

DOE Exascale studies began in 2007

Included a series of “Grand Challenge” workshops held from 2008-2010, documenting the potential of extreme-scale computing for “national needs” problems such as energy, security, and climate, and for accelerating the pace of discoveries in basic sciences.

Reports on

Climate

Nuclear Energy Systems

Nuclear Science

Particle Physics

Biology

Fusion Energy

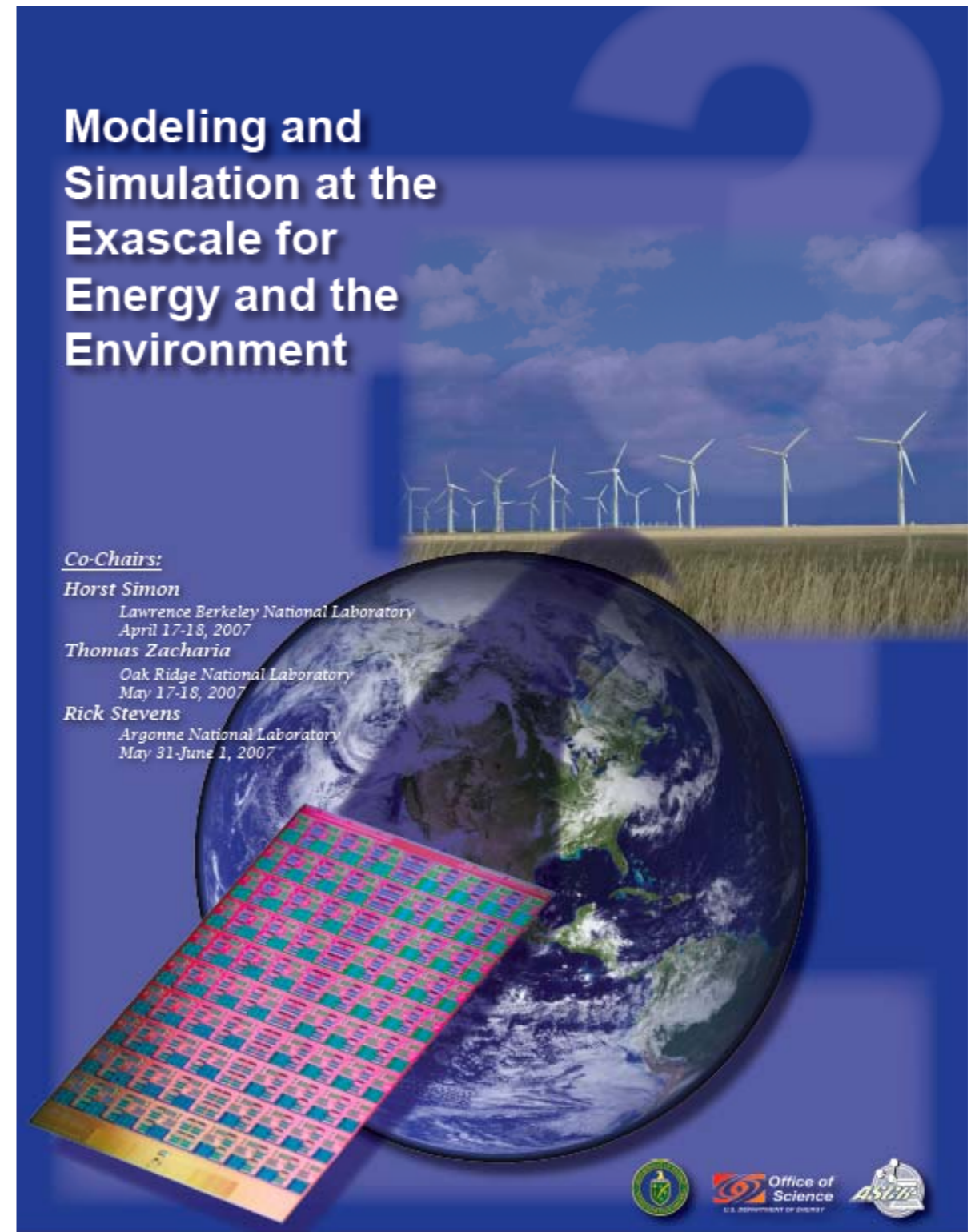
National Security

Basic Energy Sciences

Architectures

Cross-cutting Technologies

Summary “**Trivelpiece Report**” urging DOE to take leadership



Modeling and Simulation at the Exascale for Energy and the Environment

Co-Chairs:

