



U.S. Department of Energy's
Office of Science

FES High Performance Computing Resources

**PSACI-PAC Meeting
PPPL**



John Mandrekas

OFES

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www.ofes.fusion.doe.gov

OFES High Performance Computing Resources

2008 Allocation Year (AY)

NERSC (*Franklin, Bassi, & Jacquard*)

- Significant increase in NERSC resources in 2008
- The **19,320** processor **101.5 TFlop/s** Cray XT4 **Franklin** replaced **Seaborg** as NERSC's flagship system
- **53** FES repositories
 - 12 SciDAC
 - 1 INCITE
- OFES AY 08 allocation: **69.1 M hours**
 - *Compared to 16.7 M hours in AY07*
- As of June 2, 2008, ~ **49%** of resources have been used

2008 INCITE Program

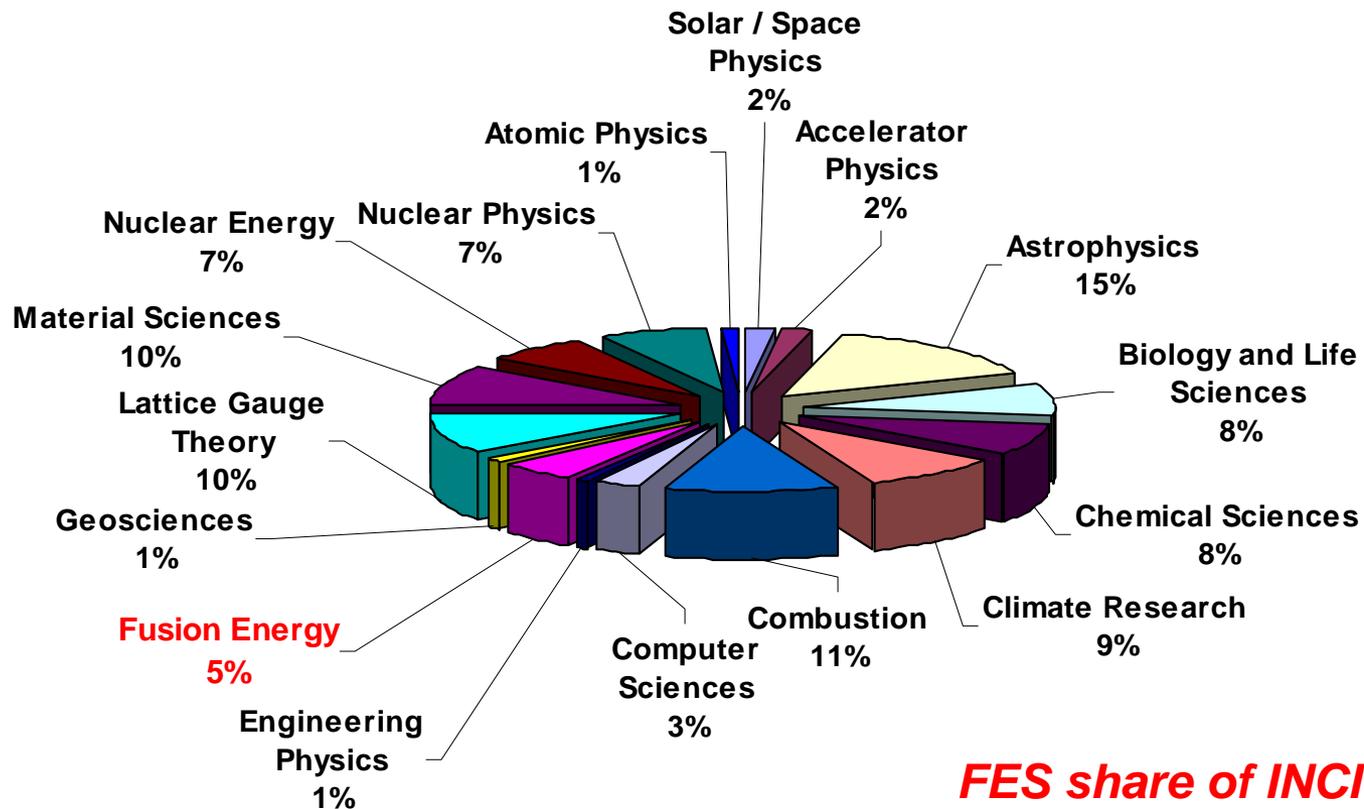
- The **I**nnovative and **N**ovel **C**omputational **I**mpact on **T**heory and **E**xperiment (**INCITE**) program provides resources to large scale computationally intensive projects that can make high-impact scientific advances
- Now in its *fifth* year, INCITE includes HPC resources at ORNL, LBNL (NERSC), ANL, PNNL
- INCITE program is open to all scientific researchers and organizations, including industry
 - *No requirement for DOE sponsorship*
 - *Small number of large awards*
- In 2008, **55** projects (31 new, 24 renewals) received **265** million processor-hours:
 - DOE Labs: 20
 - Universities: 17
 - Industry: 8
 - Other: 10
- Largest award: **26,700,000** hours (*Lattice QCD*), ORNL & ANL
- Largest award on XT4 @ ORNL: **18,000,000** hours (*Combustion*)
- Seven FES projects were selected for INCITE awards in 2008 (3 new, 4 renewals)
- Largest FES award: **8,000,000** on XT4 @ ORNL

