

Oak Ridge National Laboratory Overview

Benjamin Thomas, Jr.
Nuclear Nonproliferation Division

2023 NSSC Fall Workshop & External Advisory Board Meeting
Berkeley Labs, October 17-18, 2023

ORNL is managed by UT-Battelle, LLC for the US Department of Energy



<https://dnn-consortium.ornl.gov>

DISCUSSION

- **Overview of ORNL's Mission**
 - Roots
 - Present
 - The Future (Based on Facts & Figures)
- **What Makes ORNL Special**
 - People
 - Discoveries
 - Facilities
- **Highlights of NA-22 Relevant Work**
 - Nuclear Nonproliferation at ORNL
 - Examples of Work Performed by NSSC Interns
- **Closing Remarks**
 - Career Opportunities
 - Imagine YOU at ORNL



Roots of ORNL

ROOTS – 80 YEARS AGO

Clinton Laboratories, 1943

Mission: Produce gram quantities of plutonium for chemical and engineering research

- Construct the world's first continuously operated nuclear reactor
- Develop chemical processing techniques to separate plutonium from irradiated fuel



ORNL Today

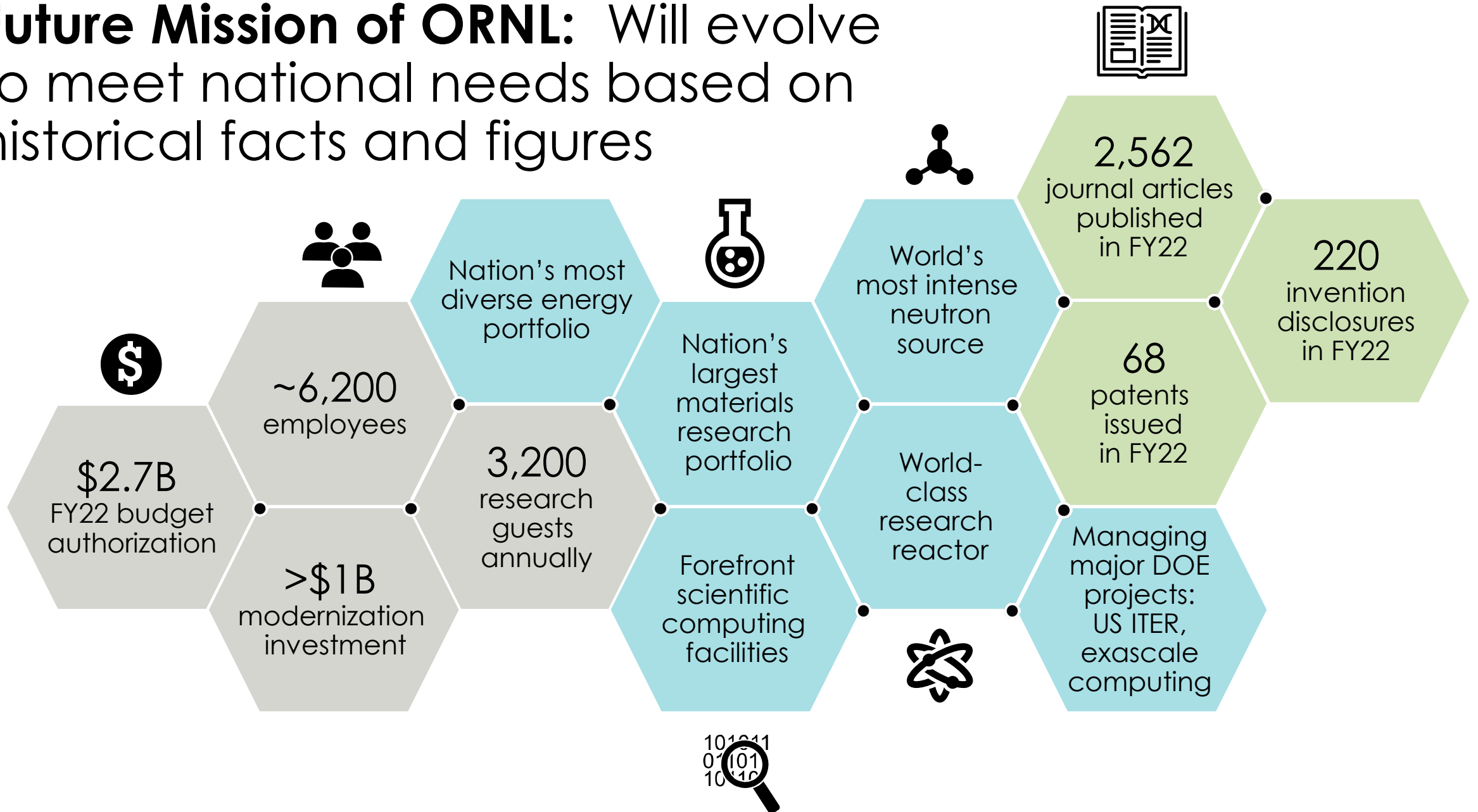
Mission: Deliver scientific discoveries and technical breakthroughs needed to realize solutions in clean energy and national security and provide economic benefit to the nation