Horst Simon
Lawrence Berkeley National Laboratory
April 17-18, 2007

Thomas Zacharia
Oak Ridge National Laboratory
May 17-18, 2007

Rick Stevens
Argonne National Laboratory
May 31-June 1, 2007

Office of Science
U.S. DEPARTMENT OF ENERGY

ASST

Nuclear Science: January 26-28, 2009

Chair: Glenn Young

Co-chairs: David Dean
Martin Savage

Panel leads

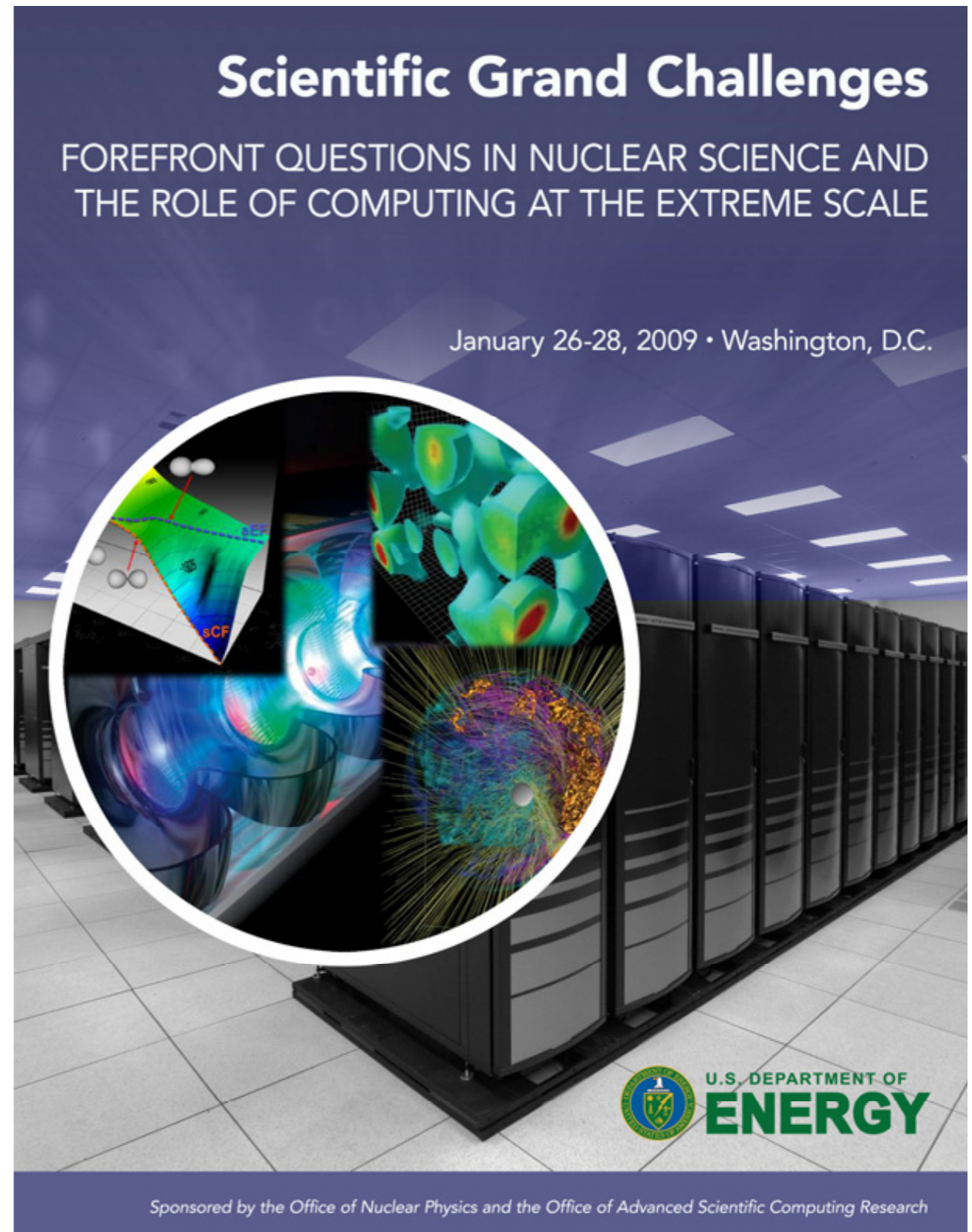
Nuclear Structure: James Vary
Steve Pieper

