



ADVANCED  
SIMULATION &  
COMPUTING™

# Roadrunner—Open Science Projects



## Advancing Science & Programming

To advance science and programming knowledge, Los Alamos National Laboratory has selected open-science and weapons-science projects to help with the Roadrunner Phase 3 system stabilization efforts once the machine is accepted. This hybrid computing system has a peak performance of 1.33 petaFLOPS (double precision on Cells) and 98 terabytes of memory (Cell and Opteron).

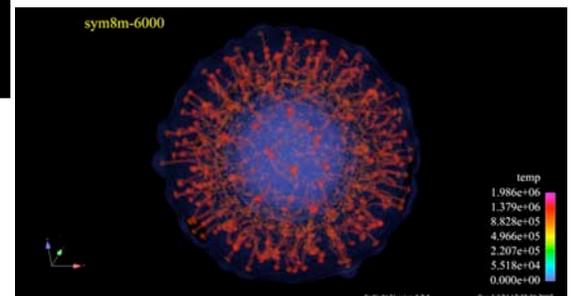
The entire Roadrunner Cell-accelerated petascale system will be available for a group of users selected in a competitive process for approximately four months early in 2009 for high-impact science and engineering simulations. Selected proposals include thermonuclear burn kinetics, laser inertial confinement fusion, ejecta, turbulence, magnetic reconnection, bioenergy from cellulose, viral phylogenetics of HIV, formation dynamics of nanowires, supernova light-curves, and dark universe cosmology. To see the complete list of projects, go to [www.lanl.gov/roadrunner](http://www.lanl.gov/roadrunner) and click on Open Science Projects.

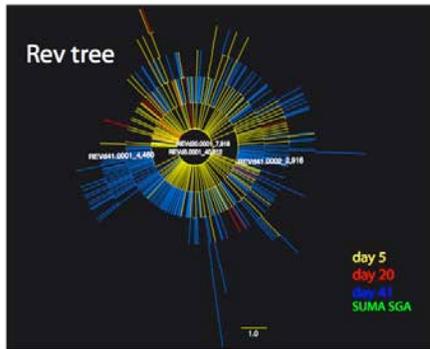
### Roadrunner Technical Seminar Videos Now Streaming on Web

Now available to the high-performance computing community are Roadrunner technical seminars presented by the Computer, Computational, and Statistical Sciences Division at Los Alamos National Laboratory. These presentations about the first multi-core petaFLOPS-speed computer, Roadrunner, were given March–June 2008 at Los Alamos. Using Flash Media Server, the 90-minute sessions include question and answer sessions, and can be used as tutorials as the adoption of similar systems increases. Visit the website at <http://www.lanl.gov/roadrunner/rrseminars.shtml>.

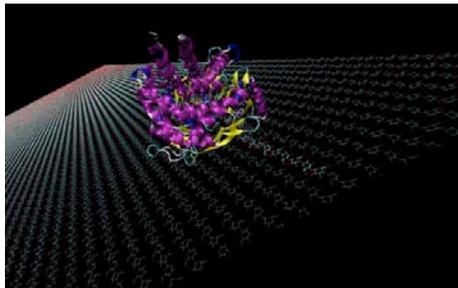


*Right: 3D simulation of a supernova explosion of a 15-solar-mass star using SNSPH code, a parallel 3D smoothed particle hydrodynamics code. From Aimee Hungerford, LANL*

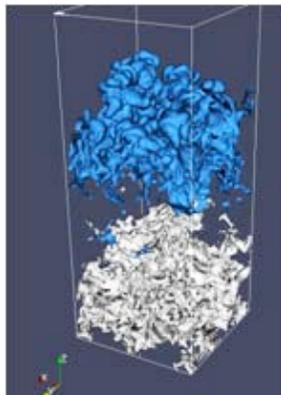




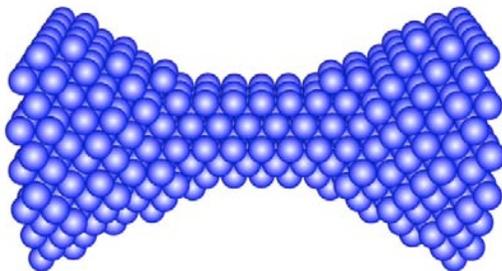
A phylogenetic tree is enabling a snapshot of virus mutation to help find a vaccine for HIV. From Will Fischer and Bette Korber, LANL



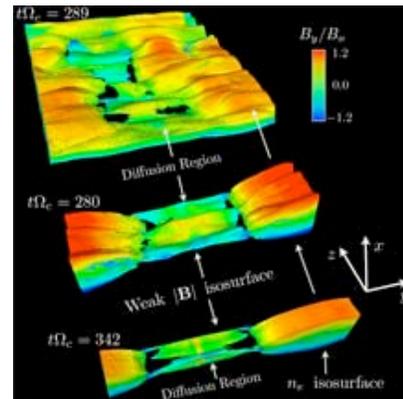
A new simulation to learn more about bio energy—a view of how cellulosomes glom onto a sheet of cellulose. From Kevin Sanbonmatsu, LANL



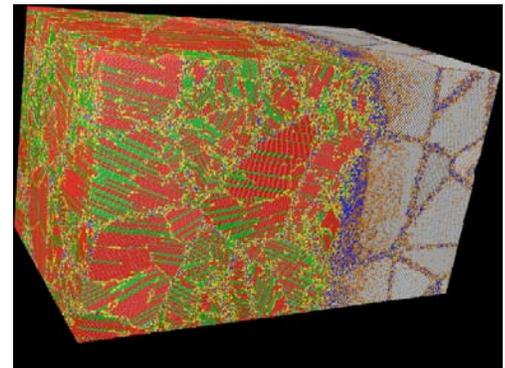
A nonreacting fully resolved Rayleigh-Taylor simulation showing the surfaces defining the mixing layer. From Daniel Livescu, LANL



Looking for ways to accelerate atomic simulations—using accelerated molecular dynamics to investigate the formation and breakup of metallic nanowires. From Art Voter, LANL



Large-scale 3D VPIC simulations on magnetic reconnection—the largest plasma particle-in-cell simulations ever done. From Lin Yin, LANL



Shock-induced transformation in polycrystalline Fe as simulated by the large-scale molecular dynamics code SPaSM *hcp(N=12) fcc(N=12,P<6.5) bcc(N=8)*. From Tim Germann, LANL



Results from a simulation of multimode Rayleigh-Taylor instability using the 3D PPM multifluid gas dynamics code. From Paul Woodward, University of Minnesota

