



An Exciting Time for a Career at an NNSA Lab

Ellen Cerreta, Associate Laboratory
Director for Physical Sciences

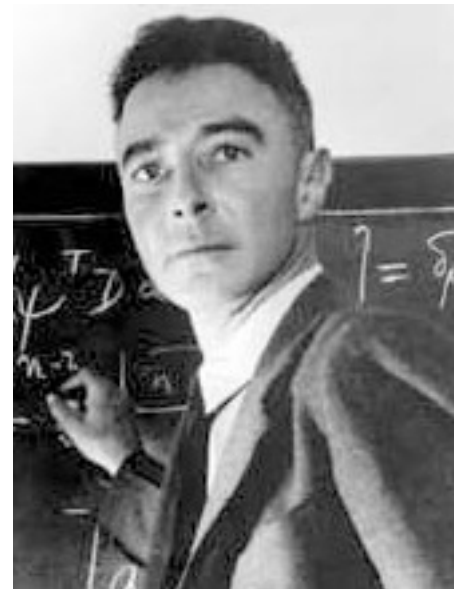
June 28th, 2023

DOE/NNSA Laboratory History Begins 80 years Ago

- The Lab was established in 1943 as site Y of the Manhattan Project
 - Manhattan Engineer District, designed & built by the U.S. Army Corps of Engineers
 - P.O. Box 1663, Santa Fe, New Mexico
- Original mission: Design & build an atomic bomb
 - **July 16, 1945:** Detonation of 1st atomic bomb
 - **Aug. 6, 1945:** Little Boy dropped on Hiroshima
 - **Aug. 9, 1945:** Fat Man dropped on Nagasaki



J. Robert Oppenheimer
1st director of LANL
1943-1945



Research and Development at the Labs Supports Our Broad Mission Space



Nuclear Deterrence – develop highly reliable, predictive tools to answer questions about performance in a changing stockpile due to aging, manufacturing, and material replacement.



Energy Security – includes materials for nuclear reactors, waste treatment, energy production, conversion and storage, transportation fuels and energy efficiency.



Global Security – includes addressing threats from peer adversaries and emerging nuclear threats; from the earliest adversary planning through resilient event response; as well as providing technical capabilities and expertise in support of global efforts to understand and limit nuclear proliferation through strengthening international nuclear safeguards and security.

Today our NNSA mission focuses on the Science, Engineering, and Associated Experiments required to Support a Modern Stockpile, Energy Security and Global Security

- Hardware realization of physics concepts and designs
 - Concepts and stockpile studies
 - Systems Engineering and Requirements Management
 - Component Design and Development
- Maintenance
 - Surveillance and Issue Response
 - Safety Assessment and Response
 - Support Production Plants, Pilot Scale Production
- Exploration/Validation Experiments
 - Large scale Hydro and Subcritical experiments
 - Smaller scale science- and issue-driven experiments
 - Model Development



Large Scale Facilities are a Hallmark of a DOE Lab

- **Manufacturing Capability:**
 - LANL operates the nation's only full-capacity plutonium facility (PF-4) and is the Production Agency for Detonators
 - Center for Microelectronics and Microelectronics Development Laboratory at SNL
 - Polymer Production Enclave at LLNL
 - All sites synergistic with the plants: Y12, Pantex, Kansas City

- **Predictive and Validation Capabilities:**
 - High Performance Computing
 - Dual-Axis Radiographic Hydrodynamic Test facility (DARHT)
 - Active firing sites: up to 2000lbs of explosive, partnership with the test site
 - Pulsed Power Facility: Z- machine at SNL
 - National Ignition Facility at LLNL
 - LANSCE User facility at LANL



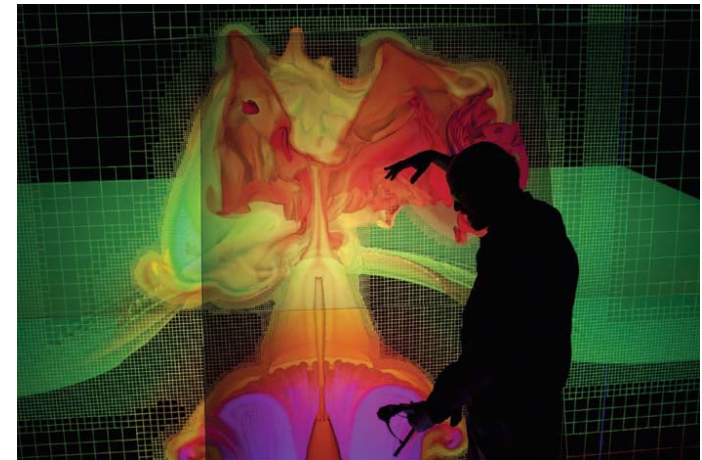
Mission Continues to Evolve

Since the end of underground testing – focused on stockpile stewardship

- Emphasis on predictive tools for the stockpile to enable certification
- Building capability to validate those models
- Understanding/controlling aging

