



Physics Opportunities at LANL: Computational, Experimental, Theoretical

LA-UR-17-30275

Jim Hill, MS NucE, PhD NucE

November 9, 2017

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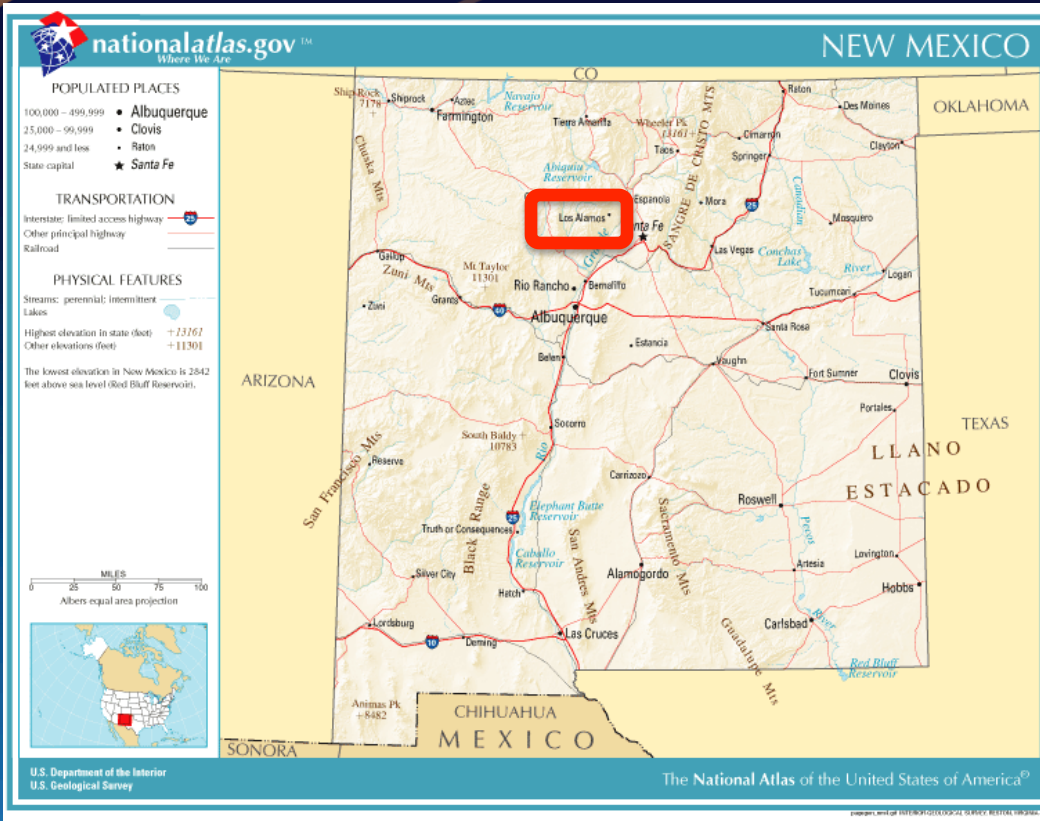
My Work History at LANL

- Graduate Research Assistant 1996-1997
- Started as a staff member 1999
- Primary design and assessment, mostly
- Nuclear safety in abnormal environments
- Point of contact for W78 / MM III ICBM
- Software development, particularly neutron transport and neutron reaction physics
- Currently an analyst for Foreign Nuclear Weapons Intelligence Initiative



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We Are ... Here



In the Jemez Mountain foothills, less than an hour from Santa Fe, less than two hours from Albuquerque – just 1,300 miles from Chambana

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We Are ... Big

- One of 17 DOE national laboratories
- One of 3 NNSA laboratories
- Annual budget \$2B+
- 11,000+ employees
 - 74% Regular/Term
 - 8% Undergraduate
 - 5% Graduate
 - 3% Postdoc



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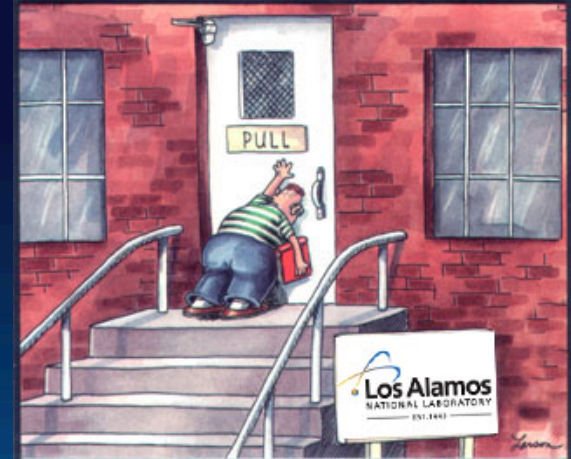
We Are ... Diverse

