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2022 Presentation for UCSD Structural Engineering Department

Brittany Ouellette, Nick Stull

November 7, 2022

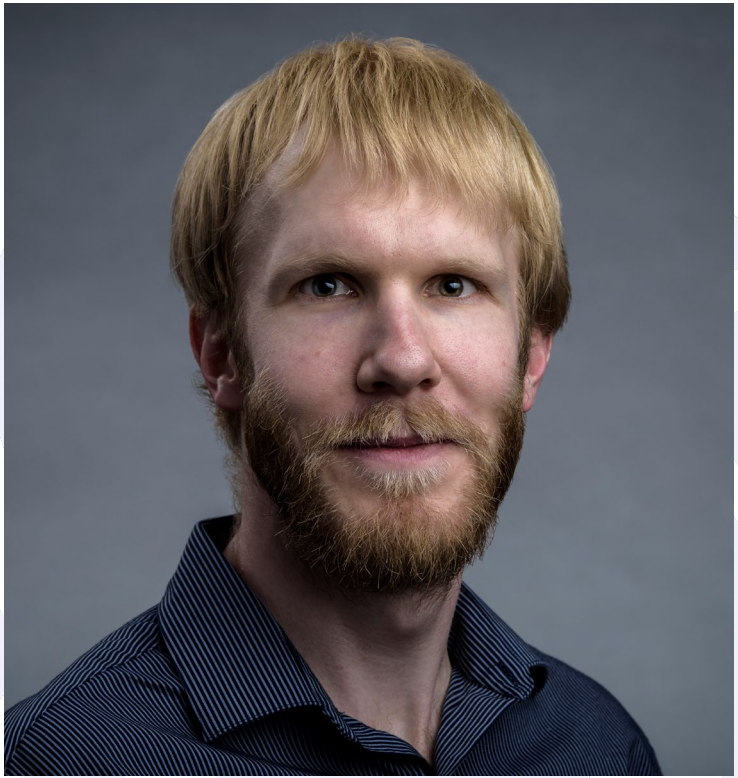
Acknowledgement of content from J.M. Gallegos, A.A. Siranosian, T.B. Stone: LA-UR-22-23830

Professional Background

- Education
  - B.S. Structural Engineering, 2009
  - M.S. Structural Health Monitoring, 2018
- Career Roles
  - Quartus Engineering, Structural Analyst
  - General Atomics-Aeronautical Systems, Liaison Engineer
  - Los Alamos National Laboratory, Graduate Research Assistant, R&D Engineer (E-1, W-13)

Professional Background

- Education
  - B.S. Mathematics and Physics, 2008
  - PhD. Mathematics, 2015
- Career Roles
  - Trine University, Assistant Professor of Mathematics
  - Los Alamos National Laboratory, Postdoctoral Research Associate, R&D Scientist (NSEC-EI, E-6, E-DO)



Overview of the Lab and Nuclear Weapons

The Los Alamos National Laboratory (LANL) is an exciting, challenging, diverse, and flexible place to work!

- Exciting: nuclear weapons and much, much more related to national security
  - Get to interact with military, intelligence, and other communities/labs
- Challenging: difficult problems require the best people using the best tools
- Diverse: wide range of people solving a wide range of challenges
- Flexible: competitive salaries, job stability, flexible work schedules and work-life balance

Mission: solve national security challenges through excellence in R&D.

LANL is part of a large enterprise under the Department of Energy and National Nuclear Security Administration.

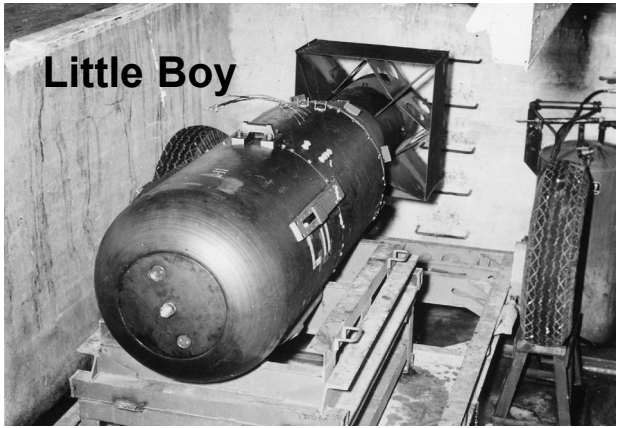
- **Department of Energy** (DOE)
  - In charge of all things “energy”… and the National Nuclear Security Administration
- **National Nuclear Security Administration** (NNSA)
  - Part of the DOE that is responsible for *non-military* aspects of the nuclear stockpile
- **Los Alamos National Laboratory** (LANL)
  - One of three national labs, plus plants, that make up the Nuclear Security Enterprise

