



SSGF and CSGF Fellows' Poster Session Opening Remarks Part 2

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The Graduate Fellowship Programs



(1)

- CSGF
 - Computational Science Graduate Fellowships
 - Able to utilize the large DOE/NNSA investments in High Performance Computing
 - Spectacular work being done in many fields of science
 - Jointly sponsored by NNSA and Office of Science
 - One of the major sources for the scientific and technical leadership of the future



The Graduate Fellowship Programs



(2)

- SSGF
 - Stewardship Science Graduate Fellowships
 - NNSA started this just three years ago
 - Emphasis is on three scientific areas:
 - *Low Energy Nuclear Physics*
 - *Materials under Extreme Conditions*
 - *High Energy Density Physics*
 - Stresses novel experimental and theoretical work
 - Hope that we will attract many of you to contribute to solving important problems for the nation



Huge Scientific Opportunities Becoming Available



- Both NNSA and the Office of Science are investing in major new scientific capabilities
 - Hope the nation's science and engineering leaders of the future (**YOU**) will address major problems of the country including:
 - ***National Security***
 - ***Fundamental Science***
 - ***Energy Production and Availability***
 - ***Medicine and Biology***
 - ***???***



Brief Look at New Capabilities (1)



- High Performance Computers
 - Secretary Bodman just announced that Road Runner has cracked the one petaflop barrier!
 - RR will be at Los Alamos
 - Number 2 fastest is now Blue-Gene L at Livermore
 - Ranking of top 500 machines due out tomorrow.
 - *DOE machines VERY well represented in the top 10 ten!*
 - *Machines at Argonne, Berkeley, Oak Ridge, Sandia etc.*
 - *Faster machines on the drawing board*



Cutting-edge Computational Science for Solutions to National Security Issues



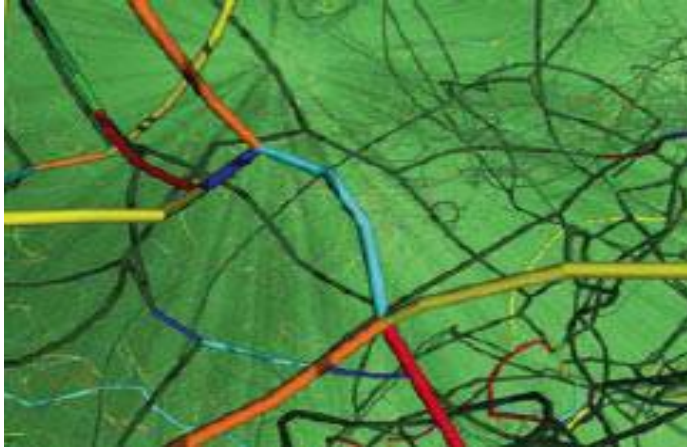
Roadrunner: first to break the petaflop barrier



BlueGene/L: 472 teraflop – top of TOP500 since 2004



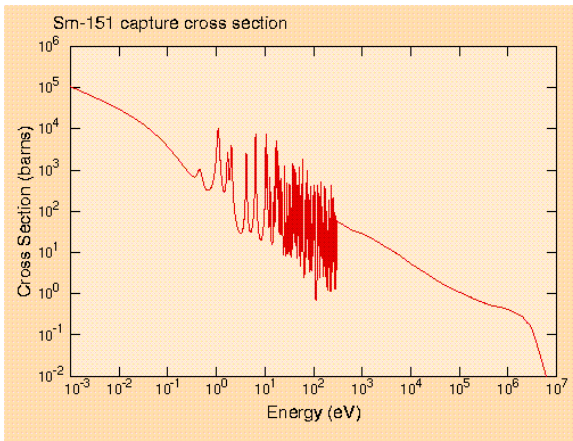
Opportunities to work on complex problems that matter