- Career staff:
 - 67% M, 33% F
 - 54% W, 37% H/L, 5% A, 1% AA, 2% O
 - 33% Millennials
 - 10% Veterans
 - 3% Individuals w/ Disabilities
- Always looking to increase diversity

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We Are ... STEM

- **Physics**
- Nuclear Engineering
- Mechanical Engineering
- Computer Science & Engineering
- Mathematics & Statistics
- Chemistry & Chemical Engineering
- Geology & Geophysics
- Biology & Ecology
- Electrical Engineering



20% PhD, 15% MS (labwide)

53% of R&D staff are student program alumni!

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We Are ... Engaged

- **APS**
- ASME
- ANS
- ACM
- ASCE
- ACS
- AIAA



New APS Fellows
Division / Topical Group:

Atomic/Molecular/Optical Physics
Chemical Physics
Nuclear Physics
Physics of Beams
Shock Compression of
Condensed Matter
Condensed Matter Physics
Magnetism

- and that's just *some* of the "A"s

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We Do ... Global Security

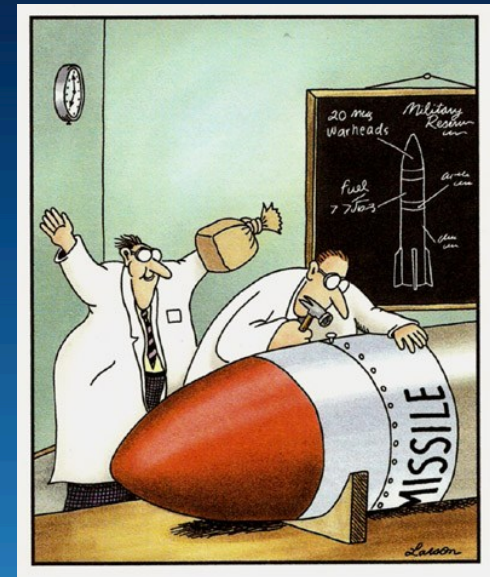
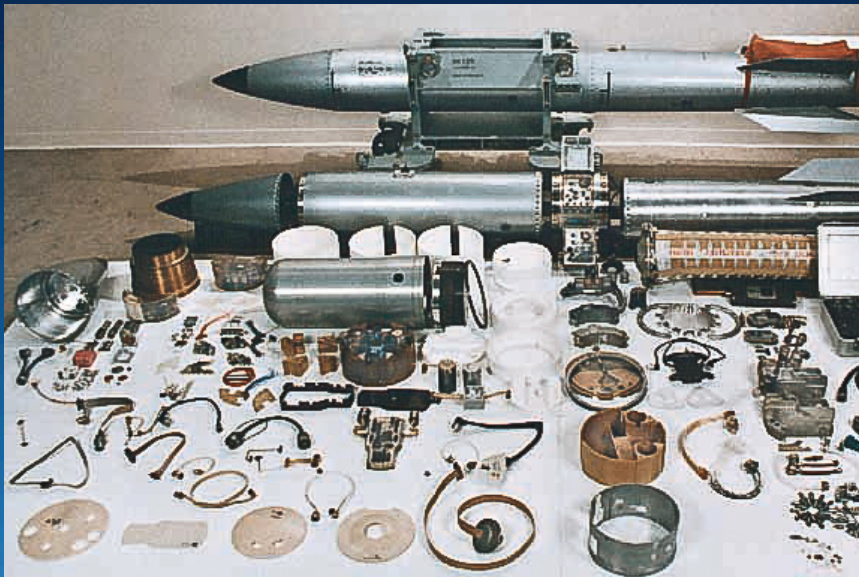
- Inspection
- Detection
- Projection
- Verifaction ... er, verification