Nuclear Astro: George Fuller
Tony Mezzacappa

Cold QCD, Forces: Thomas Luu
David Richards

Hot, Dense QCD: Steffen Bass
Frithjof Karcsh

Accelerator Physics: Robert Ryne




The poster features a dark blue background with a perspective view of server racks in a data center. A large circular inset in the center displays various scientific visualizations, including a 3D molecular model, a colorful heatmap, and a complex network structure. The text is white and green, with the U.S. Department of Energy logo in the bottom right corner.

Scientific Grand Challenges

FOREFRONT QUESTIONS IN NUCLEAR SCIENCE AND
THE ROLE OF COMPUTING AT THE EXTREME SCALE

January 26-28, 2009 • Washington, D.C.

 U.S. DEPARTMENT OF
ENERGY

Sponsored by the Office of Nuclear Physics and the Office of Advanced Scientific Computing Research

Major goals of the meeting included

- ❑ Developing the science case: progress that could be made in the five identified areas given an anticipated factor-of-1000 increase in computer power
- ❑ Providing nuclear physicists with an opportunity to influence the development of high-performance computing
- ❑ Bringing NP up-to-date on ASCR plans for future high-performance computing

Over 100 physicists from 27 universities, 7 national laboratories, industry, and the funding agencies participated

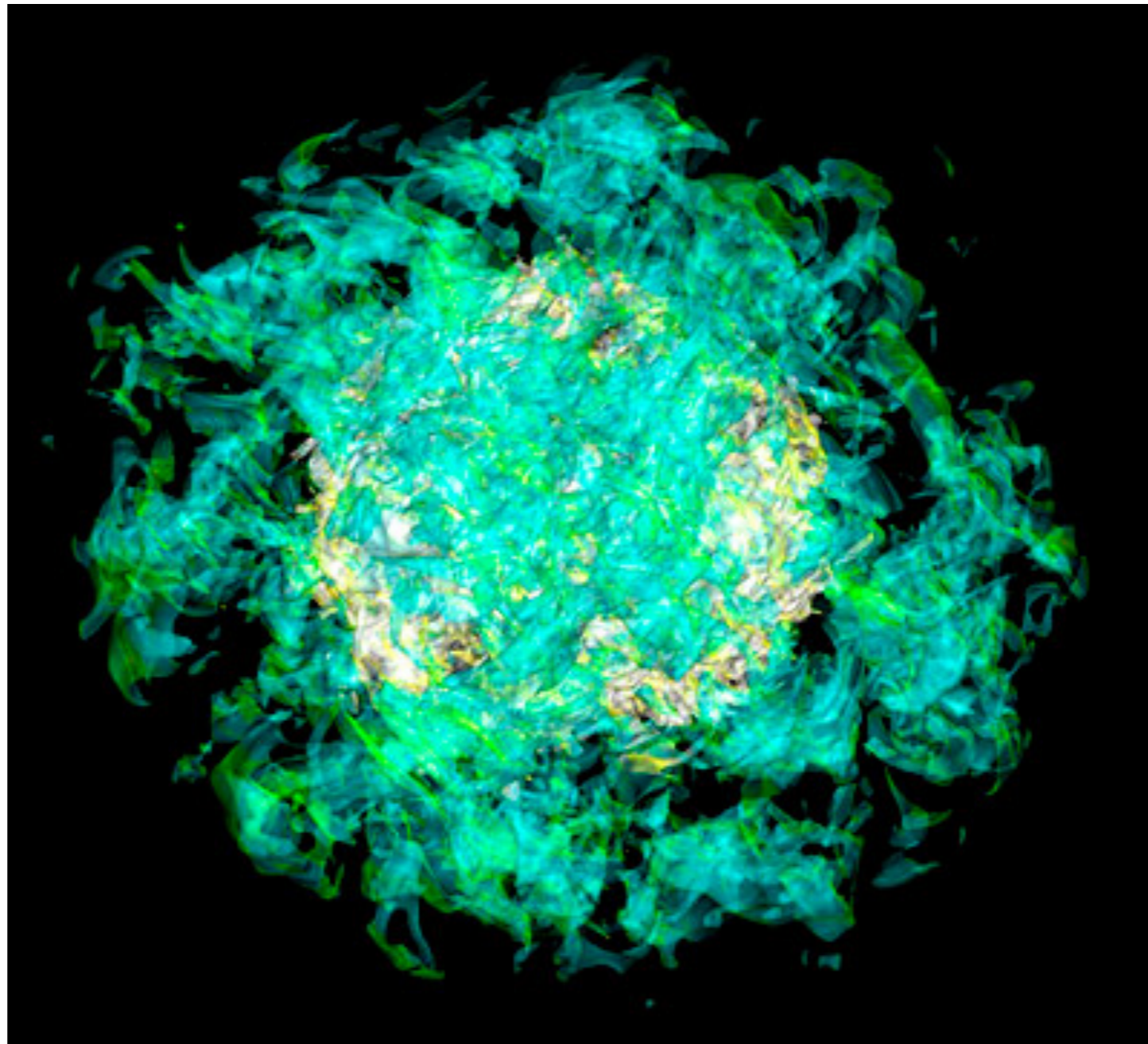
This program was proposed shortly afterward to

