nal service in the national interest

Sandia National Laboratories

SAND2016-10710PE

ia National Laboratories

arr, Chris Jenkins, Joe Castro, Corrine Trevino

nation Session: Life After Graduation

Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND 2013-7019P

Welcome

- Who We are
- Our Workforce & Culture
- What is a career like at Sandia
- Employment Opportunities

Sandia's Impact

Cleanroom invented 1963

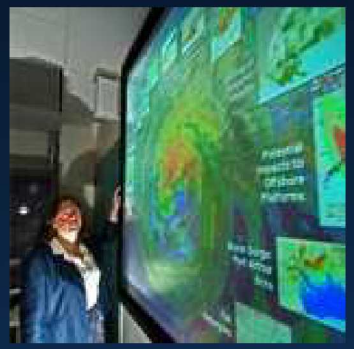
$50 billion worth of cleanrooms built worldwide It's used in hospitals, laboratories and manufacturing plants today.

9/11

Sandia sets contingency plans for release of materials and aircraft attacks on critical facilities immediately after 9/11. Search dogs are equipped with cameras for search and rescue K-9 handlers. The capability allowed search efforts to be carried out in spaces inaccessible to humans.

2008 Satellite Takedown

Red Storm computing helps shoot down rogue satellite.



Hurricane Katrina

Sandia is called to assess flooding and infrastructure failures.

Fukushima Quake

Sandia helps cleanup radioactive wastewater.

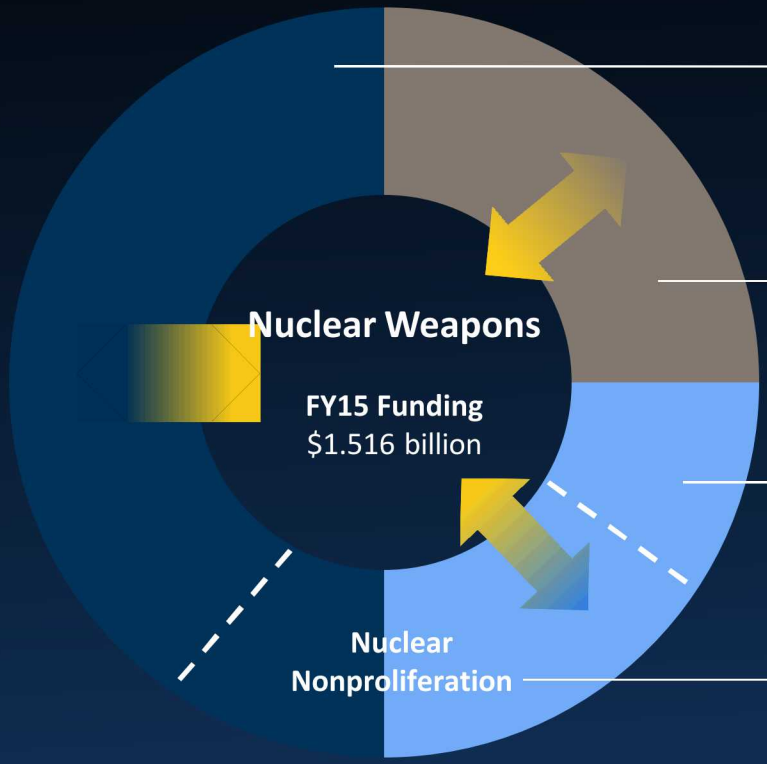
Gulf Oil Spill

Sandia works to help to develop an approach for securing the damaged well head, stopping the leak, and minimizing the severity of the oil spill.

Sandia is a National Laboratory

Sandia has two main locations

Sandia's Funding - ~$2.8 Billion



Department of Defense
$614M + $92M (Nuclear Nonproliferation)
= $706M

Department of Energy (DOE)
Energy Programs
$167M

Department of Homeland Security &
Department of Defense Infrastructure Security
$81M

NNSA Nuclear Nonproliferation
$144M

Note: **Other DOE and non-DOE Funding**
$195M

High reliability, high consequence of failure, challenging environments, and technology solutions

Fulfilling Our National Security Mission

Nuclear Weapons

International, Homeland & Nuclear Security

Energy & Climate

Defense Systems & Assessments

Our Foundations in Research

ntial research-and-discovery activities that
ention, innovation, entrepreneurship,
unity, and public benefit.

- Bioscience
- Computing and Information Science
- Engineering Science
- Geoscience
- Materials Science
- Nanodevices and Microsystems
- Radiation Effects and High Energy Density Science