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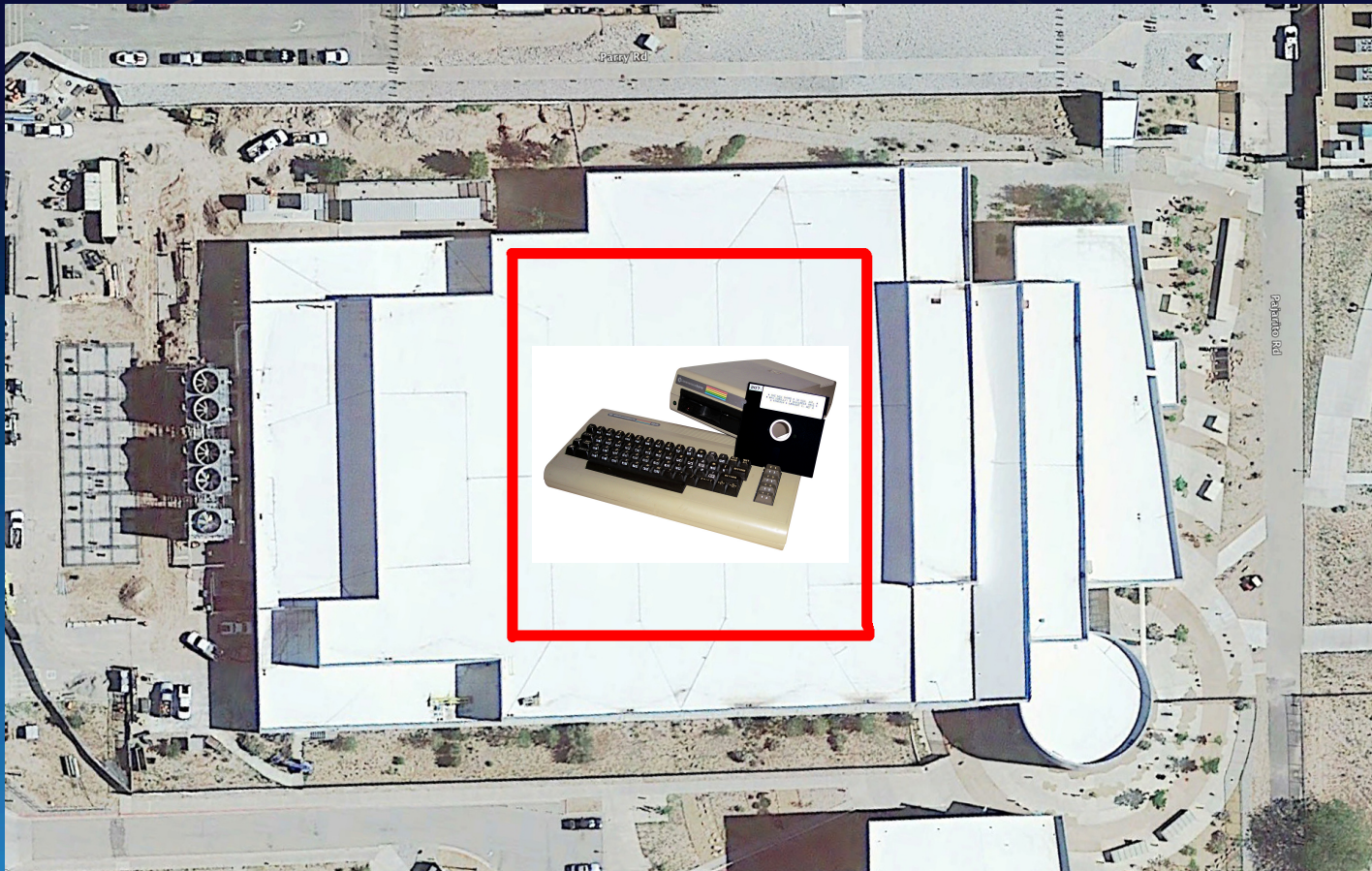
We Do ... National Security

