LA-UR-20-24474

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Title: LANL Overview Summer 2020

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Intended for: He is filming a video.

Issued: 2020-06-22

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Overview

Los Alamos National Laboratory

John Sarrao
Deputy Director
Science, Technology & Engineering

[LANL Summer Student, 1990]

Summer, 2020

Managed by Triad National Security, LLC for the U.S. Department of Energy's NNSA

The Laboratory is a complex, dynamic system of people, facilities, materials, and services

Weapons Programs

- Weapons Physics Design and Computation
- Weapons Engineering
- High Explosives
- Plutonium
- Tritium/GTS
- Uranium, Beryllium, Salts, Metals
- Detonators
- Component Fabrication and Assembly

Science, Technology & Engineering

- Nuclear Nonproliferation & Counter-Proliferation
- Emerging Threats
- Intelligence Community
- National Defense and Homeland Security
- Chemistry, Earth and Life Sciences
- Materials and Physical Sciences
- Theoretical and Computational Sciences

Director's Office

- Institutional Management

Institutional Operations

- Business Services
- Environmental, Safety, and Health
- Nuclear & High Hazard Operations
- Security and Mission Assurance
- Capital Projects
- Project Management Services

40 square miles 47 technical areas 1,280 buildings/ 9M sq ft 11 nuclear facilities 268 miles of roads

8,600 career employees/12,900 workers on site 2,500 R&D staff 1,100 veterans 460 postdocs 1,850 students

\$2.9B budget 11 Directorates 60 Divisions

Los Alamos National Laboratory

Organizational structure

DDSTE organization

Simultaneous excellence:

Balance between operations and mission

How we do our work is as important as *what* we do

Los Alamos' core mission is to ensure the U.S. nuclear deterrent

- Ensure safety, reliability, and performance of U.S. nuclear stockpile
- Design agency for 4 out of 7 warhead systems constituting the nation's deterrent
 - Physics design & engineering
- Significant & growing production responsibilities: detonators, heat sources, Pu pits

Modeling & simulation

Specialized experiments

Supercomputing

DARHT – Dual axis x-ray

Los Alamos uses scientific assessment, experimentation & modeling to assess and certify the stockpile, which has aged significantly since it was first developed and since the conclusion of full-scale testing

Our national security mission is broad and important — and motivates and is enabled by ST&E discovery

Ensure the safety, reliability,
and performance of the
U.S nuclear stockpile

- Physics & Design
- Engineering
- Production

Preventing and countering
*efforts of proliferants to
acquire, develop or
disseminate materials
and expertise necessary
for nuclear weapons*

Excellence in nuclear security

*to ensure the nation's nuclear
deterrent through theory,
modeling and simulation,
and experimentation*

Energy security

- Sustainable Nuclear Energy
- Resilient Materials
- Complexity in Energy Systems

Supporting the DoD, IC, and other national
security partners to execute multidomain
operations across land, air, sea, space and cyber

Our capability areas now define six key areas of science, technology & engineering in which we must lead

MATERIALS FOR THE FUTURE

Defects and Interfaces
Extreme Environments
Emergent Phenomena

SCIENCE OF SIGNATURES

Nuclear Detonation
Nuclear Processing, Movement,
Weaponization
Natural and Anthropogenic Phenomena

NUCLEAR AND PARTICLE FUTURES

High Energy Density Physics & Fluid Dynamics
Nuclear & Particle Physics, Astrophysics & Cosmology
Applied Nuclear Science & Engineering
Accelerator Science & Technology

WEAPONS SYSTEMS

Design
Manufacturing
Analysis

INTEGRATING INFORMATION, SCIENCE, AND TECHNOLOGY FOR PREDICTION

Complex Networks
Computational Co-Design
Data Science at Scale

COMPLEX NATURAL AND ENGINEERED SYSTEMS

Human–Natural System Interactions:
Nuclear
Engineered Systems
Human–Natural System Interactions:
Non-Nuclear