Results of the 30+ years are:

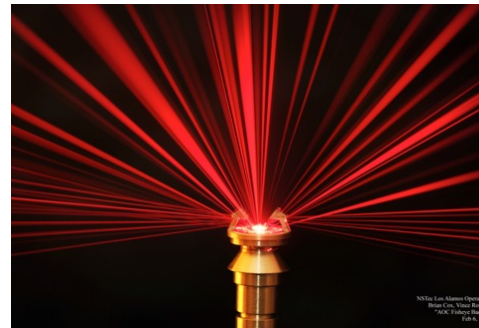
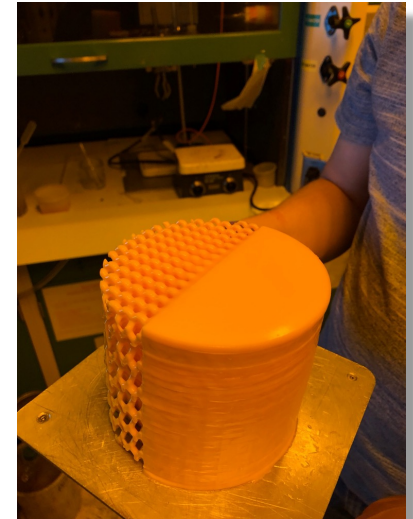
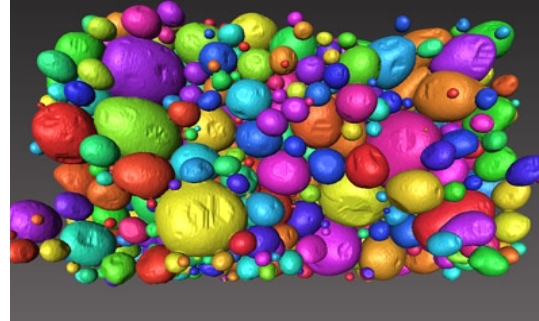
- We have some strong predictive capabilities for structure to performance of materials
- We have a number of world class capabilities for examining performance at the component and system level
- Our systems have aged
- We have lost some capability in making new materials and qualifying



Current state, is one in which we would like to consider insertion of new materials and new systems into the stockpile

Significant Challenges/Opportunities are Ahead

- New production, accelerated qualification of materials and transition to rate production
- Maintenance of an aging stockpile
- Responsibility to a portfolio of capabilities that are of interest to our broad set of partners
- Enhanced partnership throughout DOE and our partners



My Path and Access to the Labs

My Path Before and at LANL



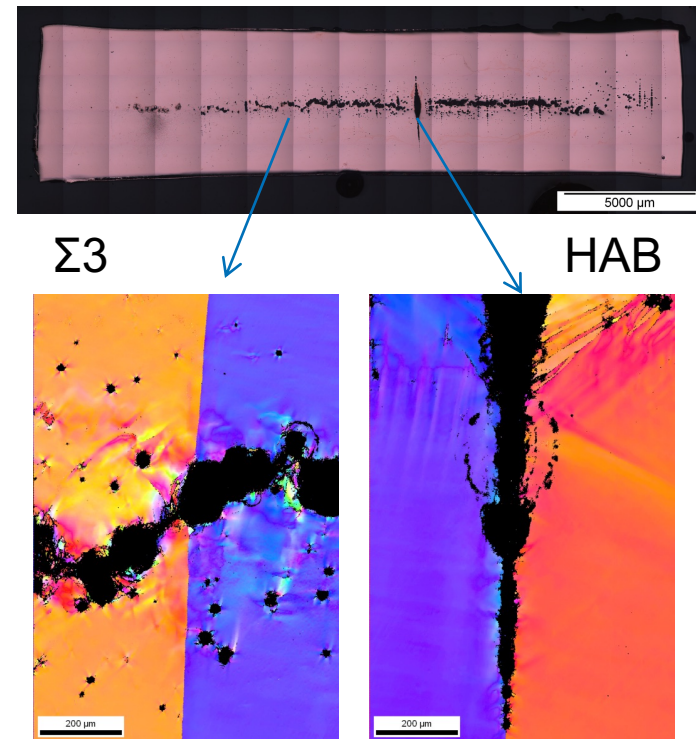
- **University of Virginia**, BS in Aerospace Engineering (1992-1996)
- **Carnegie Mellon**, MS and PhD Materials Science (1996-2001)
 - **Arizona State University**, visiting scientist (1999-2001)
- **Los Alamos National Laboratory**
 - Post Doc: (2001-2003)
 - Technical Staff Member: (2003-2015)
 - Group Leader for MST-8 (LANL) (2015-2017)
 - Deputy Division Leader for Explosive Science and Shock Physics (2017 -2019)
 - Division Leader for Materials Science and Technology (2019 – 2022)
 - Associate Laboratory Director for Physical Sciences (current)