Meeting national needs through discovery and innovation



Future Mission of ORNL: Will evolve to meet national needs based on historical facts and figures



What Makes ORNL Special?

- People
- Discoveries
- Facilities



The People

“The strength of laboratories like ORNL lies in the **interdisciplinary composition of their staffs**. Over and over again it has been demonstrated that the whole can be greater than the sum of its parts, that **good people from diverse fields working together** can make major scientific discoveries that are denied geniuses working in isolation.”

— Alvin M. Weinberg, 1967



Oak Ridge National Laboratory

Stephen Streiffer, Laboratory Director

Susan Hubbard
Deputy for Science
and Technology

Lindsey Twardy
Chief
of Staff

Balendra Sutharshan
Deputy
for Operations

Chief Inclusion Officer: Delphia Howze

Federal Affairs: Tyler Owens

Office of Institutional Planning: Jens Dilling

Office of Research Education: Moody Altamimi

Partnerships: Mike Paulus

UT-Oak Ridge Innovation Institute:
David Sholl (Interim)

Communications: David Keim

Counterintelligence: Julian Rael

General Counsel: David Mandl

Internal Audit: Fred Pieper

Office of Integrated Performance Management:
Dana Hewitt

Project Management Office: Greg Capps

Biological and Environmental Systems Science

Paul Langan
Assoc Lab
Director
Steve Cline, COO

Biosciences Division
Julie Mitchell
Environmental Sciences Division
Eric Pierce

Computing and Computational Sciences

Shaun Gleason
Assoc Lab
Director (Interim)
Fred Sudler, COO

Computational Sciences and Engineering Division
Kate Evans
Computer Science and Mathematics Division
Michael Parks
National Center for Computational Sciences Division
Gina Tourassi

Energy Science and Technology

Rick Raines
Assoc Lab
Director (Interim)
Ron Ott, COO

Buildings and Transportation Science Division
Robert Wagner
Electrification and Energy Infrastructures Division
Philip Bingham
Manufacturing Science Division
Yarom Polsky

Fusion and Fission Energy and Science

Mickey Wade
Assoc Lab
Director
Chris Beatty, COO

Fusion Energy Division
Phil Snyder (Interim)
Nuclear Energy and Fuel Cycle Division
Dave Pointer (Interim)

Isotope Science and Engineering

Jeremy Busby
Assoc Lab
Director
Kenneth Engle, COO

Enrichment Science and Engineering Division
Brian Anderson
Isotope Processing and Manufacturing Division
Jim Placke
Nonreactor Nuclear Facilities Division
Allen Smith (Interim)
Radioisotope Science and Technology Division
Susan Hogle

National Security Sciences

Moe Khaleel
Assoc Lab
Director
Michaela Martin, COO

Cyber Resilience and Intelligence Division
Mason Rice (Acting)
Field Intelligence Operations Division
Chuck Durant
Geospatial Science and Human Security Division
Budhendra Bhaduri
Nuclear Non-proliferation Division
Cary Crawford

Neutron Sciences

Jens Dilling
Assoc Lab
Director (Interim)
Brian Weston, COO

Neutron Scattering Division
Jon Taylor
Neutron Technologies Division
Richard Ibberson
Research Accelerator Division
Fulvia Pilat
Research Reactors Division
Mike Pierce