FY20 Lab Agenda

SIMULTANEOUS EXCELLENCE	1.0 NUCLEAR SECURITY	2.0 MISSION-FOCUSED SCIENCE, TECHNOLOGY & ENGINEERING	3.0 MISSION OPERATIONS	4.0 COMMUNITY RELATIONS
Strategic Objective (10–20 years)	Excellence in Nuclear Security	Excellence in Mission-Focused Science, Technology & Engineering	Excellence in Mission Operations	Excellence in Community Relations
Critical Outcomes (5–10 years)	Design, produce, and certify current and future nuclear weapons and reduce global nuclear threats	Deliver scientific discovery and technical breakthroughs that support DOE and NNSA missions	Execute sustained operations that are reliable and responsive to mission needs	Sustain and enhance LANL's partnership with the community across the Northern New Mexico region
Major Strategic Initiatives (1–5 years)	<p>1.1 Execute LANL's Manufacturing mission to deliver 30 plutonium pits per year</p> <p>1.2 Transform nuclear weapons warhead design and production</p> <p>1.3 Anticipate threats to global security; develop and deploy revolutionary tools to detect, deter, and respond</p> <p>1.4 Continue to support the W88 Alt 370, Alt 940, and the B61-12 LEP</p> <p>1.5 Assess the stockpile as it ages and project weapon systems lifetimes</p>	<p>2.1 Refresh and refine the LANL capability pillar framework</p> <p>2.2 Advance accelerator science, engineering, and technology to enable future stewardship capabilities</p> <p>2.3 Advance the frontiers of computing to exascale and beyond</p> <p>2.4 Assert leadership in the national quantum initiative</p> <p>2.5 Develop and implement an integrated nuclear energy and materials initiative</p> <p>2.6 Develop and implement an integrated initiative for plutonium and actinide missions</p>	<p>3.1 Change organizational culture with an emphasis on organizational learning</p> <p>3.2 Improve integrated planning across priority mission activities and infrastructure</p> <p>3.3 Address critical issues related to NMCA, nuclear safety, criticality safety, and waste</p> <p>3.4 Implement systematic process improvement to drive increased rigor and efficiency in work execution</p> <p>3.5 Enhance quality of work life, workforce planning, and training and development</p>	<p>4.1 Continue commitment to the community with educational, economic, and philanthropic investments of time and resources</p> <p>4.2 Strengthen pipelines and partnerships to build workforce of the future</p> <p>4.3 Enhance small business participation in executing LANL scope across all directorates</p>

FY20 Lab Agenda

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Employee numbers continue to grow

Continued commitment to student/postdoc programs, diversity initiatives

LANL Hires and Attrition
(FY13 – FY20 est.)

*(data as of March 2020)

Student/Postdoc Numbers (FY13–FY19)

Postdoc Diversity*	LANL	DOE Nat'l Labs
Women	25%	24.4%
Under-represented minorities (URM)	6.4%	8.6%
Other people of color (OPC)	35.3%	36.5%

*2019 (URM: Hispanic, Black, Native American; OPC: Asian)

Partnerships & Pipeline Office (PPO) was formed at transition to enhance our internal coordination and external outreach

Pipeline

Partnerships

Pipeline Mechanisms:

- **Student Programs:** Education opportunities for high school, undergraduate, and graduate students
- **Postdoctoral Programs:** Postdocs contribute to research efforts, enhance our STE capabilities

Partnership Opportunities:

- **National Security Education Center Strategic Centers:** Scientific centers of excellence with high international visibility that innovate strategic new science and education programs
- **New Mexico Consortium Coordination:** Creative mechanisms for collaboration with NM research universities through joint appointments and unique facilities
- **Feynman Center for Innovation:** From “tech transfer” to innovation asset stewardship with strategy driven through Innovation Asset Strategic Council

The Laboratory continues to be essential to the nation's security

Los Alamos delivers national security mission solutions

- By applying multidisciplinary science, technology & engineering capabilities, in unique experimental, computational, and nuclear facilities
- With an agile, responsive, and innovative workforce
- Dedicated to addressing complex national security issues and the world's most difficult challenges

Advice for exploring opportunities (collaborative and employment)

- Be persistent and don't be shy
- Think broadly
 - Very few of us are doing today the job we were hired to do
- ALDs don't bite (and it's their job to engage with you)
- You have a right to expect transparency and consistency in conversion discussions
 - Engage early and often
- I'm happy to personally help