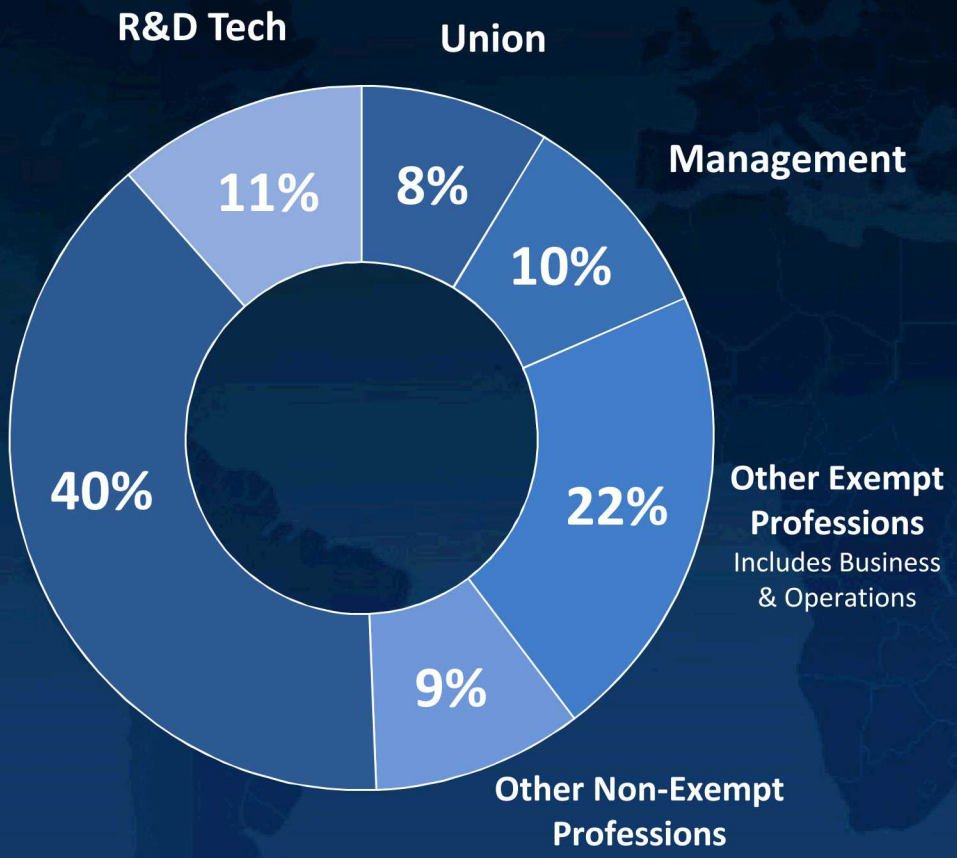
Our Workforce & Culture

Our Workforce ~12,000 employees

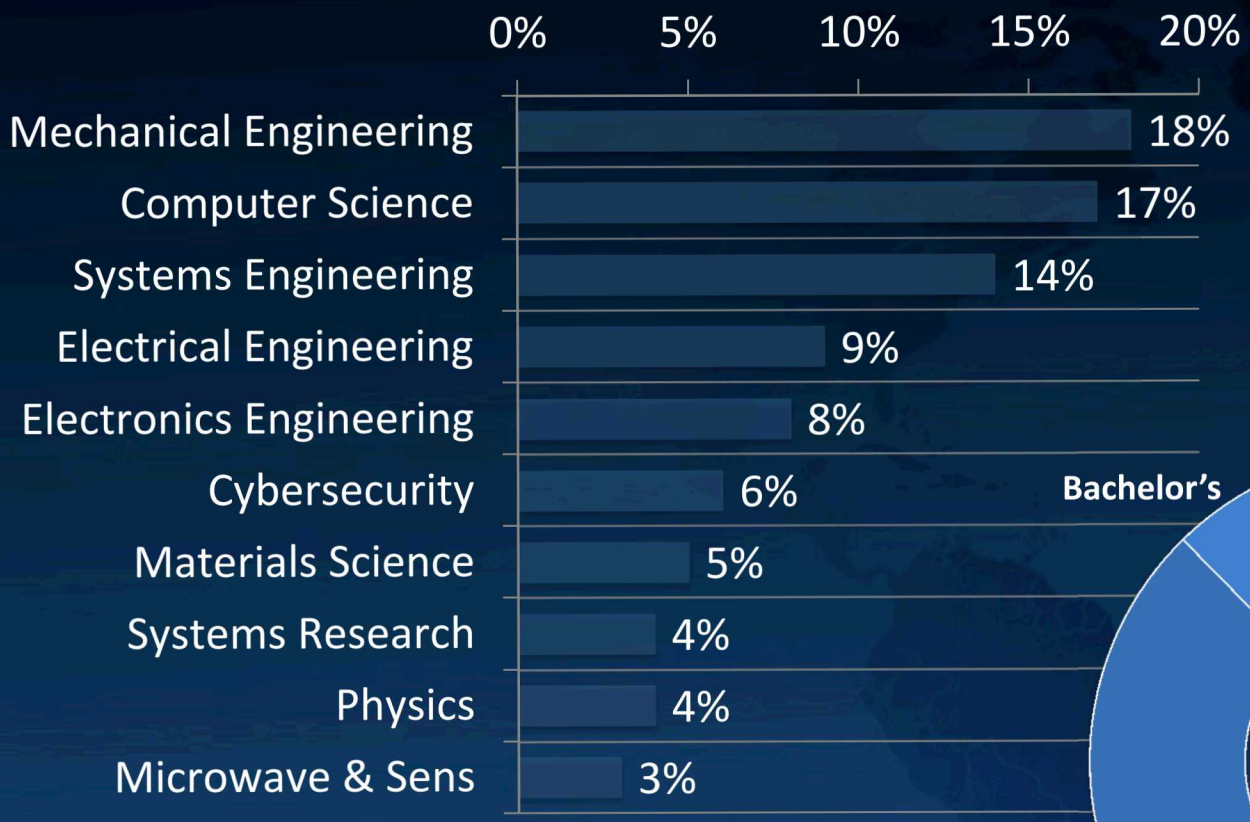
~10,500 Regular employees
~1,600 Temporary employees, students & postdoctoral appointees

New Mexico Site:
Workforce: ~10,800
R&D employees: ~4,700
(R&D Staff & Technologists)

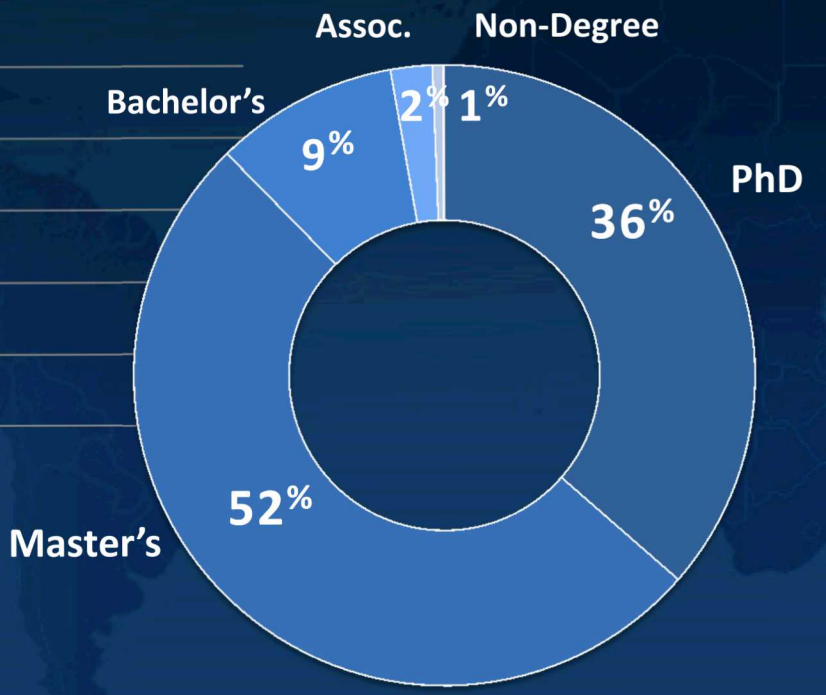
California Site:
Workforce : ~1,300
R&D employees: ~600
(R&D Staff & Technologists)



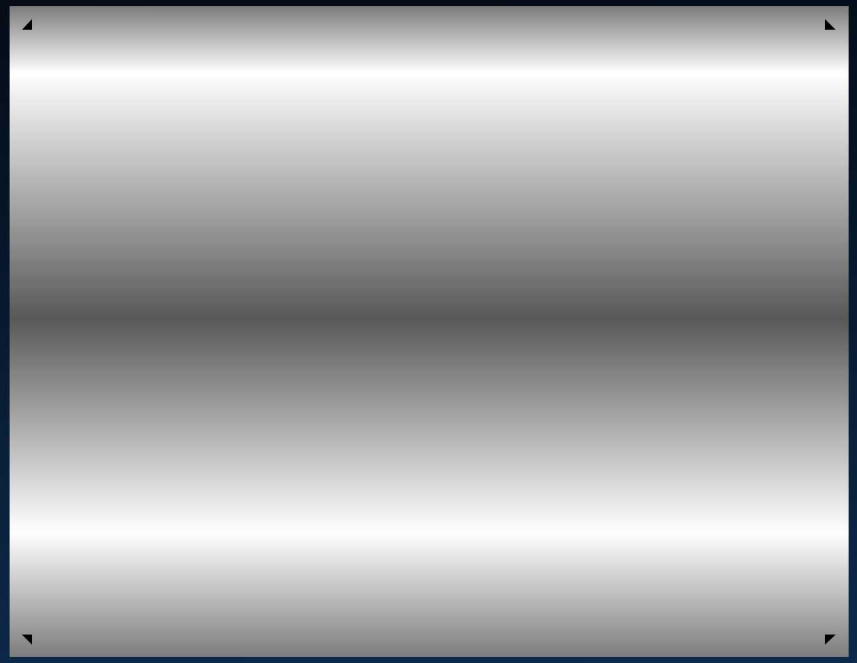
R&D by Discipline & Degree



Top 10 job descriptions shown, Regular exempt non-management employees only

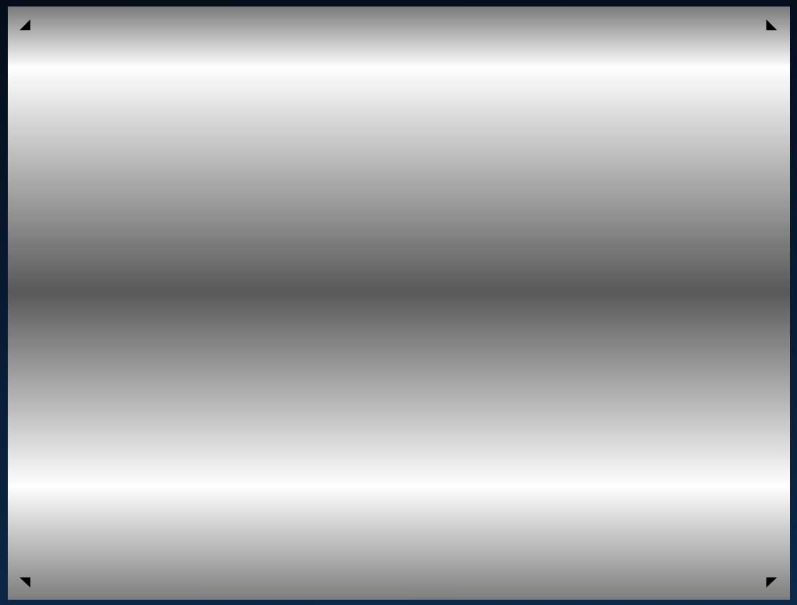


Our Culture – Our Values



- We serve the nation
- We team to deliver with excellence
- We respect each other
- We act with integrity
- We live safe and healthy lives