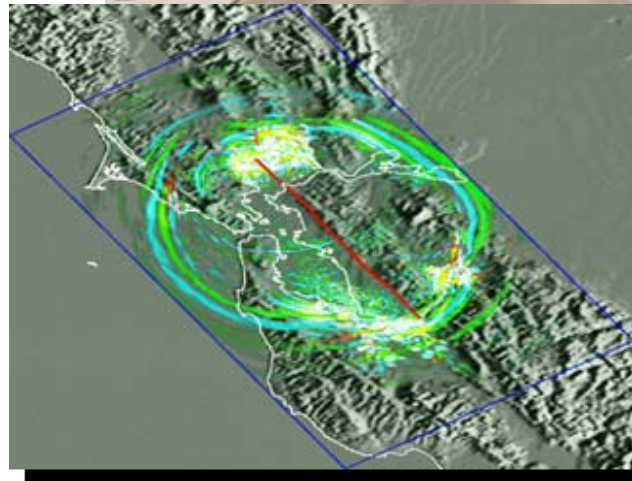
Material Science



Nuclear material detection



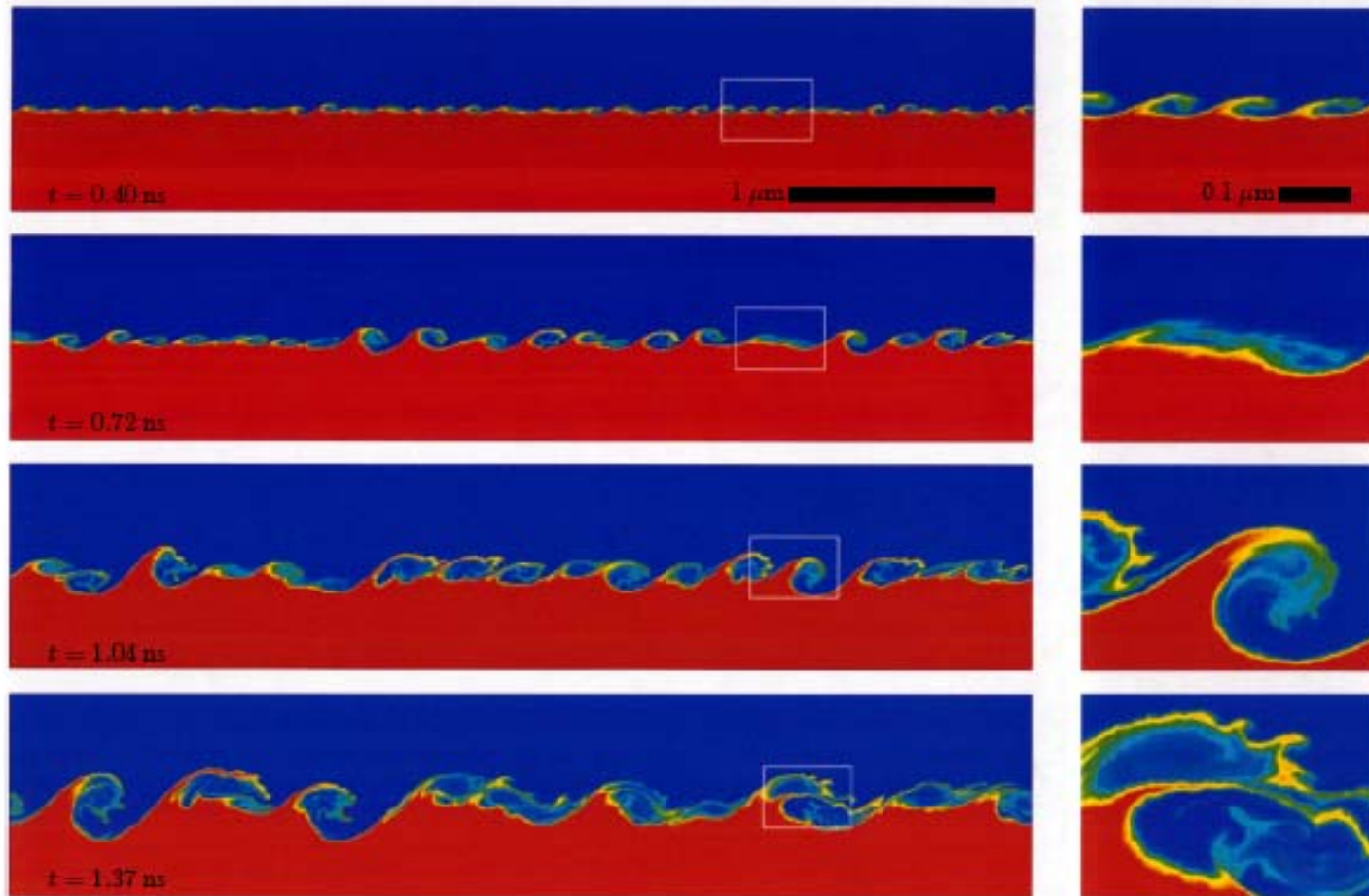
Nuclear Forensics



Seismic Modeling



Science on BG/L: MD model of Rayleigh-Taylor instability (2007 Gordon Bell Prize Winner)