- ❑ Continue building the science case for nuclear physics as a key application of extreme computing
- ❑ Continue the computation nuclear physics “community building”
- ❑ Continue the effort to build stronger partnerships with the applied mathematics and computer science communities

INT Program INT-11-2a

Extreme Computing and its Implications for the Nuclear Physics/Applied Mathematics/Computer Science Interface

June 6 - July 8, 2011



Proposed by a group that included many of the organizers of the “Grand Challenge” NP workshop

Joe Carlson
George Fuller
Wick Haxton
Tom Luu
Juan Meza
Tony Mezzacappa
John Negele
Esmond Ng
Steve Pieper
Martin Savage
James Vary
Pavlos Vranas

and organized around subject areas closely paralleling the “Grand Challenge” workshop structure

Applications and Program Organization

Anyone interested in participating in this program can apply by filling out the online [application form](#). To help in planning your visit, we hope to concentrate discussions as follows:

- June 6-10 Nuclear Structure and Reactions (Quantum Monte Carlo, Lanczos Methods, Density Functional Methods)
Coordinators: Steve Pieper, James Vary
[Schedule](#)
- June 13-17 Neutron Star Matter, Astrophysics (Nuclear Equation of State, Supernovae)
Coordinators: Joe Carlson, George Fuller, Tony Mezzacappa
- June 20-24 Astrophysics, Hot QCD (First Stars, Structure Formation; QCD Phase Transition)
Coordinators: George Fuller, Pavlos Vranas
- June 27-July 1 Workshop on the Nuclear Physics/ Applied Math/Computer Science Interface
Applied Math/CS Coordinators: Juan Meza, Esmond Ng
Nuclear Physics Coordinators: Wick Haxton, John Negele
[Workshop agenda](#)
There is a registration fee of \$85 to attend this workshop
- July 5-8 Lattice QCD at Zero Temperature
Coordinators: Tom Luu, Martin Savage

Weeks one, two, three, and five will be organized in the usual INT way, with seminars limited to one or two per day so that participants will have free time for discussions and collaborations. The fourth week will be a more intense workshop similar to the Grand Challenge workshops that the DOE organized in 2008 and 2009. As in these earlier workshops, the focus will be the steps that nuclear physics, applied mathematics, and computer science communities should take in order to optimize the nuclear physics transition to exascale computation.

Thanks to the INT for sponsoring this effort!
Thanks to the participants!