Our Culture – Giving Back

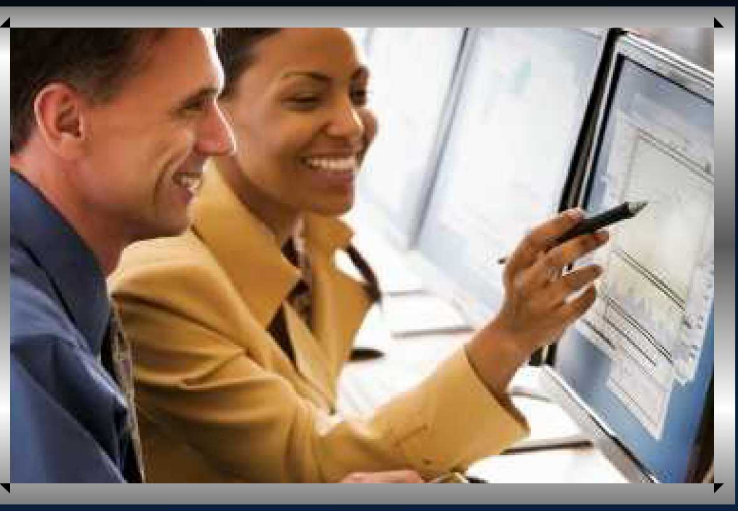


+ 100,000 Volunteer Hours Annually

~ $6 Million Donated to Nonprofits Annually

- Animal Adopt-a-thons
- Coach sports teams
- Lead scouting troops
- K-12 education outreach
- Help at food banks
- Build homes
- Contributions and drives

Special Programs, Education and Mentoring



University-based Education

- Tuition Assistance Program
- University Part-Time Program
- Special Master's Program
- Doctoral Study Program

In-house Education, Training and Mentoring Programs

- Business
- Communication
- Design and drafting
- Energy
- Health and wellness
- Information technology
- Manufacturing
- Marketing
- Project management
- Sciences

What's a career like at Sandia?

Joe Castro (PhD, NEEP, Class of 1995)
Undergrad Years (1984-1989)

Berkeley on the Brain

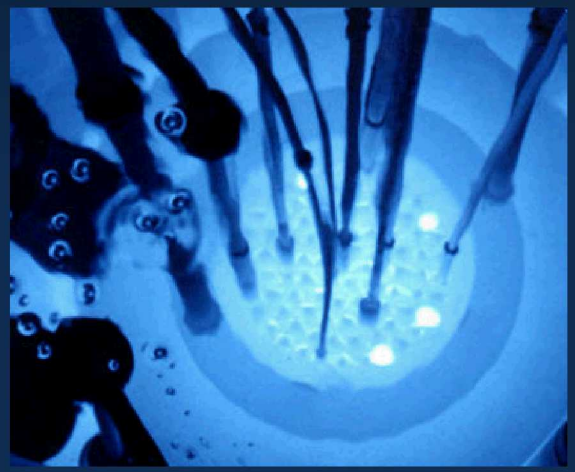
- Planned to transfer after freshman year
- 1st semester grades suffered

Refocused – graduate school is the next goal

K-State was a great school and a great experience

Obtained B.S. in Nuclear Engineering – Dec. 1989

- Emphasis on physics and math

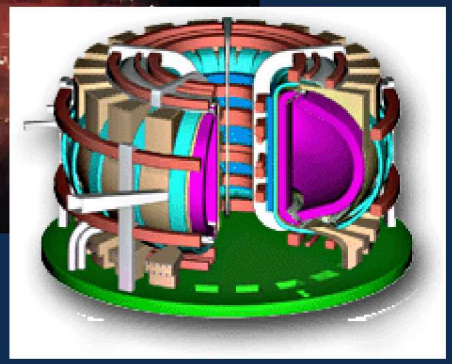


Lesson Learned:
"High Profile" School was not a critical need for my academic goals

Graduate Years (1989-1995)

Lessons Learned:

- On-site visit is critical – if not offered a visit take the time and expense to do it yourself
- The school is not only important but also the location – you'll live there for 5-8 years of your life!
- Grad school choice is more critical than undergrad – make sure to do your homework
- Your academics are important but have a broader perspective about your future. Transition to next slide…



Desert Period (1995-1997)

Lessons Learned:

❖Assumed Would Receive a Post-Doc position (no money) – communicate with advisor!

❖Should have been pro-active on job search early! (saw it coming)

❖Should have made more contacts – involvement in intern program, university organizations, etc.

❖Job market tends to be cyclic – don't give up!

Sandia: Early Years (1997-2001)

Lessons Learned:

❖Always re-educate yourself when you have the opportunity (something I should have done more during grad years)

❖Be flexible and willing to transition into something new – you may find you like it!

❖Be persistent and communicate with your management – was able to be hired during a very difficult time

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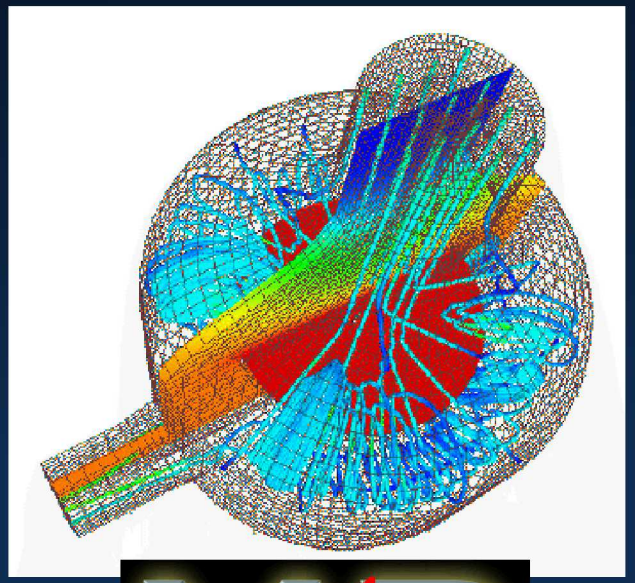


MP Salsa

Sandia Years: Middle Years (2001-2010)

Lessons Learned:

- Again, always be open to change:
  - Unforeseen change
    - ✓Budget
    - ✓Priority
  - New Opportunities
    - ✓Technical
    - ✓Programmatic
  - Good for growth!
- Sandia gives you the opportunity to transition to different things and wear different "hats"
  - If it doesn't work for you – have the ability to transition back

Sandia Years: Later Years (2008-Present)

Converted to Primary Member of Technical Staff

Continue technical and programmatic lead on the QASPR project

- Programmatic and research

Developing skill set for management

- Begun bidding on management positions in 2014

Why management?

- Higher level impact
- Helping others succeed

QASPR
QUALIFICATION ALTERNATIVES TO SPR

Hired as manager of Electrical Models and Simulation org. in October of 2014

Lesson Learned:

~20 years at Sandia I've transitioned to areas I never would have predicted at the beginning of my career. I look forward to the continuing opportunity and change!