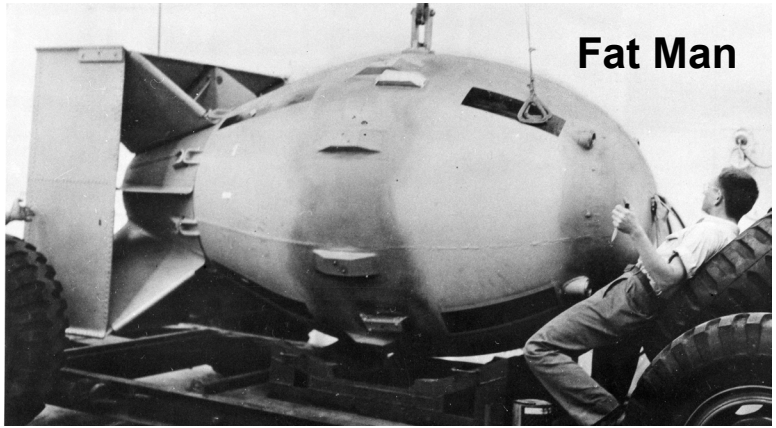
LANL and the Nuclear Security Enterprise have connections to the Department of Defense (DoD).

DoD and NNSA share responsibilities for nuclear weapons.

Why the LANL connection to the DoD and nuclear weapons? Revisit World War II.

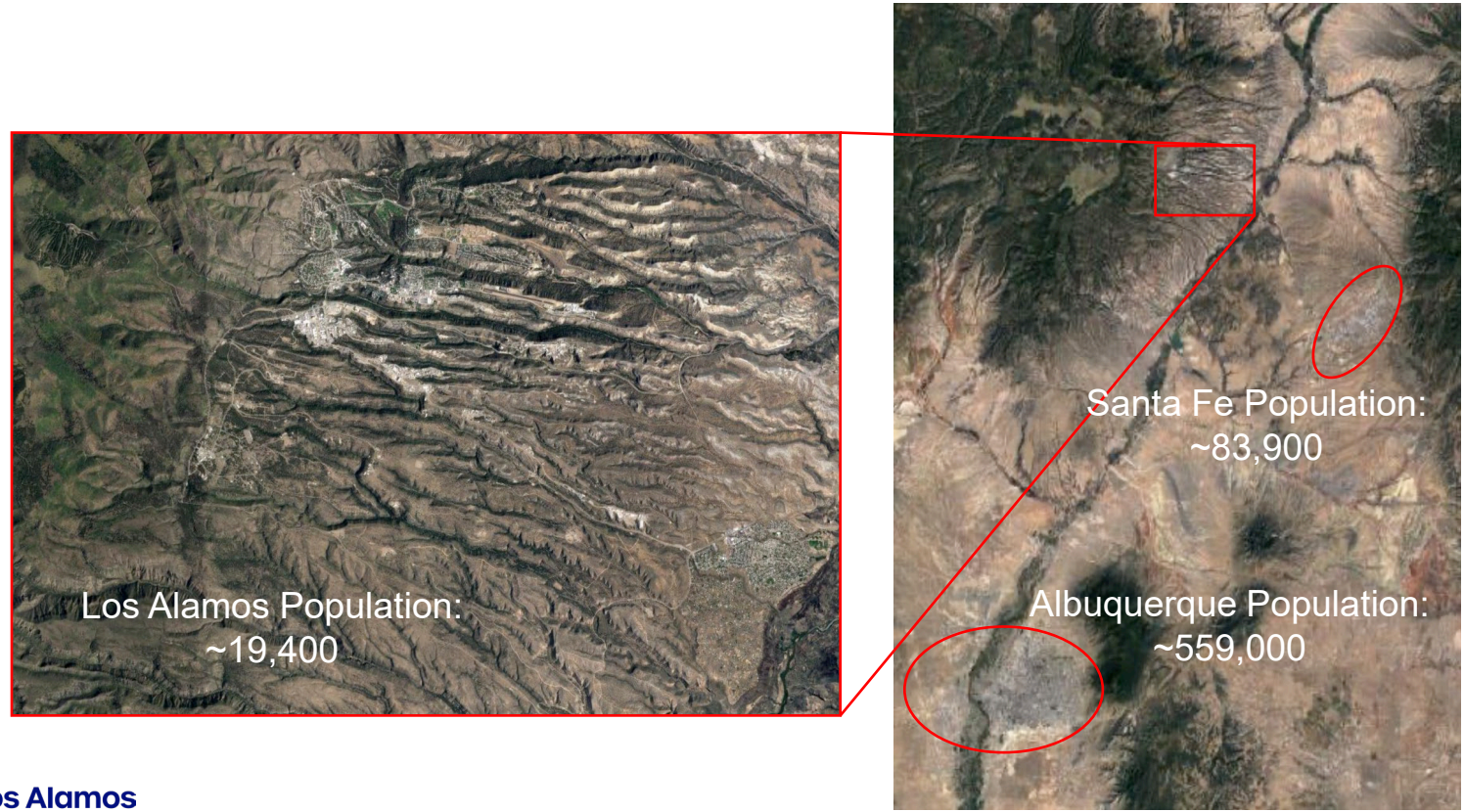
- LANL was originally “Project Y” of the Manhattan Project
- Established in 1943 as a secret city/laboratory
- Researched, designed, developed, engineered, fully tested, and weaponized first-ever nuclear weapons *from scratch in two years and three months*