- Stewardship of an aging stockpile



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We Do ... Supercomputing

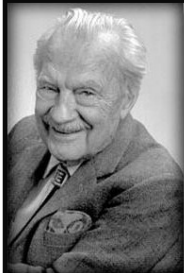
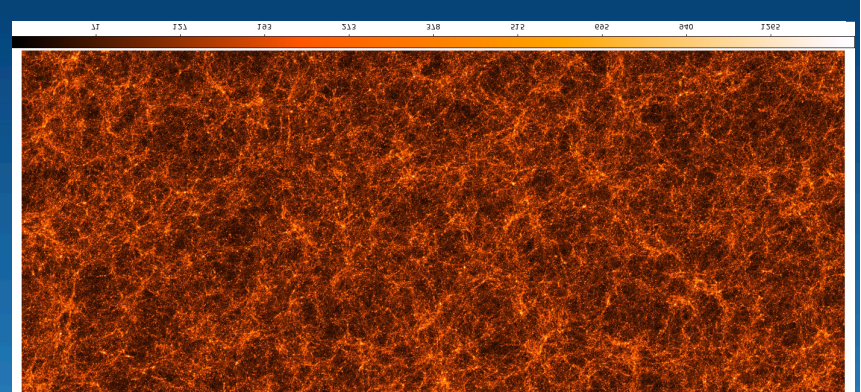
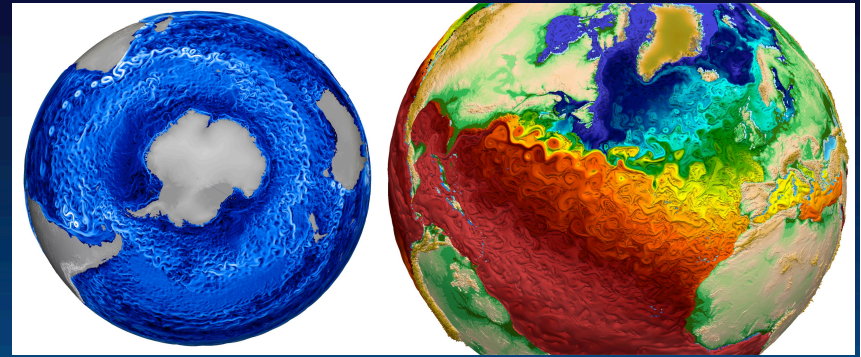


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Operated by Los Alamos National Security, LLC for the U.S. Department of Energy's NNSA

We Do ... Supercomputing

- Trinity: 42 PFlop, 2.1 PB RAM, 15 MW, 8k ft²



Most of us have grown so blasé about computer developments and capabilities — even some that are spectacular — that it is difficult to believe or imagine there was a time when we suffered the noisy, painstakingly slow, electromechanical devices that chomped away on punched cards.

(Nicholas Metropolis)

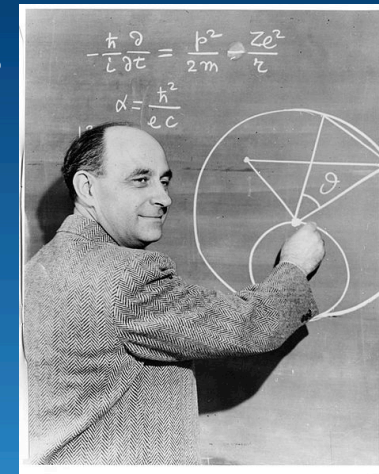
izquotes.com

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Theoretical (T) Division

- Physics and Chemistry of Materials
- Nuclear and Particle Physics, Astrophysics, and Cosmology
- Fluid Dynamics and Solid Mechanics
- Physics of Condensed Matter and Complex Systems
- Applied Mathematics and Plasma Physics
- Theoretical Biology and Biophysics

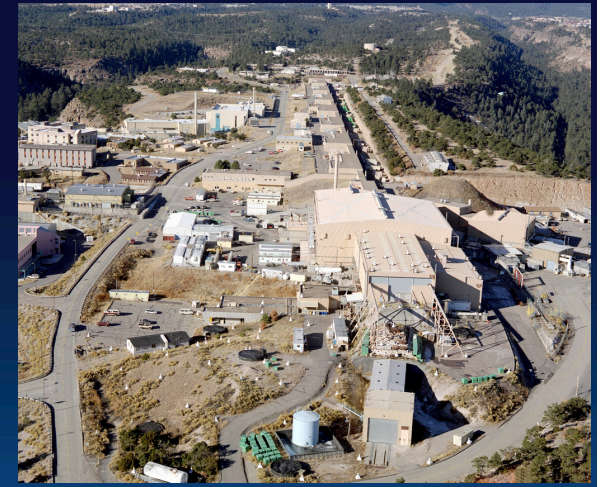
- Center for Nonlinear Studies



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Physics (P) Division

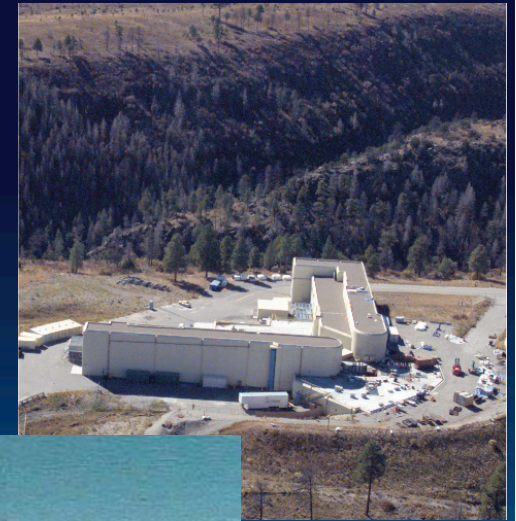
- Applied Modern Physics
 - Neutron Science & Technology
 - Plasma Physics
 - Subatomic Physics
 - LANSCE Weapons Physics
-
- Lujan Neutron Scattering Center
 - Proton Radiography (pRad)
 - Weapons Neutron Research
 - Ultracold (<300 neV / 4 mK / 8 m/s) Neutron Source