Chris Jenkins (Ph.D., EE, Class of 2011)

- Hometown: Peoria, IL
- Undergraduate work: UIUC
- Graduate work: UW Madison
  - Thesis: Cryptographic Primitives for Secure Software Defined Radio Platforms
- Previous internships
  - Caterpillar (1998 – 2005)
  - GE Healthcare (2006)
  - Qualcomm (2008 – 2009)
- Current focus at SNL
  - Cyber Assessment of target bus architectures (submitted patent)
  - Next-generation Cryptography
  - Drones
  - Effect-based testing

Variety of projects

- Varied Types
  - Research
  - R&D
  - Development
  - Classified
- Self-picked projects
- Matrix organization (5600)
- Project lead vs. Line manager
- Misc.
  - Outreach project with HMTech
  - Lecture series: Virtualization on ARM Architecture
  - Workplace Enhancement Team

Integrity Levels: A New Paradigm for Protecting Computing Systems

Proposal stage

- Initial / Full
- Investment Area Review
- Mentor, Sr. Scientist

Independent funding and direction

- Conferences / Publications
- External Presentation
- Software / Hardware
- Other employees / interns

Joint Collaboration

Cyber Assessment of Bus Architectures

Targets

- VPX
- MIL-STD-1553
- ARINC 429
- LonTalk

Why?

- Customers utilizing networked components
- No authentication
- Potential to affect critical infrastructure
- Design protection (patents)
- Improve national security of the nation

Did academia prepare me?

Skills I acquired at school

- Tech skills
  - Programming
  - Computer architecture
  - Web Design
  - Networking
  - Scripting
  - Version Control
- Soft skills
  - Organization and leadership
  - Communication skills

Skills I had to acquire at work

- Tech skills
  - Operating system design
  - Linux Kernel
  - Virtual Machines
  - ARM architecture
  - Version Control (git)
- Recruiting
- Soft skills
  - Manage my manager
  - Maintain project outlook
  - Understand financial implications

Things I enjoy about work

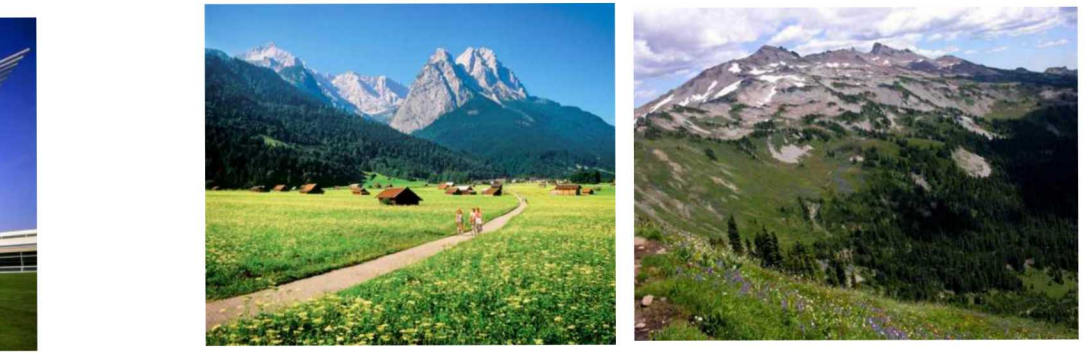
- Consistent work schedule
- Weekends off
- Evenings off
- Paycheck
- More Independence

Things I miss about academia

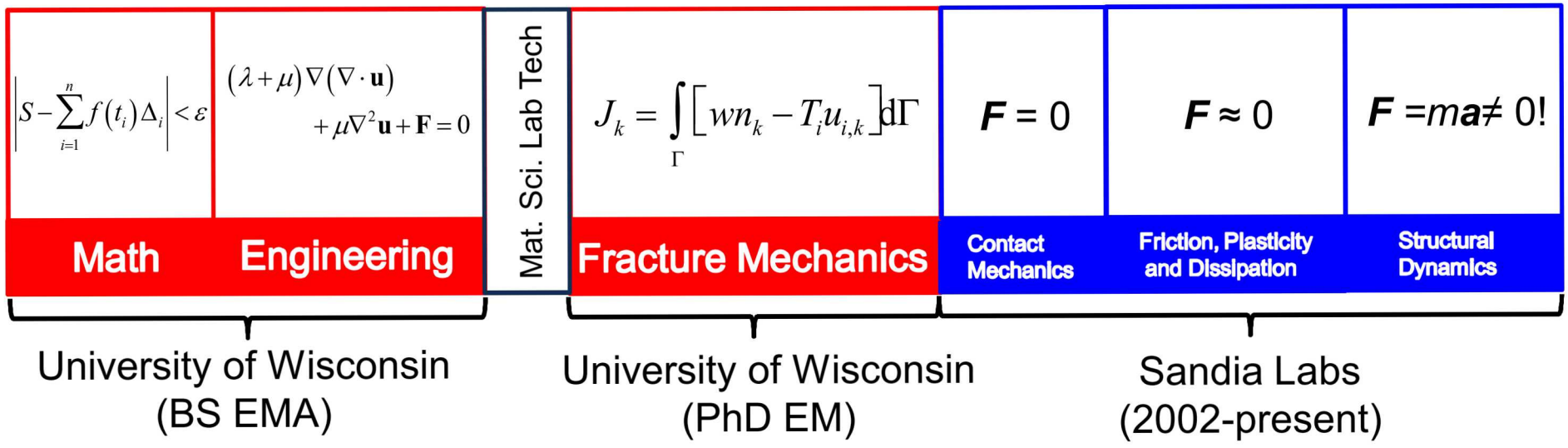
- Wake up when I want to
- Time flexibility
- Colleague interaction (Student Lab)

Mike Starr (EM, 2002)

- Hometown: Milwaukee, WI



- Education/Specialization History:



What is it like working at Sandia?

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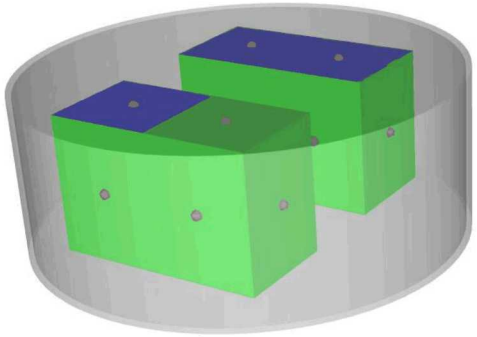
- Feels like graduate school, but …
  - Office has a door
  - Defined work hours (if you want)
  - Problems don't always have a solution
- Weekly meetings
  - Time in meetings $\propto 2^{years-1}$
- Everyone is willing to help; open door policy
  - An expert around each corner
- Time is split between research and analysis
- The mountains are right there

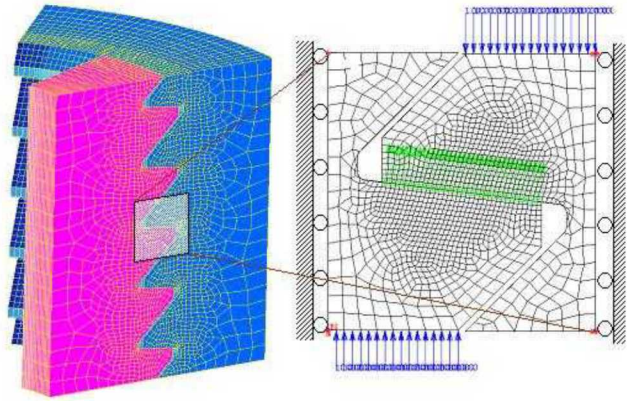
How I Approach My Job:

Can I develop and populate **predictive** physics models for the structures I work on?

What exactly does that mean, and what does it require?