Focus of My Own Research at LANL has been on High Strain Rate, High Stress Properties of Materials

- Establishing deterministic role of microstructure on damage – toward controlled performance
- Understanding the role of plasticity and phase transformation on material strength
- Extended past post mortem measurements to in-situ techniques at LANL & LCLS/APS to examine structure during dynamic loading

Funded through: NNSA Weapons program, DoD Programs, Office of Basic Energy Sciences and Laboratory Directed Research and Development (LDRD) Program



J.P Escobedo, E.K. Cerreta, and D. Dennis-Koller, *Journal of Metals*, 66 (2014) 113-12

LANL's National Science Education Center hosts 6 Institutes to Enable External Collaboration

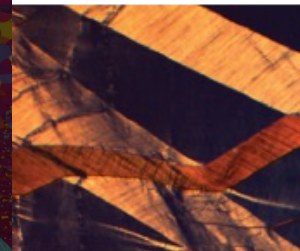
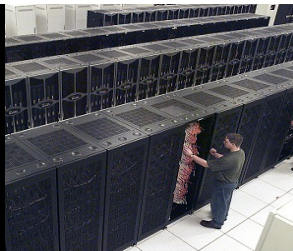
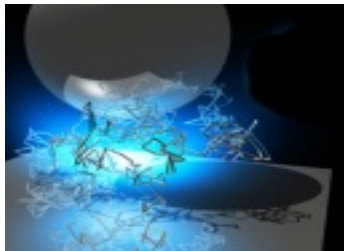
Program Director: David L. Clark

MISSION: To provide creative mechanisms for education and training, research, and academic interactions with the Laboratory that promote mission-relevant multidisciplinary technology innovation.