Only nuclear weapons used—i.e. **detonated**—in war.

Why Los Alamos, New Mexico, the place? Geography.



That geography hosts thousands of employees and many facilities needed to execute the LANL mission.

~ 13,800 employees
~ 1,800 students & postdocs

~ $2.9B budget
66% Weapons

~40 square miles of property

~900 individual facilities

Managed by Triad National Security, LLC
Battelle Memorial Institute, The Texas A&M University System, **University of California**

https://www.lanl.gov/about/facts-figures

The landscape is generally not what you think..

- High Desert
- Southern most tip of Rockies
- Biking, hiking, climbing, snow sports, fishing, art & culture

Those employees come from diverse technical and personal backgrounds to solve various challenges.

"We believe inclusive diversity promotes innovation, enhances problem-solving, and makes us a more successful and productive organization. Every unique voice brings something valuable to the conversation – and everyone's ideas and opinions are welcome and respected."

https://lanl.jobs/creative/about-diversity

I am one example of many possible career tracks.

UC San Diego

BS & MS, Structural Engineering, Structural Health Monitoring

quartus ENGINEERING

Associate Analyst

GENERAL ATOMICS AERONAUTICAL

Composite Liaison Engineer

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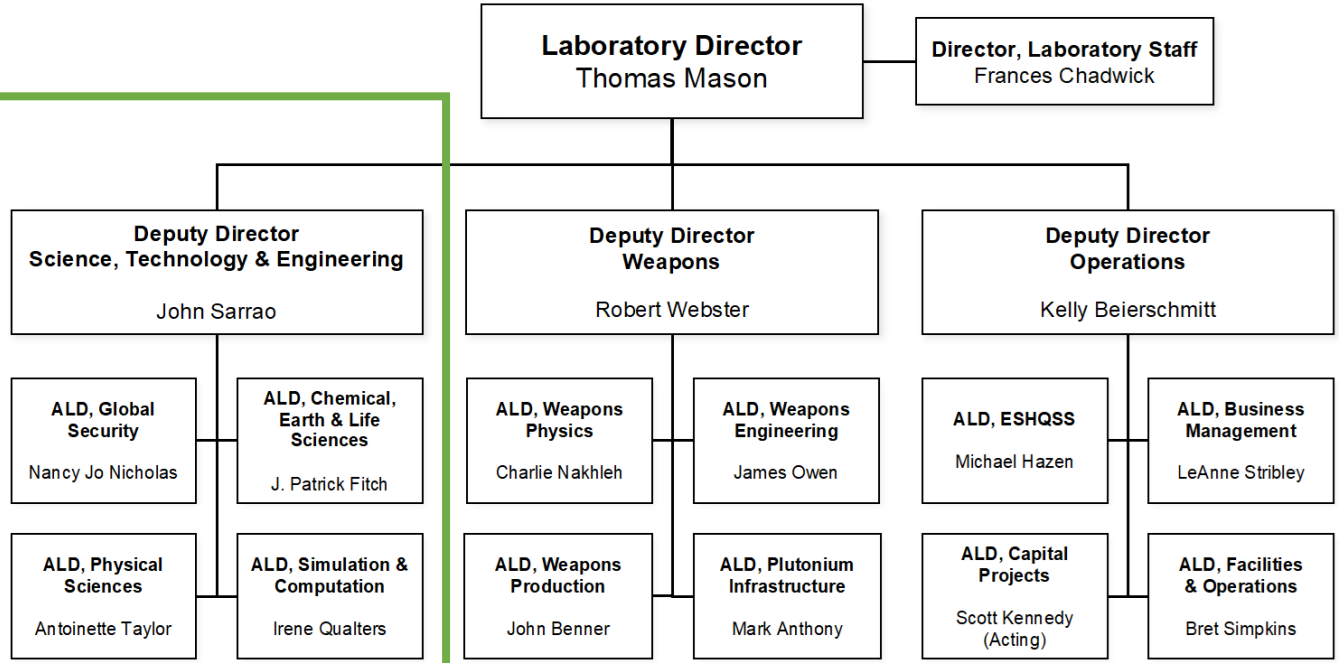
Graduate research assistant (GRA)

R&D Engineer

The ability to learn, grow, and adapt is very valuable.

That diversity gives LANL a workforce that solves various problems, not all about nuclear weapons….

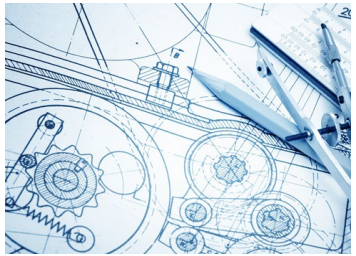
- Bioscience
- Chemistry
- Counterproliferation
- Counterterrorism
- Earth/Environmental Sciences
- Energy
- High Performance Computing
- Intelligence
- Materials Science
- Particle Accelerator
- Space Research
- Theory



Opportunities for all sorts of work, collaborations, and internal moves.

… But nuclear weapons are a big part of LANL.

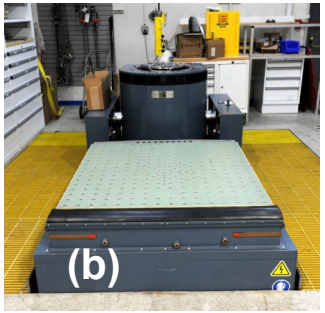
- Critical to understand requirements, interfaces, environments, and more
- Fundamentally, need to know what weapons look like and do on target
- Major efforts go into refurbishment, development, qualification, and certification
  - And the tools, people, infrastructure, and collaborations to conduct those efforts

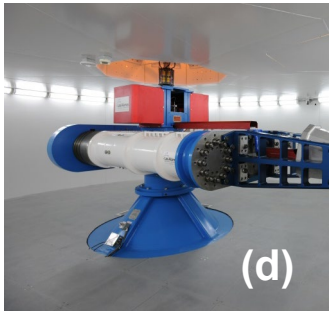


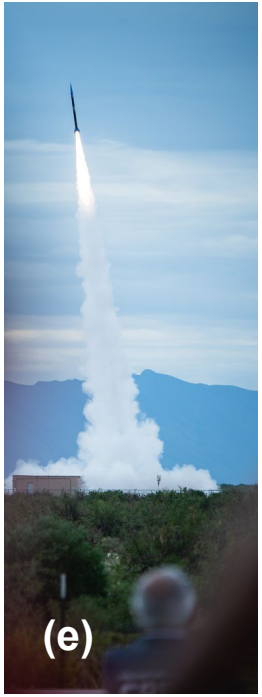


Need to establish that weapons will perform as intended.

It is very challenging to try and understand weapons without full nuclear, or even full hazardous, testing.







Cross-disciplinary efforts are critical.