Physical Sciences

Cynthia Jenks
Assoc Lab
Director
Doug Collins, COO

Center for Nanophase Materials Sciences
Karen More
Chemical Sciences Division
Roger Rousseau
Materials Science and Technology Division
Yutai Kato
Physics Division
Marcel Demarteau

Exascale Computing Project

Lori Diachin,
Project Director

Neutron Upgrades Project Office

Graeme Murdoch,
Director

US ITER Project

Kathy McCarthy,
Project Director

Business Services

Scott Branham, CFO
Stacy Boggs, Operations Director

Accounting Operations Division
Libby Brown
Business Operations Division
Andrew Petzold

Contracts Division
Tina Richards

Environment, Safety, Health, and Quality

John Gearhart, Director
Jeff Ullian, Operations Director

Engineering Management Division
Doug Freels
Environmental Protection Services Division
David Skipper
Health Services Division
Bart Iddins

Safety and Operations Services Division
Jeff Ullian (Interim)

Transportation and Waste Management Division
Jeff Shelton
Nuclear and Radiological Protection Division
Mike Stafford
Performance Analysis and Quality Division
Jill Christian

Facilities and Operations

Ann Weaver, Director

Facilities Management Division
Jim Serafin (Interim)
Integrated Operations Support Division
Kim Jeskie
Laboratory Modernization Division
Bart Hammontree (Interim)

Laboratory Protection Division
Bill Manuel
Logistical Services Division
Steve Macklin
Utilities Division
Bob Baugh