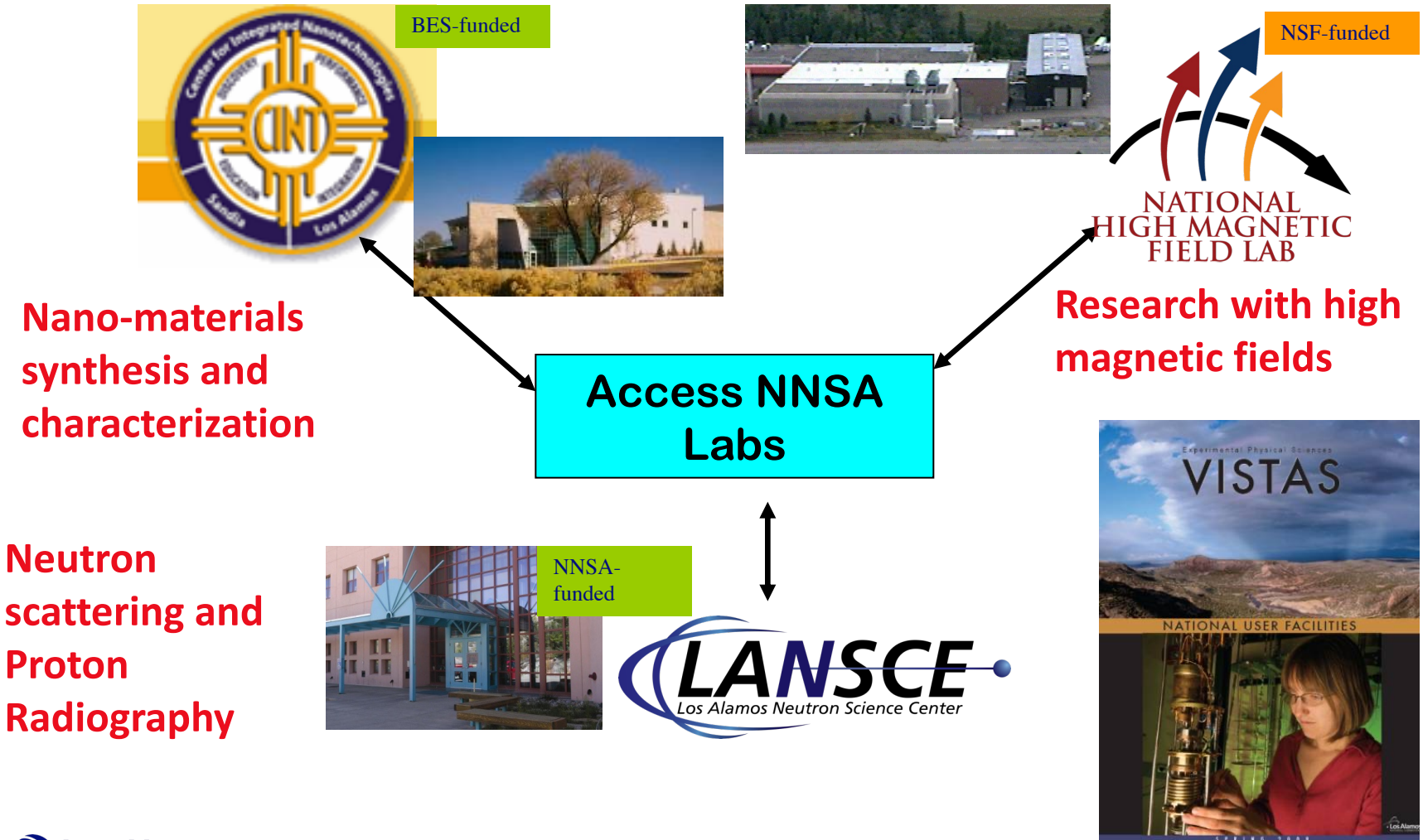


Website:

[Http://nsec.lanl.gov](http://nsec.lanl.gov)



National User Facilities can be a Key Access point to the Labs





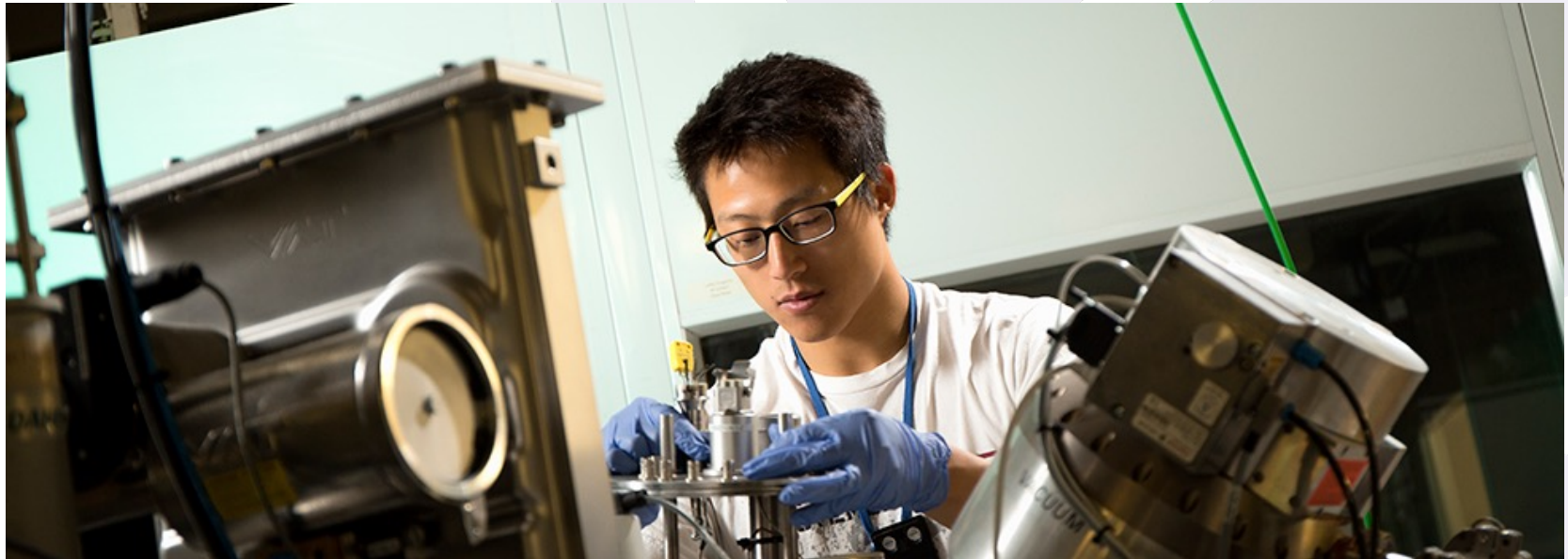
Career Paths & Access Points at NNSA Labs:

- **R&D position:**
 - **Post Doctoral, Post Masters, Post Baccalaureate**
 - **R&D Scientist and R&D Engineer**
 - **Research technologist and Technician**
- **Management Roles:**
 - **Program**
 - **Line: Team, Group, Division level**
 - **Technical Projects**
- **Technical Support:**
 - **Computer Science and Programming, Radiation Protection, Environmental Science, Industrial Hygiene, Nuclear Criticality, Power Systems, Cybersecurity, Industrial Engineering, Quality Assurance, Operations and Maintenance, etc.**
- **Access Points: Many ways to access opportunities to do research @ LANL**
 - **Human Resources, User Facilities, Student Programs, the Institutes, and LANL Post-Doctoral Program**

Jobs @ LANL

<https://www.lanl.gov/careers/index.php>

- Access to all Open Positions
- How to apply
- Recruiting events
- Explore Different Careers @ LANL
- Information regarding Diversity and Inclusion



Student Programs @ LANL

Positions:

- Undergraduate
- Graduate
- Post Baccalaureate
- Post Masters

Information About Program Resources:

- Salary Structure
- Student Symposia
- Students Association
- Career Resources
- Scholarships

Program Coordinator

Emily Robinson

Student Programs Office

(505) 665-0964

erobinson@lanl.gov



Student Program Website

<https://int.lanl.gov/employees/education/index.shtml>

Post Doc Program

Information regarding the program:

- LANL Post Doc program
- Post Doc Research Symposium and Career Fair
- Post Doc Association
- Post Doc Housing
- Benefits
- Life @ LANL
- Career Development Events
- Post Doctoral Awards

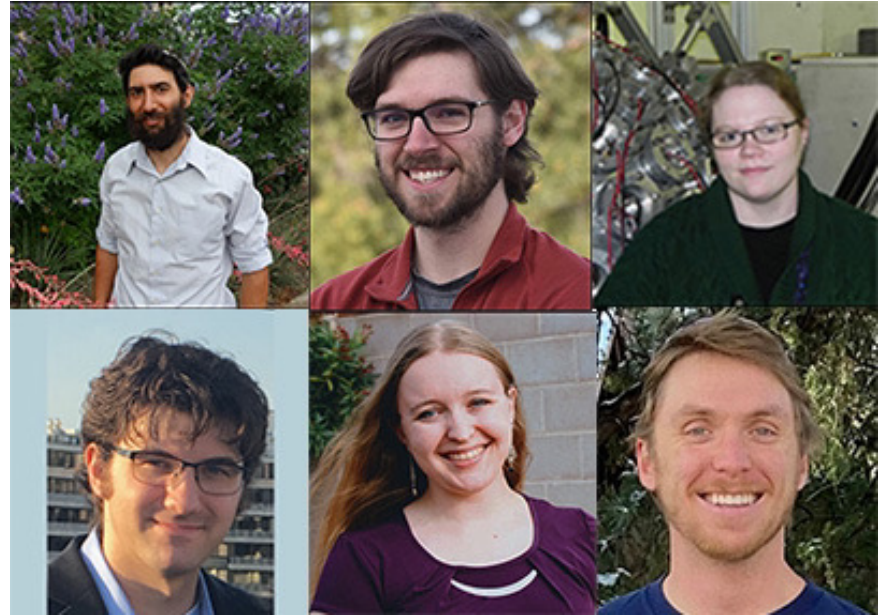
Contacts:

Postdocprogram@lanl.gov

Webpage:

<https://www.lanl.gov/careers/career-options/postdoctoral-research/index.php>

Previous Agnew And Metropolis Fellows





Final Thoughts

Current NNSA mission has led to many R&D opportunities at the labs

- Production Science
- Energy Security Mission
- Weapons Engineering and Experiments

There are multiple access points for those looking to collaborate or for careers at LANL

- User Facilities
- Student and Post Doctoral Programs
- National Security Education Center (NSEC)
- Human Resources

Contact Information:

Ellen Cerreta

ecerreta@lanl.gov

<https://www.lanl.gov/org/ddste/aldps/materials-science-technology/index.php>