

NCCS Snapshot

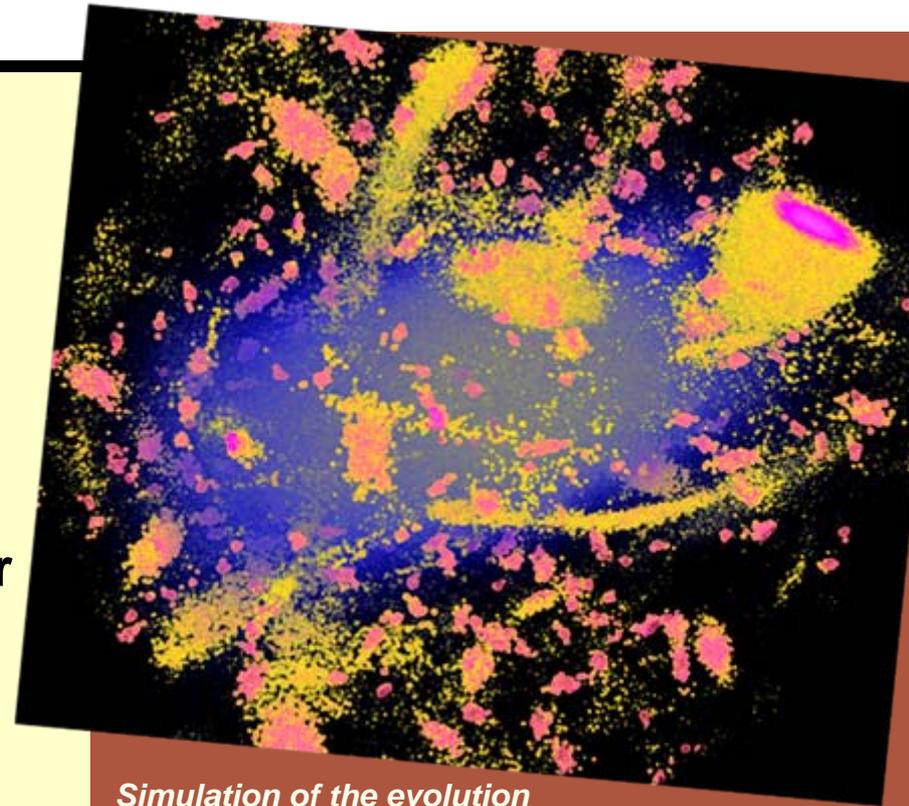
The Week of August 4, 2008

NATIONAL CENTER
FOR COMPUTATIONAL SCIENCES



Invisible Means of Support

- A team led by astrophysicist Piero Madau of UC–Santa Cruz has performed the largest computer simulation ever of dark matter evolving in a galaxy
- Madau and his collaborators performed the simulation on ORNL's state-of-the-art Jaguar supercomputer
- The simulation divided the galaxy's envelope of dark matter into a billion parcels and showed how they would evolve over 13 billion years
- The collaborators review the simulation and their findings in the August 7, 2008 issue of the journal *Nature*



Simulation of the evolution of the Milky Way's dark matter halo.

Astrophysicists simulate the dark matter that cradles a galaxy

Upgraded Jaguar's Transition-to-Operations Features Six Pioneering Applications

- Six select software applications have been running pioneering “science-at-scale” simulations on a high-performance computer at the NCCS
- The simulations employ most or all processing cores of the center’s flagship system, a Cray XT4 called Jaguar, capable of 263 teraflops
- Running demanding software applications after a major machine upgrade is part of a “transition to operations” activity, dubbed T2O
- Jacqueline Chen of Sandia National Laboratories is a good example: her simulations of ethylene required 4.5 million hours running on 30,000 processors and generated more than 50 terabytes of data



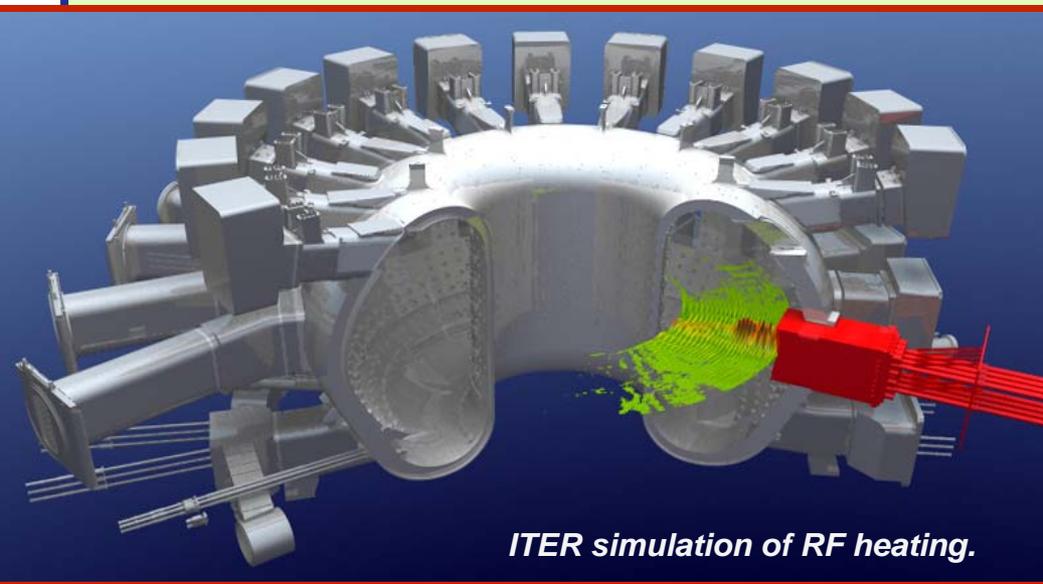
Apps exploit majority of Jaguar's muscle

Journal Cover Highlights Jaguar Simulations



ORNL-led team featured in leading plasma publication

- Fusion simulations performed on ORNL's Cray XT4 Jaguar supercomputer are featured in the cover article of July's edition of the journal *Physics of Plasmas*
- A team led by ORNL physicist Fred Jaeger used its AORSA code to demonstrate that radio waves will be effective in heating the multi-national ITER fusion reactor



- The team's article is entitled "Simulation of high-power electromagnetic wave heating in the ITER burning plasma;" the magazine's cover features an image created by NCCS visualization specialist Sean Ahern

NCCS Hosts IBM Blue Gene/P Workshop

Blue Gene architect on site



“A number of researchers expressed interest in pursuing an official allocation on Blue Gene to utilize the machine.”

Don Frederick, NCCS staff member

- The NCCS recently hosted an educational seminar on the IBM Blue Gene supercomputing platform
- The seminar featured hands-on access to the NCCS’s IBM Blue Gene/P, dubbed “Eugene,” with a peak performance over 27 teraflops
- Researchers were given the opportunity to port their codes to the new architecture and run their codes, all of which were run successfully
- The designer of the Blue Gene/P, Rajiv Bendale, also visited the workshop and shared his expertise

Students Get Crash Course on Supercomputing

- ORNL recently hosted the Appalachian Research Council's Math, Science, and Technology Institute
- The event brings students and teachers from all over Appalachia to Oak Ridge, Tennessee, to get an up-close look at scientific research by working in teams to solve real scientific problems
- The NCCS mentored a five-student research project team in which they assembled a small supercomputer consisting of five Macintosh Minis and learned programming, networking, and other basics

ARC program paves way for future scientist



"I learned so much in such an incredibly short amount of time. It is memories like this opportunity that will last a lifetime and help so much in the future."

Student and ARC participant Rebecca Harrison of Richmondville, New York