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Integrated Weapons Experiments (J) Division

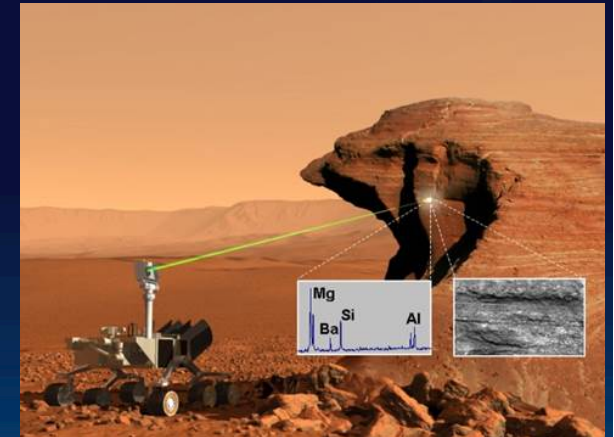
- DARHT: Dual-axis radiography
- Focused experiments
- HE development / research
- Nevada operations



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Intelligence and Space Research (ISR) Division

- Space Science & Applications
- Space & Remote Sensing
- Space Data Science & Systems
- Space Electronics & Signal Processing
- Space Instrument Realization



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Explosive Science and Shock Physics (M) Division

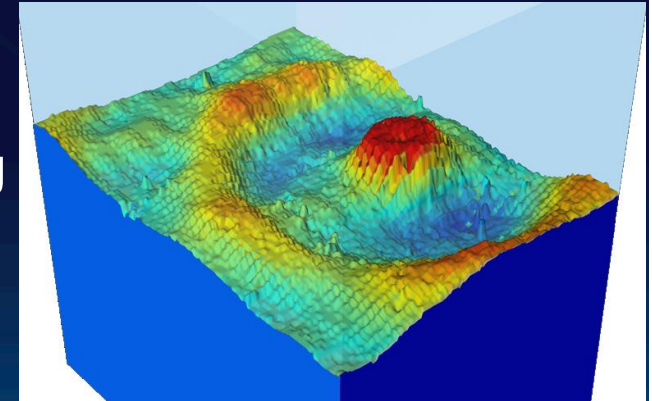
- Explosive Applications & Special Projects
- High Explosives Science & Technology
- Shock & Detonation Physics

- High Explosive Pulsed Power (up to 1 MV, 100+ MA)
- Physics of Energetic Materials
- Reactive Flows
- Blowin' Stuff Up Real Good

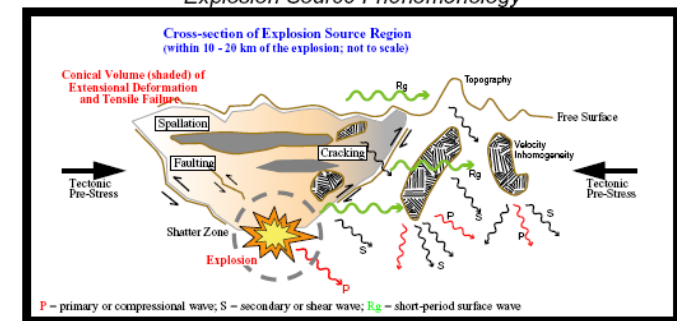
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Earth & Environmental Sciences (EES) Division

- Computational Earth Science
 - Terrestrial, Energy, & Atmospheric Modeling
 - Subsurface Flow & Transport
- Earth System Observations
 - Atmosphere, Climate, & Ecosystem Science
 - Instrument Deployment & Operations
 - Geology, Geochemistry, & Geomaterials
 - Radionuclide Chemistry
- Geophysics
 - Modeling & Simulation
 - Seismo-Acoustics
 - Sensors & Signatures



