasma**: 11%

**Awarded 1.67 billion hours**
**for CY 2012**
2012 INCITE award demographics

PI Affiliations
2012 INCITE Awards

PI Demographics
2012 INCITE Awards
Diversity of INCITE science

Simulating a flow of healthy (red) and diseased (blue) blood cells with a Dissipative Particle Dynamics method.
- George Karniadakis, Brown University

Demonstration of high-fidelity capture of airfoil boundary layer, an example of how this modeling capability can transform product development.
- Umesh Paliath, GE Global Research

Provide new insights into the dynamics of turbulent combustion processes in internal-combustion engines.
- Jacqueline Chen and Joseph Oefelein, Sandia National Laboratories

Calculating an improved probabilistic seismic hazard forecast for California.
- Thomas Jordan, University of Southern California

Modeling charge carriers in metals and semiconductors to understand the nature of these ubiquitous electronic devices.
- Richard Needs, University of Cambridge, UK

High-fidelity simulation of complex suspension flow for practical rheometry.
- William George, National Institute of Standards and Technology

Other INCITE research topics
- Glimpse into dark matter
- Supernovae ignition
- Protein structure
- Creation of biofuels
- Replicating enzyme functions
- Global climate
- Regional earthquakes
- Carbon sequestration
- Turbulent flow
- Propulsor systems
- Membrane channels
- Protein folding
- Chemical catalyst design
- Combustion
- Algorithm development
- Nano-devices
- Batteries
- Solar cells
- Reactor design
- Nuclear structure
2013 INCITE Call for Proposals

More than 5 billion core-hours will be allocated for Calendar Year 2013

What’s new

- Management plan required
- Development plan for next-gen system
- Guidelines about ensemble simulations and the capability metric
- Request for Information

Call for Proposals

www.doeleadershipcomputing.org

The INCITE program seeks proposals for high-impact science and technology research challenges that require the power of the leadership-class systems.

Allocations will be for calendar year 2013.

April 11 – June 27, 2012

Contact information

Julia C. White, INCITE Manager
whitejc@DOEleadershipcomputing.org
Request for Information

We invite prospective INCITE-proposal PIs to respond to a Request for Information to inform the INCITE management of the proposal topics anticipated. The information requested here is not a prerequisite for proposal submittal, nor will it limit any requests you may decide to make in your INCITE proposal.

http://hpc.science.doe.gov/allocations/incite/

The response to date includes expressions of interest from across the US, Europe, and Asia.
Contacts

For details about the INCITE program:

www.doeleadershipcomputing.org
INCITE@DOEleadershipcomputing.org

For details about the centers:

www.olcf.ornl.gov
help@nccs.gov, 865-241-6536

www.alcf.anl.gov
support@alcf.anl.gov, 866-508-9181