How UCSD Structural Engineering Department and Past Experiences have supported my career at LANL

UCSD Experience

- Relevant coursework prepared me to be agile, multidisciplinary engineer
  - Did not know exactly what field I wanted to go into
- Theoretical knowledge, laboratory experience & team building opportunities
- Professional Societies:
  - SCSE VP of Conference for University of Hawaii: planning, communication, budget
- Well regarded faculty that notice student effort

How previous jobs and corporate experiences have helped me at LANL

- Understanding that there are many different roles and types of engineers than just “civil” or “mechanical”
- Communication, teamwork, and networking plays a huge role in your long-term success
- It pays to put in a little extra effort: both in your day-to-day work, but also with colleagues, and people you interact with outside of your team
- Respect, Integrity & Professionalism

JWST build, flickr.com, MQ-9 Reaper www.ga-asi.com

What I wish I would have known earlier….

The Structural Engineering degree has allowed me to be successful in a variety of different roles

Some advice as you head into your careers:

- Now: Develop strong connections with your peers, and reach out to Professors who are doing research that is interesting to you
- New Hires: Ask questions, shows interest, dedication, take notes!!!
- Develop strong communication skills
- Don’t be afraid to try a new skill/ take on a new project

Distinguished Performance Award: Spinning and Dynamic Imaging Test team

Thank You to the SE Faculty and Staff:

Prof. Mike Todd

Dr. Farrar

Prof. Kim

Prof. Kosmatka

Rev. Porter

Prof. Krysl

Prof. Van Den Einde

Prof. Lanza di Scalea

Dr. Williams

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LANL Jobs, What Hiring Managers Look For, and LANL Engineering Analysis and Test Engineering

You are the future of LANL's diverse workforce.

- Information
  - General: https://www.lanl.gov
    - Includes details on Mission, technical highlights, etc.
  - Jobs: https://lanl.jobs
    - About the Lab: https://lanl.jobs/creative/about-lanl
    - About Northern NM: https://lanl.jobs/creative/about-newmexico
    - Application & Interview Tips: https://lanl.jobs/creative/about-faq
    - Benefits: https://lanl.jobs/creative/benefits
    - For Veterans: https://lanl.jobs/creative/veterans
    - For Students & Postdocs: https://lanl.jobs/creative/students

Be informed, get in touch, and help us help you.

There are many ways to connect with LANL…

Educational Programs and Summer Schools

Learn More ›

Partner Internship Programs at the Lab

Learn More ›

LANL Foundation Scholarships

Learn More ›

Undergraduate Internships

The Undergraduate Student Internship Program is a year-round internship program that provides domestic and international students with relevant research experience while they are pursuing an undergraduate degree. It is designed to complement your education with work experience related to your chosen field of study and offers opportunities in both technical and professional fields.

Learn More ›

Graduate Internships

The Graduate Research Assistant Program is a year-round internship program that provides domestic and international students with relevant research experience while they pursue a graduate degree. This educational program is designed to complement your education with work experience related to your chosen field of study. In some cases, you can arrange to conduct masters or doctoral thesis research at the Lab. We offer appointments in both technical and professional fields.

Learn More ›

Postdoc Programs

The Postdoctoral (Postdoc) Research program offers the opportunity for you to perform research in a robust scientific R&D environment, present and publish research, advance knowledge in basic and applied science, and strengthen national scientific and technical capabilities. To be considered for a postdoc appointment, a candidate must be nominated and sponsored by a member of the Laboratory's technical staff. Selection for postdoc appointments is competitive and determined by your academic qualifications and research excellence.

Generally: be enrolled (where applicable), good enough GPA, pass a drug test…

… and be vaccinated.

… And even more ways to connect with LANL.

Networking helps!

- LinkedIn and social media
- Friends
- Faculty
- Project mentors
- Visiting staff

Image courtesy of BigStock

It helps to interact with just enough of the right people.

In general, it helps to make a good first impression to facilitate connections and find job openings.

- Get noticed, quickly
  - Clearly and concisely present most important information
  - Always be honest
- Know the organization and people you are interacting with
  - Do a bit of research when possible
  - Get a feel for the person's background (HR, manager, technical?)
  - Tailor your interaction as much as possible
- People from industry aren't showing up to job fairs, etc. just for fun
  - Help them help you by being prepared (e.g. still worth having hardcopy of resume/CV)

Get on someone's radar to get a foot in the door.