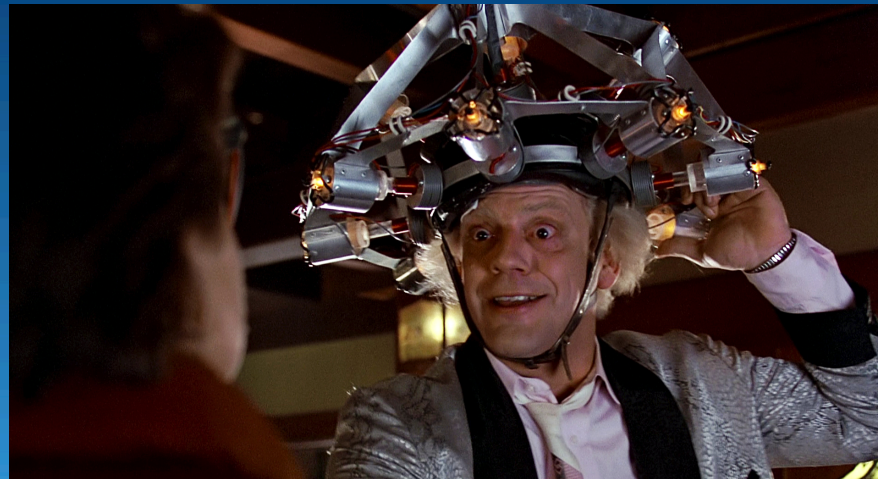
Explosion Source Phenomenology



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Nuclear Engineering & Non-proliferation (NEN) Division

- Safeguards Science & Technology
- Advanced Nuclear Technology
- International Threat Reduction
- Systems Design & Analysis
- Advanced Nuclear Experiments



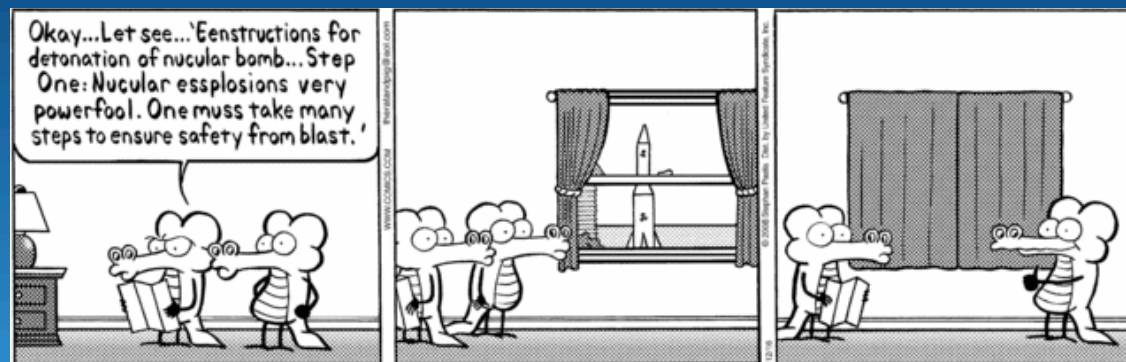
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X-Theoretical Design (XTD) Division

- Primary Physics
- Integrated Design & Assessment
- Nuclear Threat Assessment
- Safety & Surety



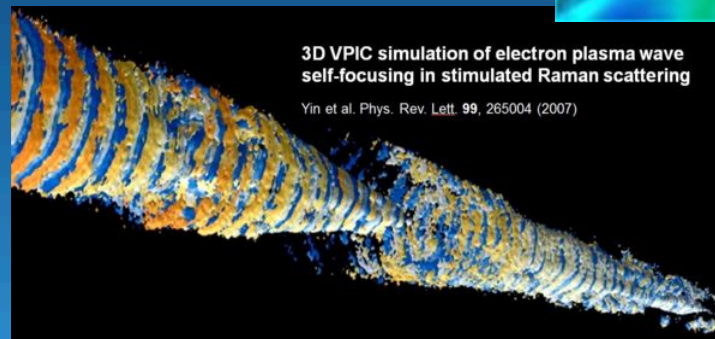
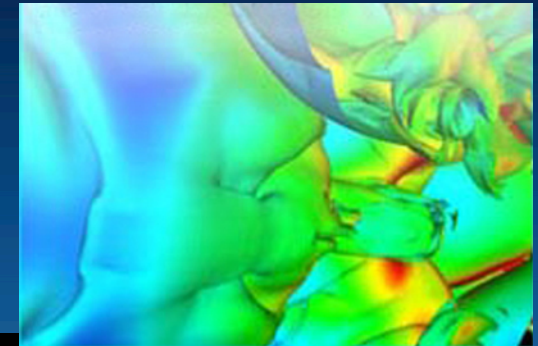
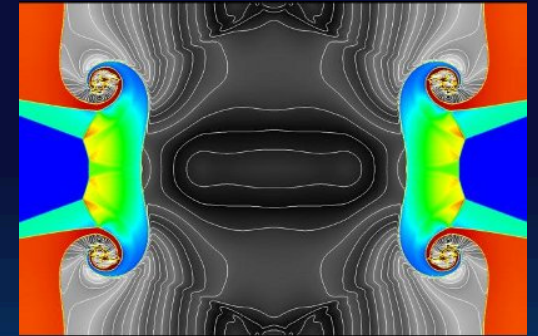
- Neutron-diagnosed Subcritical Experiments (NDSE)