O(m)



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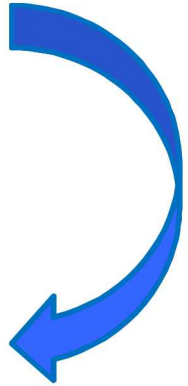
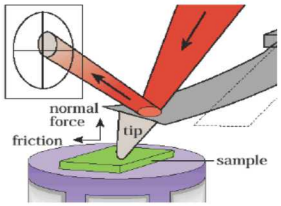
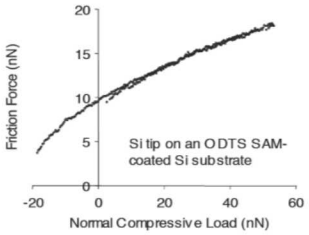
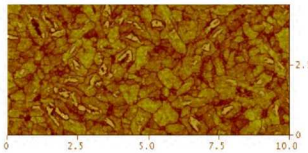




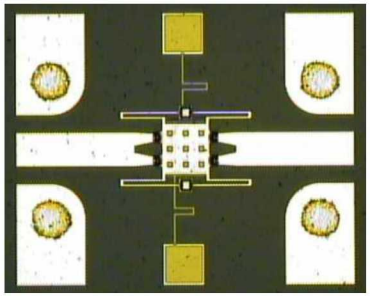
AFM tip is the asperity (R~30 nm)



O(nm)



From Carpick et al., U. Wisc. - Madison



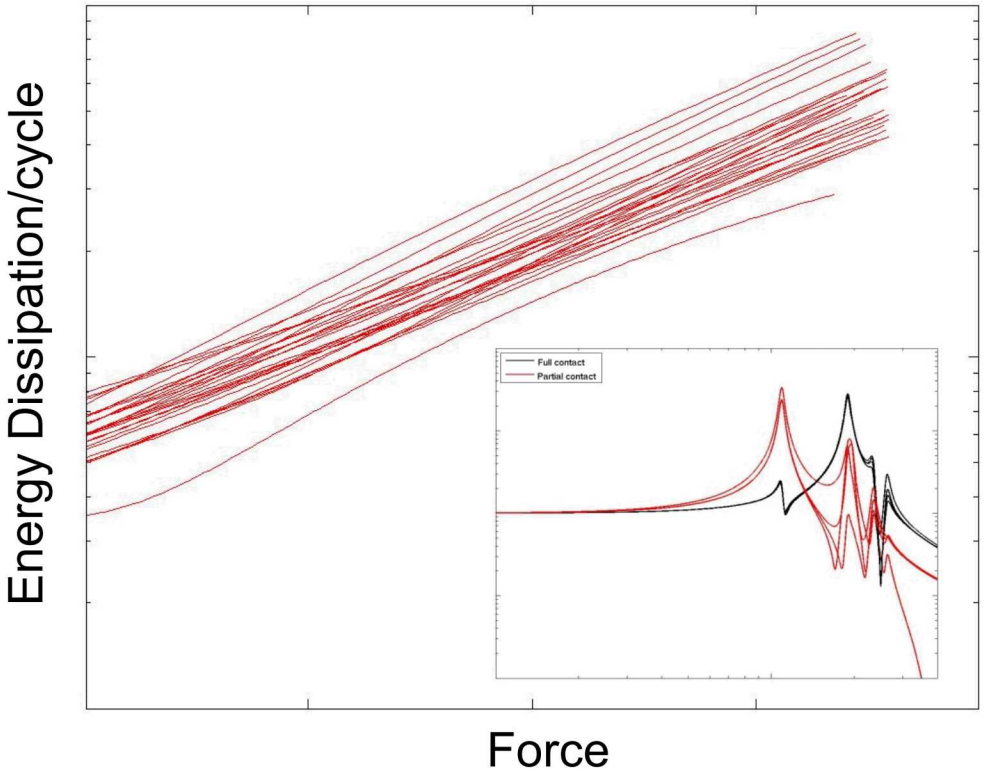
O(μm)

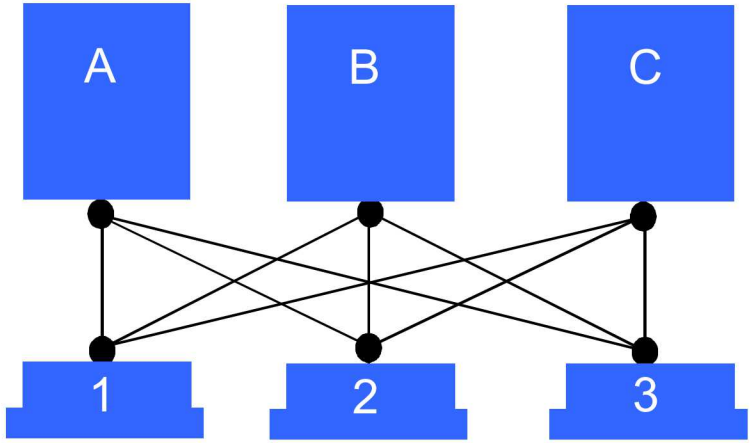
Things I Used To Not Think About …

Do deterministic mechanical systems really exist?

What's so wrong about empiricism, approximation, and linearization?

All models are wrong, but some are useful.





- Part-to-part variability
- Assembly variation
- Material variability

Work, Research, and Other Realities

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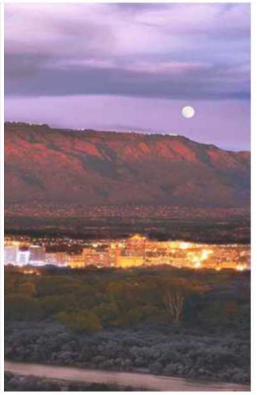
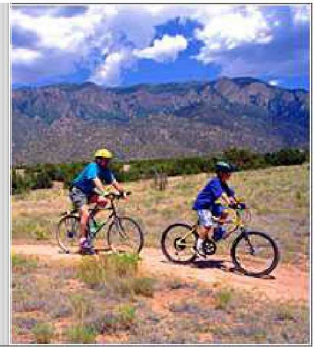
- Daily Technical Tasks
  - Analysis: Validate my SD models against experimental data.
  - **Analysis: Qualify hardware against environments over lifetime of their exposure.**
  - Research: Account for the non-linearities and variability of contact interfaces in built-up structures.
  - Research: Accurate modeling of boundary conditions and derivation of 6DOF model inputs from experiments.
- Politics, Funding, and Security
  - Budgets ebb and flow, projects evolve as mission evolves.
  - Security clearance required; classification dictates where and how you can talk about your work.

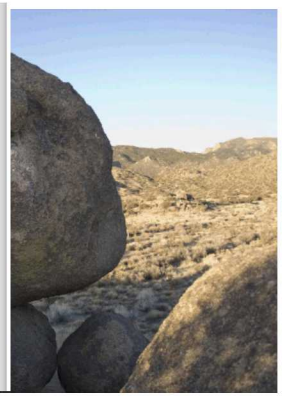
Working at Sandia / Living in New Mexico

- Working at Sandia:
  - Diversified portfolio and work opportunity
  - Great amount of freedom
  - Many opportunities for self-investment
  - Meaningful work
  - Good work/life balance





- Living in New Mexico
  - Gorgeous scenery and year-round outdoor activities
  - 300 days of sunshine
  - Unique culture



Questions?