After a good first impression, it also helps to fit the job.

- Thoroughly read the job ad
- Make sure you at least fit the major(s)
- Use a cover letter to provide details, even if not required
  - Explain how you are a ~~perfect~~ fit for the job
    - At least meet the minimum requirements, and desired qualifications are a bonus
    - Show how you could fit (e.g. continuous learning), be honest about where you don't fit
- Tailor your resume/CV to the job ad but keep it as concise as possible
  - Remember about publications, software, professional societies, extracurriculars
  - List things that are relevant or demonstrate potential
- Assume reader has no knowledge of acronyms, citizenship, etc.

Be a good-enough fit that can learn and grow.

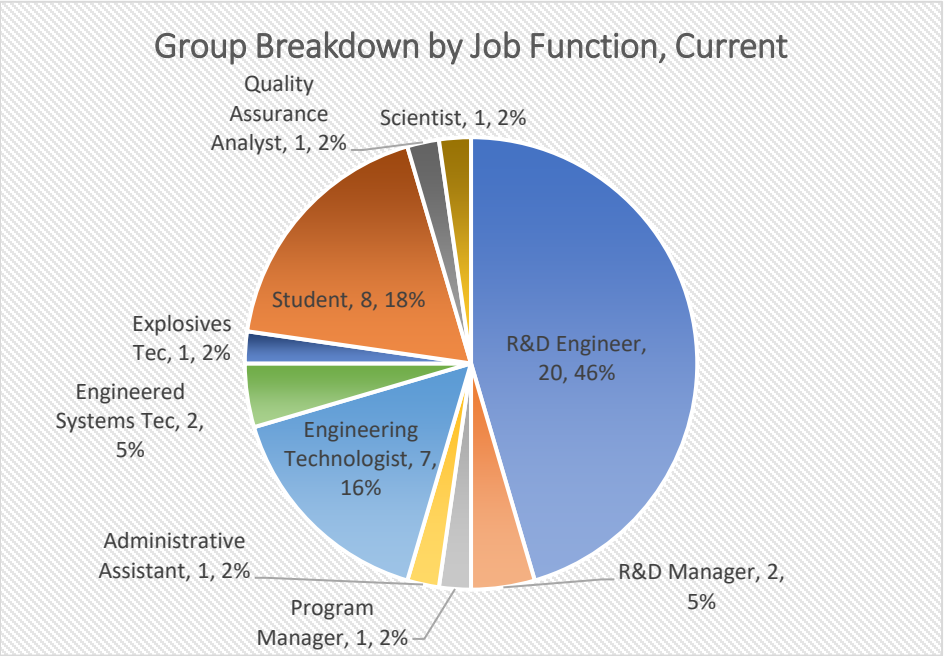
Here is an overview of the Advanced Engineering Analysis Group.

- Lead the development of computational engineering solutions and expertise
- Diverse representation of engineering expertise in the group
  - Structural mechanics, structural dynamics, heat transfer, radiation transport, thermodynamics, fluid dynamics, mechanics of materials, and numerical analysis
- Work in teams to develop, apply, and validate complex engineering models and document and communicate results
- Demonstrated experience in these areas will set you apart
  - Technical: engineering expertise, computational skills, verification and validation, statistical analysis, programming or code development
  - Core: documentation, communication, teamwork, leadership, continuous learning

Engineering computations to understand weapons before detonation.

Here is an overview of the Test Engineering Group.

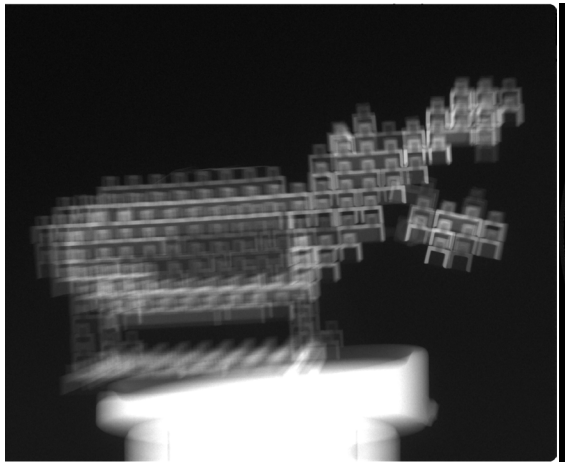
- The Test Engineering Group provides experimental solutions and expertise to address critical weapon design questions:
  - Qualification testing,
  - Component and material response, including margin assessments,
  - System, sub-system and component environmental specification development, and
  - Management and assessment of complex data sets
- Employees in the Test Engineering Group plan (understand requirements) and perform (technical ability and collaboration) mechanical, thermal, shock and vibration testing and provide test data back to customers (customer service).