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X-Computational Physics (XCP) Division

- Lagrangian Codes
- Eulerian Codes
- Monte Carlo Codes & Applications
- Methods & Algorithms
- Materials & Physical Data
- Plasma Theory & Applications
- Verification & Analysis



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Career Opportunities

- The “Help Wanted” sign is always in the window
 - Especially now!
- Many positions require DOE security clearance
 - Clearances *typically* require US citizenship
- Committed to an inclusive, diverse work environment where all can thrive
- Excellent salary & benefits package
- Nationally-ranked school system (for the kids!)

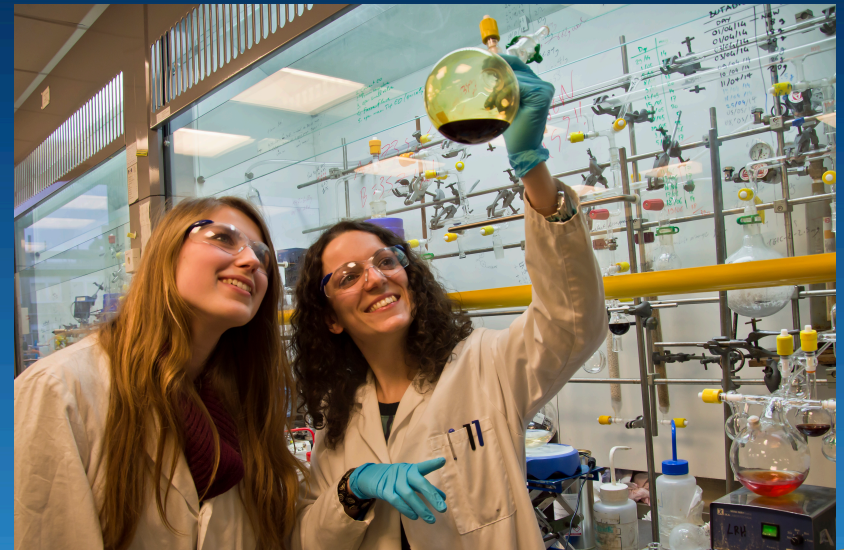
<http://www.lanl.gov/careers/career-options/index.php>

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Postdoctoral Opportunities

- Two-year appointments renewable for a third
- Work with world-class mentors
- Access to world-class resources
- Launch your career
- Many staff conversions

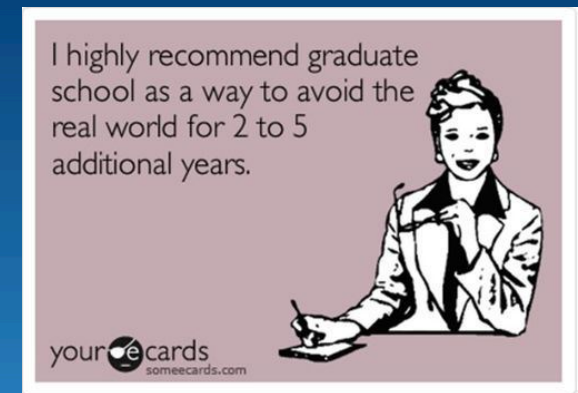
<http://www.lanl.gov/postdocs>



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Graduate Opportunities

- Graduate Research Assistantships
- Appointments from 90 days – 1 year with renewability provided requirements are met
- Thesis research can be part of the assistantship
- Post-master's option allows participation for up to 2 years