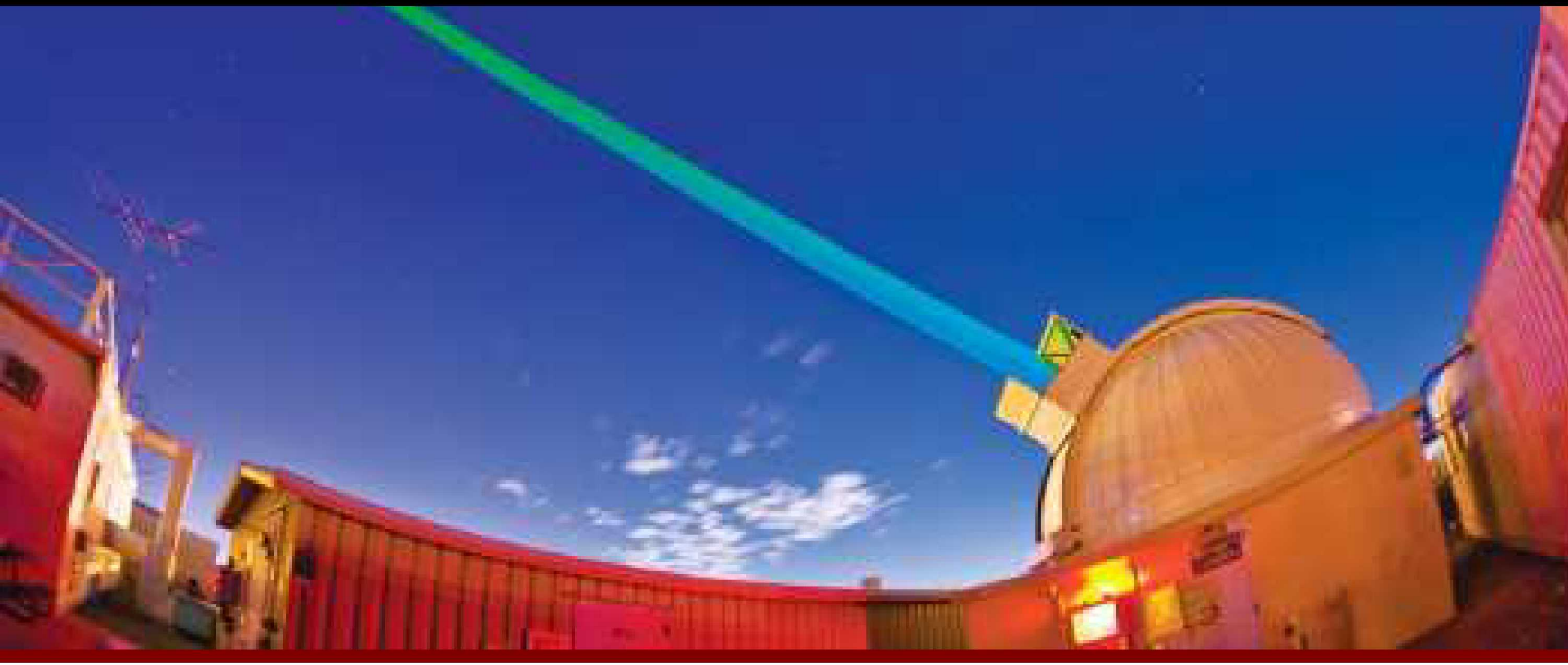
Sandia National Laboratories

Employment Opportunities

Sandia - *Today*

As a multi-faceted national security laboratory, Sandia has delivered essential science and technology for more than 60 years and plays a critical role in ensuring U.S. technical superiority.

At Sandia, you can become part of something more—and contribute to our quest to render exceptional service in the national interest.

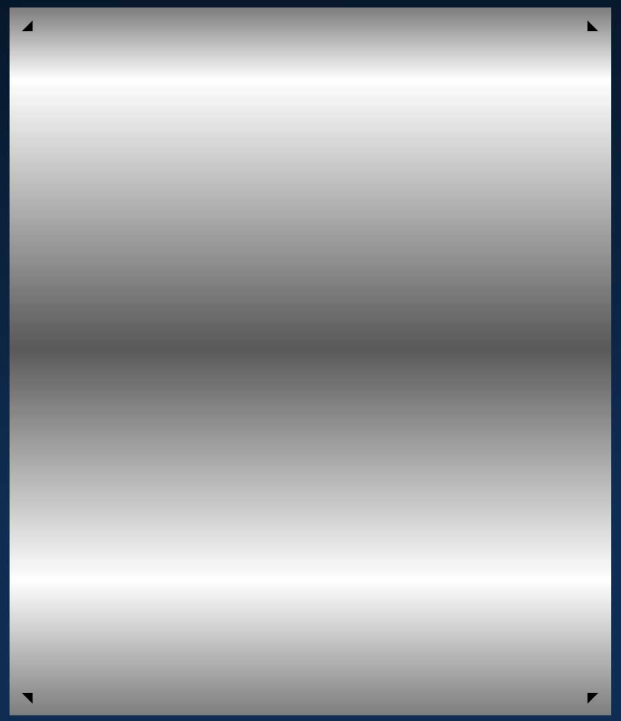


Internships

Encourages qualified students to develop interests in critical skills areas related to our mission, with the ultimate objective of developing our pipeline for our future. Available for Summer, Year Round and Co-op.

Eligibility Criteria

- Min. cumulative GPA (3.2 Undergrad/3.5 Grad)
- Have U.S. citizenship for positions that require clearance or as stated in the job posting
- Full-time enrollment status at an accredited college, university, or local high school
- At least 16 years of age



Nuclear Weapons

Sandia assumes an increasingly pivotal role in sustaining the nation's nuclear deterrent.

International, Homeland & Nuclear Security

Nonproliferation - the prevention of an increase or spread of the number of countries possessing nuclear weapons

Energy & Climate

urity

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ucture Security

ing Capabilities

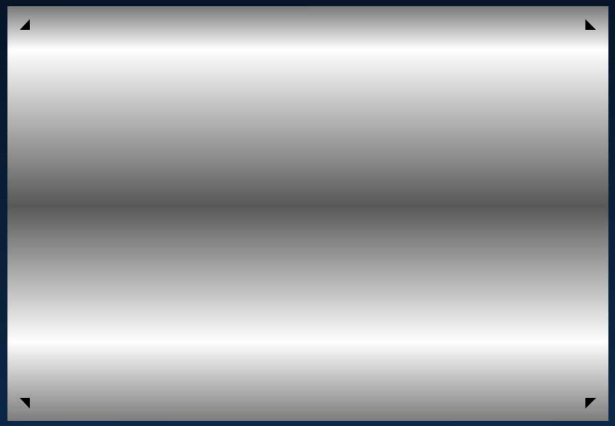
Defense Systems & Assessments

We support our troops arc *d help to keep them safe*

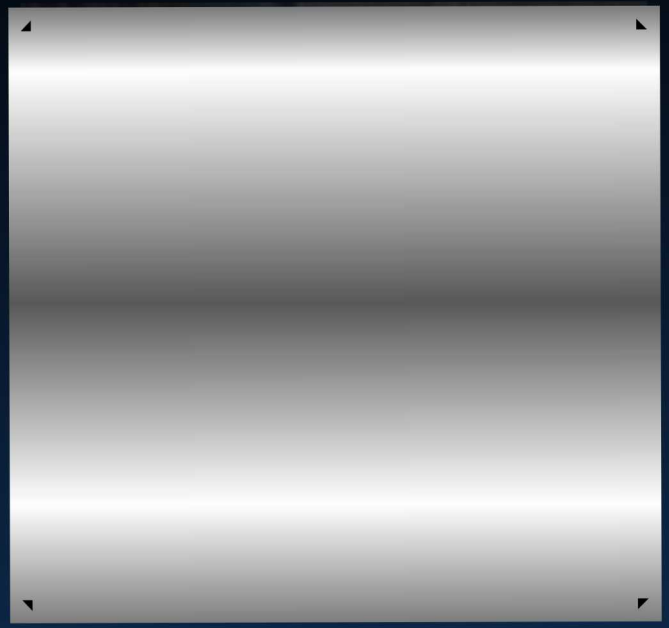
Technical Institute Internships

Technical institute interns perform leading-edge research under the guidance of Sandia research mentor and use world-class equipment and facilities.