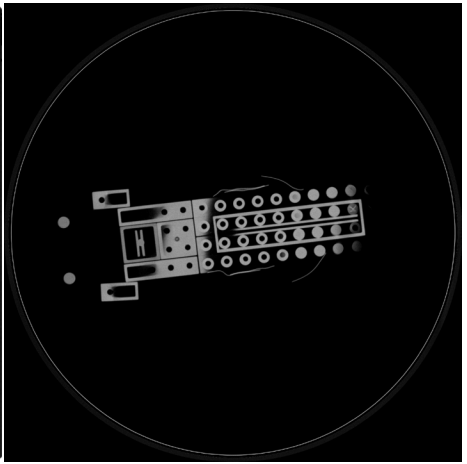


Experiments to understand weapons before detonation.

E-1 and E-6

- E-1: Mechanical and Thermal Engineering
  - Design
  - Test
  - Fabrication
  - Analysis
- E-6: Non-Destructive Testing & Evaluation
  - NDE techniques
  - X-ray, Digital Radiography, Computed Tomography, UT, ET, & others
  - Looking for computer engineers too





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Back to the Cover Letter, use it to help hiring managers see how you fit the job.

Dear Hiring Manager,

The following table highlights how my experience matches the requirements of the position.

LANL Requirement	My Qualifications
(requirement from job ad)	(concise explanation of meeting requirement)
…	…
…	…
…	…

The attached resume provides further details, references will be provided upon request.

Remember, make their jobs as easy as possible.

After good first impressions and applications, make sure to prepare for your interviews.

- Do your best to understand your audience and prepare accordingly
  - This includes responses to questions coming from a potentially diverse audience, including technical staff, managers, HR
  - Expect questions that help interviewers get an idea of who you are and how you work
- PRACTICE
  - This normally means getting comfortable with your responses and presentation
  - Currently may include getting familiar with the virtual interview process
- Be yourself, be confident, and be professional
- Be ready to ask questions regarding the company/lab, position, working environment, surrounding area, etc. (i.e. interview your potential employer)

Prepare to be interviewed, and to interview potential employer.

Here are things that can help or hurt you in interviews.

The Good

- Understanding *how* to work
- Making sense of and explaining work
- Balancing quality of work against time
- Taking advantage of sanity checks
- Getting help when needed
- Flexible with work assignments
- Working well with, and leading, others
- Learning from failure
- Initiative to keep learning
- Properly addressing problems at work

The Bad

- Being unprofessional
- Being arrogant
- Claiming you can do, and solve, everything
- Not fully understanding your own work
- Not giving credit to others who help you
- Being overly focused on promotion

Here are other things to keep in mind about your future.

- Follow your passion but don’t let that get in the way of opportunity
- You can likely do more/different jobs than you think
  - You are learning to think critically and solve problems
- Make sure employers are a good fit for you too, for example
  - Work/life balance
  - Organizational culture
  - Alignment with hobbies and other activities outside of work

You can do more than you think you can, don’t limit yourself.

You are the future of LANL's diverse workforce.

- Information
  - General: https://www.lanl.gov
    - Includes details on Mission, technical highlights, etc.
  - Jobs: https://lanl.jobs
    - About the Lab: https://lanl.jobs/creative/about-lanl
    - About Northern NM: https://lanl.jobs/creative/about-newmexico
    - Application & Interview Tips: https://lanl.jobs/creative/about-faq
    - Benefits: https://lanl.jobs/creative/benefits
    - For Veterans: https://lanl.jobs/creative/veterans
    - For Students & Postdocs: https://lanl.jobs/creative/students

Be informed, get in touch, and help us help you.