Time evolution of the development of R-T instability near the fluid interface; blue is Al, red is Cu, at 2,000 K. This calculation used 2 billion atoms.



Brief Look at New Capabilities

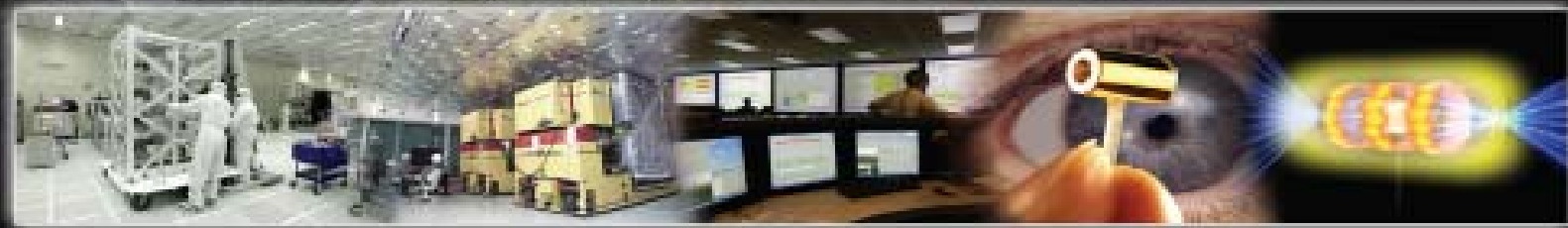
(2)



- High Energy Density Physics
 - **The National Ignition Facility**
 - Completion date March 2009
 - Experimental Program soon after that
 - Scientific Opportunities from fusion to planetary science to element formation to ????
 - **The OMEGA Laser**
 - **ZR at Sandia (Z pinch machine)**
 - **The Linac Coherent Light Source at Stanford**
 - **Jupiter, Trident, Beamlet etc.**
 - **The Relativistic Heavy Ion Collider (RHIC) at Brookhaven**



National Ignition Facility



• With NIF, LMJ, ZR, EP, FIREX, LCLS all turning on in the near future, we have a unique opportunity to broaden and strengthen the field of laboratory astrophysics



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Brief Look at New Capabilities

(3)



- Accelerators (partial list only)
 - LANSCE
 - Los Alamos Neutron Science Center
 - Neutron scattering (materials)
 - Nuclear Physics
 - Radiography
 - Radiation Environment Testing
 - SNS
 - Spallation Neutron Source –Oak Ridge (materials science)



Photon sources for material research

- APS
 - Advanced Photon Source –Argonne
 - Includes high pressure beam line
- ALS
 - Advanced Light Source - Berkeley
- NSLS
 - National Synchrotron Light Source - Brookhaven
- LCLS
 - Linac Coherent Light Source -Stanford



Nuclear and Particle Physics

- CEBAF
 - Continuous Electron Beam Accelerator Facility – Thomas Jefferson National Laboratory
- Tevatron
 - Fermi National Accelerator Laboratory
- LHC
 - Large Hadron Collider – CERN
- FRIB
 - Facility for Rare Isotope Beams – TBD soon



Brief Look at New Capabilities

(4)



- Microelectronics
 - MESA facility at Sandia
- Nanoscale Science Research Centers
 - Argonne
 - Berkeley
 - Brookhaven
 - Oak Ridge
 - Sandia/Los Alamos



Conclusion

- The Department is doing its part by providing the tools and capabilities for the future.
- The rest is up to you and others like you.
- Think about joining us at one of the DOE Labs
- I look forward to seeing as many of your posters as I can.