- Center for Computing Research (CCR)
- Engineering Design and Integration Students (EDIS)
- Nonlinear Mechanics and Dynamics (NOMAD)
- Science of Extreme Environments Research Institute (SEERI)
- SENTINL: Energy Surety Incubator (ESI)
- SENTINL: Interns for Secruity, Arms Control, and Force Protection Engineering (iSAFE)
- TITANS: Center for Analysis Systems and Applications (CASA)
- TITANS: Center for Cyber Defenders (CCD)
- TITANS: Monitoring Systems and Technology Intern Center (MSTIC)



Post-doc Opportunities



Key areas for post-docs at Sandia:

- Biosciences and biotechnology
- Chemistry and materials science
- Combustion
- Computational mechanics
- Computer science
- Hydrogen
- Microelectronics and microfluidics
- Nanotechnology
- Physics

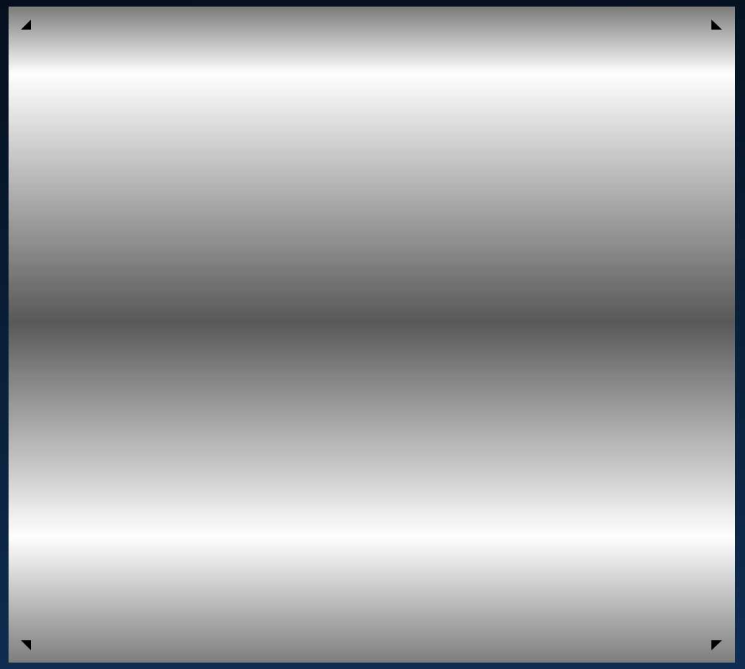
Eligibility Criteria

- A recent PhD (awarded within the past five years) or the ability to complete all PhD requirements before beginning
- No previous post-doc appointments at a national laboratory

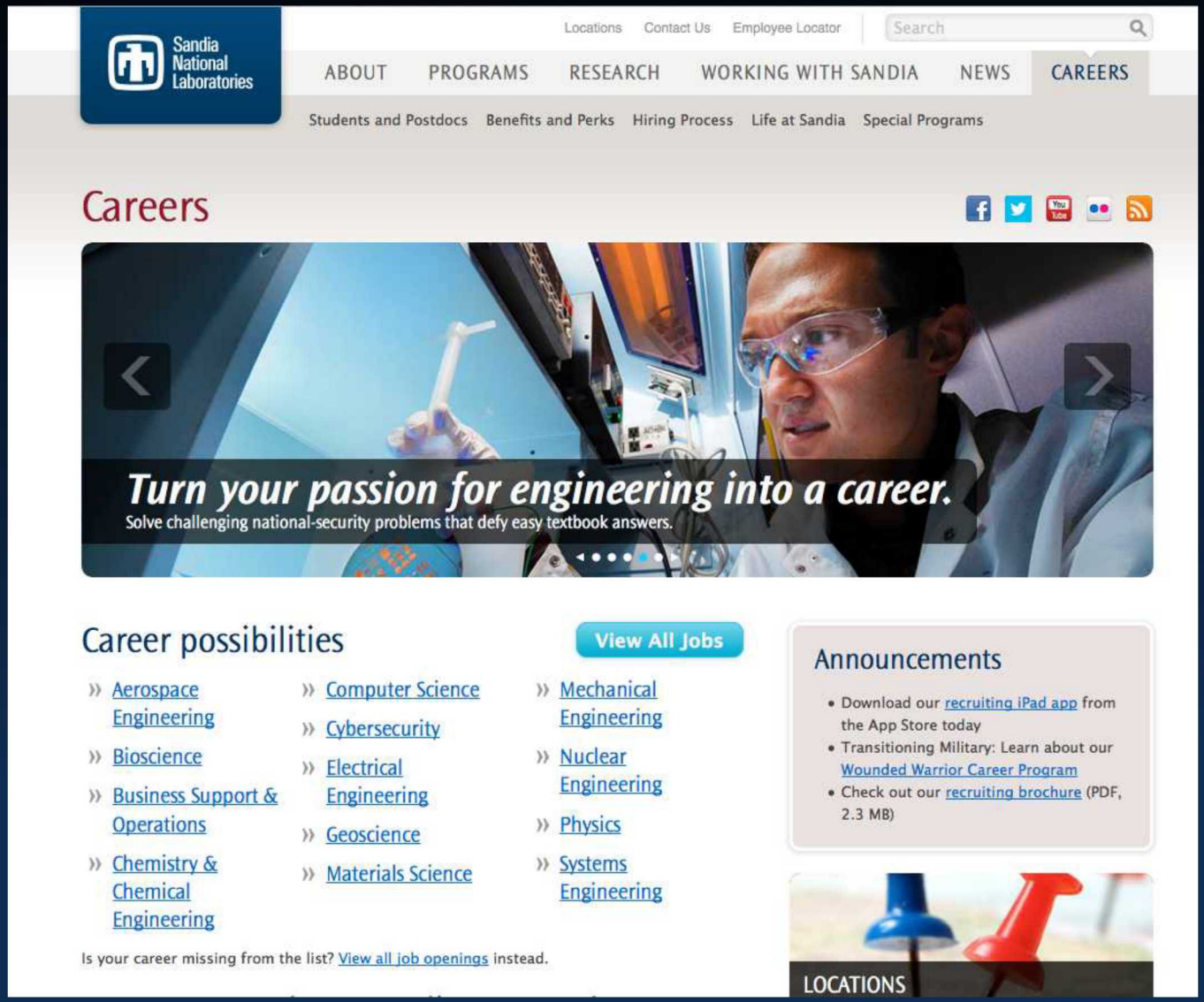
Special Degree Programs & Fellowship Opportunities