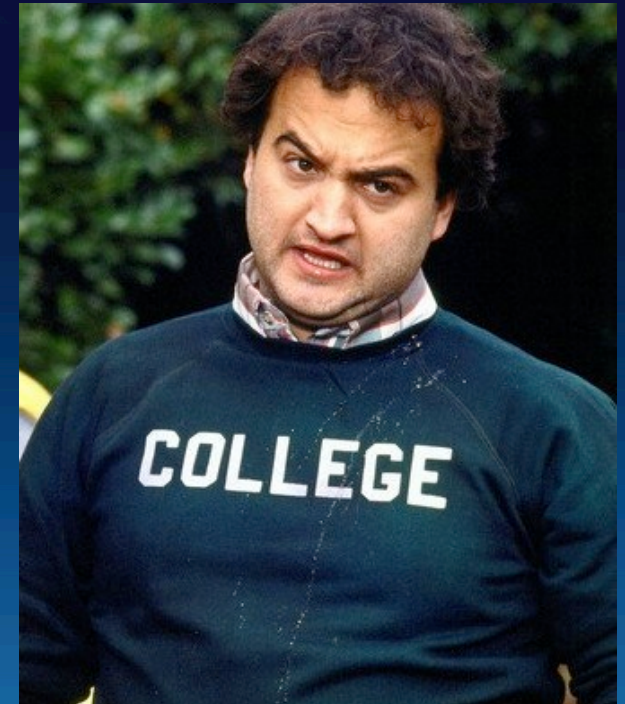


<http://www.lanl.gov/careers/career-options/student-internships/graduate/index.php>

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Undergraduate Opportunities

- Undergraduate Student Program
- 90-day summer internships
- Part-time during academic year
- Post-baccalaureate option



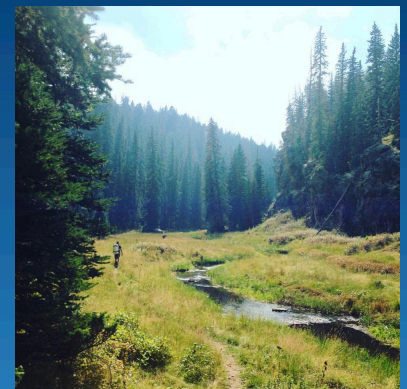
<http://www.lanl.gov/careers/career-options/student-internships/undergraduate/index.php>

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For the Students (All 1,200 of 'em)

Students Association is an active group for meeting others with like interests:

- Hiking
- Camping
- Biking
- Gaming
- Zymurgy
- Skiing
- Road-tripping
- Rock-climbing
- Exploration
- Photography
- Gastronomy
- Whatevs, yo!



<http://www.lanl.gov/careers/career-options/student-internships/students-association/index.php>

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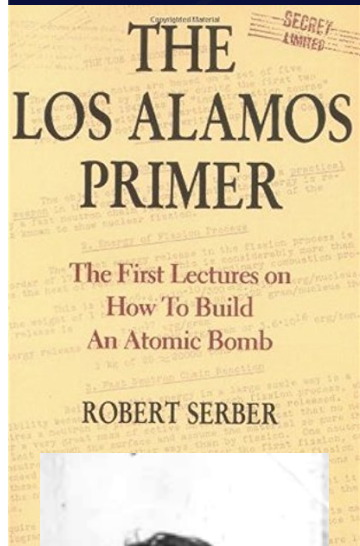
Additional Opportunity

- Computational Physics Student Summer Workshop
- A competitive program for outstanding students
- 10 weeks, paired w/ another student and a LANL mentor to work on a research project of interest
- Results suitable for publication / follow-on research
- Generous stipend (\$7500-\$13k based on standing)
- Many previous participants come back to LANL!

<http://compphysworkshop.lanl.gov>

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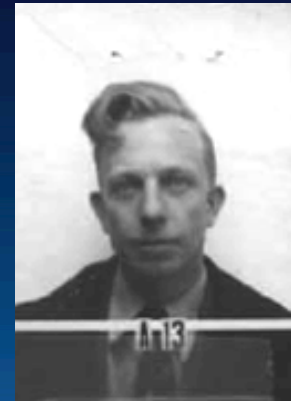
Illinois has been associated with LANL from the beginning ...



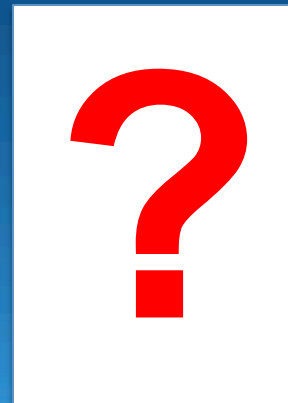
Robert Serber wrote the FAQ



Donald Kerst invented the Betatron



John Manley helped prove feasibility of an atomic bomb



What might
YOU do?

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