FES & INCITE – 2004-08

Year	Number of FES INCITE Projects
2004	-
2005	-
2006	2 <i>Gyrokinetics, Atomic Physics</i>
2007	7 (3 SciDAC) <i>Non-INCITE Projects “promoted” to INCITE after majority of ORNL LCF resources dedicated to INCITE</i>
2008	7 (3 SciDAC)

2008 INCITE Awards

Allocations by Discipline



FES share of INCITE resources in 2007: 11%

FES INCITE Projects

New for 2008

Verification and validation of petascale simulation of turbulent transport in fusion plasmas

- PI: Patrick Diamond (UCSD)
- Cray XT4 (ORNL), 8,000,000 hours
- SciDAC: **GPS-TTBP, GSEP, CPES**

Fluctuation Spectra and Anomalous Heating in Magnetized Plasma Turbulence

- PI: William Dorland (U Maryland)
- Cray XT4 (ORNL), 4,000,000 hours
- ***Fusion Science Center for Multiscale Plasma Dynamics***

High Resolution Global Simulation of Plasma Microturbulence

- PI: William Tang (PPPL)
- IBM Blue Gene / P (ANL), 2,000,000 hours
- SciDAC: -

Renewals

Computational Atomic and Molecular Physics for Advances in Astrophysics, Chemical Sciences and Fusion Energy Sciences

- PI: Mitch Pindzola (Auburn U)
- Cray X1E (ORNL), 2,000,000 hours
- SciDAC: -

Gyrokinetic Steady State Transport Simulations

- PI: Jeff Candy (GA)
- Cray XT4 (ORNL), 1,500,000 hours
- SciDAC: **SSGKT (FACETS SAP)**

High Power Electromagnetic Wave Heating in the ITER Burning Plasma

- PI: E. Fred Jaeger (ORNL)
- Cray XT4 (ORNL), 1,000,000 hours
- SciDAC: **CSWPI**

Three-Dimensional Particle-in-Cell Simulations for Fast Ignition

- PI: Chuang Ren (U Rochester)
- NERSC (LBNL), 2,000,000 hours
- **Fusion Science Center for Extreme States of Matter**

2009 INCITE Program

- INCITE Call for Proposals out (<http://hpc.science.doe.gov/>)
- Submission Deadline: **August 11, 2008, 11:59 PM EDT**
- Awards to be announced **December 2008**
- Over half a billion hours available
 - *Most of the resources at the ANL 550 TF **Blue Gene /P***
- INCITE projects are expected to be **computationally intensive** and their use of the resources should reflect this fact:
 - *A computationally intensive research project will utilize a major fraction of the processors and multiple cores, if applicable, in the proposed research.*
 - *A project that involves a large number of small independent jobs is not considered computationally intense (from the INCITE FAQ)*

2009 INCITE Program (cont.)

- Proposals from SciDAC groups should make sure they include this information in the Summary / Abstract
- OK to submit multi-project proposals (especially if based on the same code). However, each sub-project should qualify as an INCITE-class project on its own merit
- Startup accounts are offered at ORNL and ANL
 - Useful for obtaining scaling information for your codes
- Let us know if your codes require math packages or other tools
- Getting ready for Blue Gene / P:
 - July 18, Redmond, WA, SciDAC tutorial:
 - *Porting and Scaling Applications on ALCF's BlueGene/P*
 - July 28-30, ORNL:
 - *Blue Gene / P Workshop*