Ph.D. Level Fellowships

- Harry S. Truman Fellowship
- John Von Neumann



Apply Online! sandia.gov/careers



Sandia National Laboratories

…nk You

Backups

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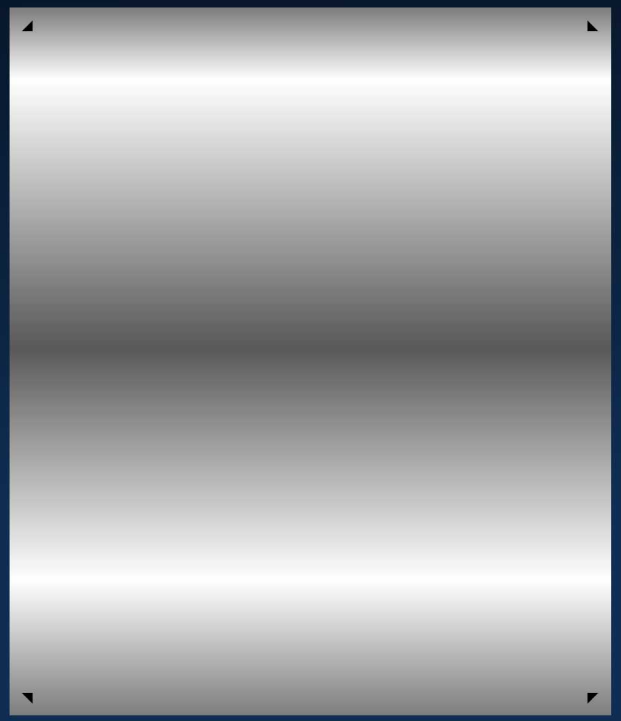
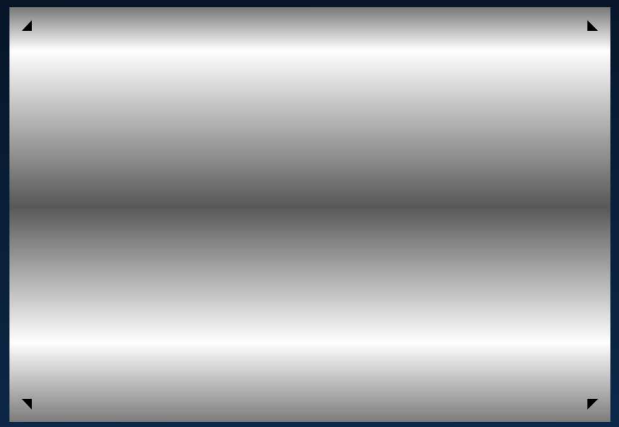


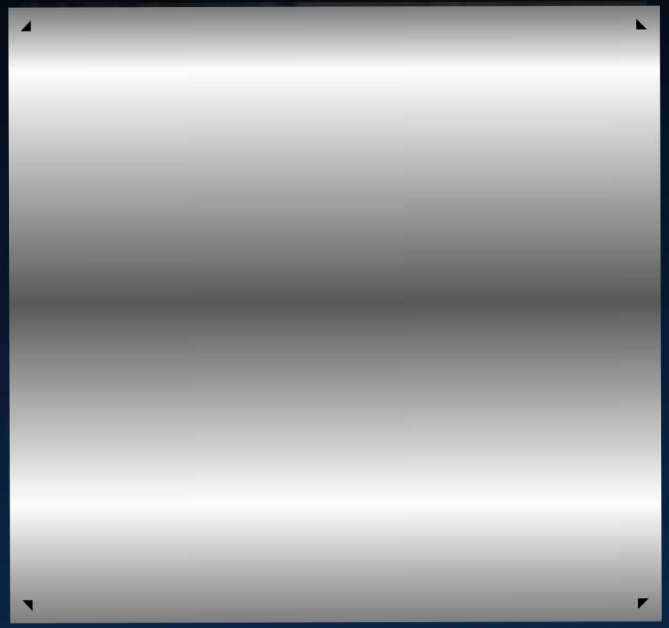
Technical Institute Internships

Technical institute interns perform leading-edge research under the guidance of Sandia research mentor and use world-class equipment and facilities.

- Computer Science Research Institute (CSRI)
- Enabling Predictive Simulation Research Institute (EPSRI)
- National Security Engineering Institute (NSEI)
- Physical Sciences Institute (PSI)
- Sandia Institute for Modeling and Simulation (SIMS)
- Science of Extreme Environments Research Institute (SEERI)
- Energy Surety Incubator (SENTINL: ESI)
- Interns for Secruity, Arms Control, and Force Protection Engineering (SENTINL: iSAFE)
- Center for Analysis Systems and Applications (TITANS: CASA)
- Center for Cyber Defenders (TITANS: CCD)
- Monitoring Systems and Technology Intern Center (TITANS: MSTIC)



Post-doc Opportunities



Key areas for post-docs at Sandia:

- Biosciences and biotechnology
- Chemistry and materials science
- Combustion
- Computational mechanics
- Computer science
- Hydrogen
- Microelectronics and microfluidics
- Nanotechnology
- Physics

Eligibility Criteria

- A recent PhD (awarded within the past five years) or the ability to complete all PhD requirements before beginning
- No previous post-doc appointments at a national laboratory

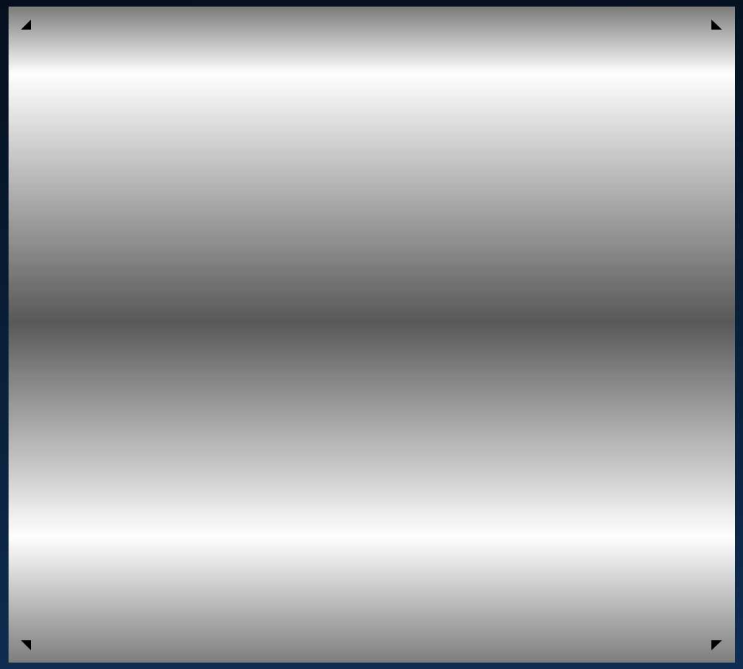
Special Degree Programs & Fellowship Opportunities

Special Degree Programs

- Critical Skills Master's Fellowship Program
- Master's Fellowship Program

Ph.D. Level Fellowships

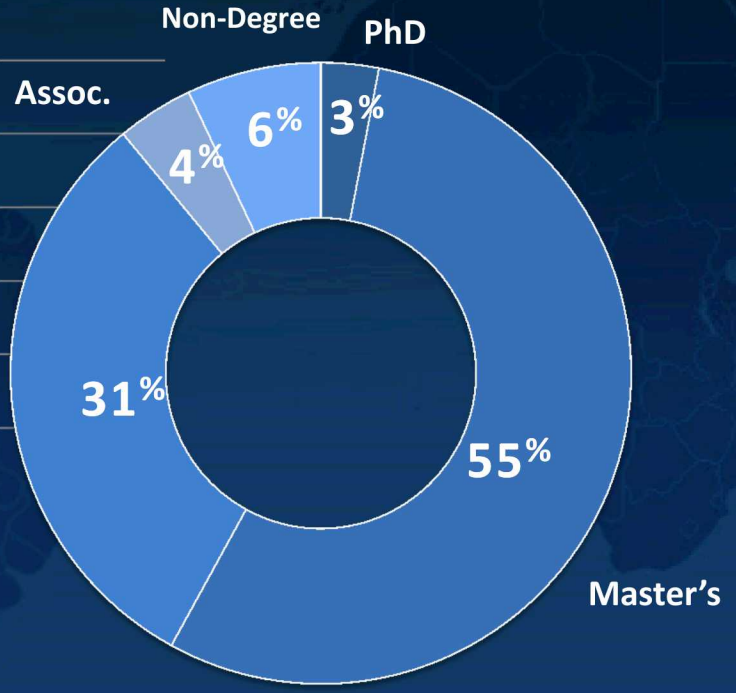
- Harry S. Truman Fellowship
- John Von Neumann



Business & Operations Staff

Top 10 job families shown , Regular exempt non-management employees only

Degree levels for all our non-management professions including those not represented



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