Human Resources

Brian Arrington, CHRO

Benefits Division
Scott McIntyre
Employee Experience Division
Joy Wilson

HR Partnerships Division
Megan Fielden

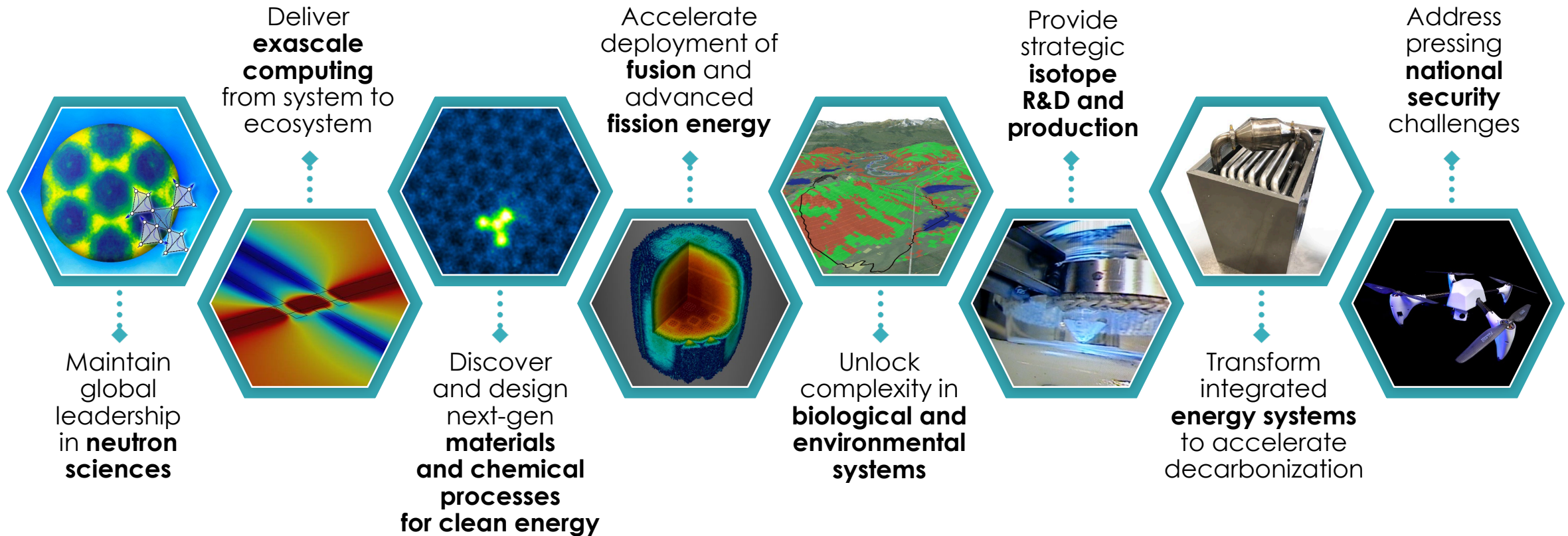
Information Technology Services

Kris Torgerson, CIO

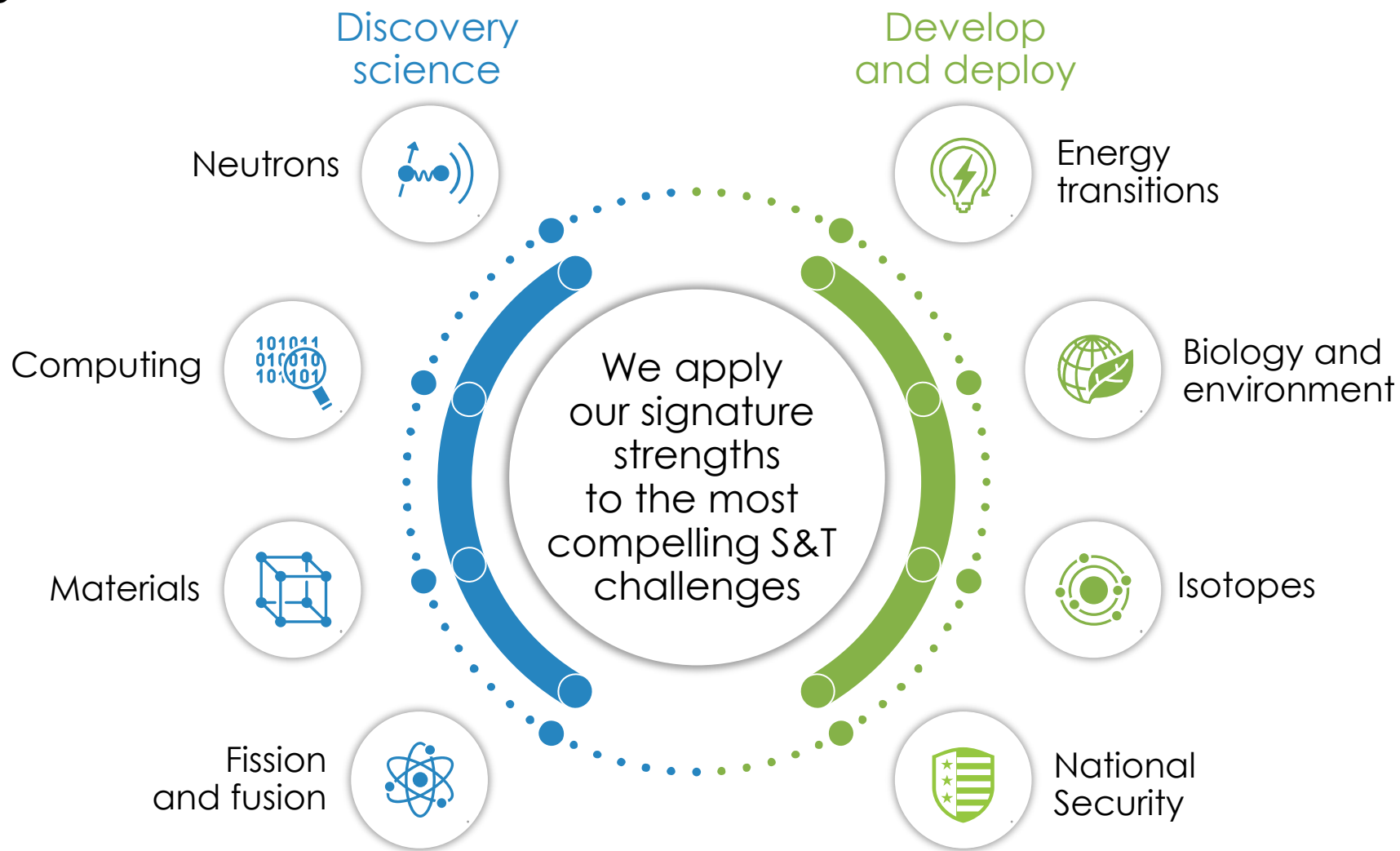
Application Development Division
Jay Eckles
Cyber Security Division
Maria McClelland

Digital Services Support Division
Paul Chamberlain
Research Computing Support Division
Brett Ellis

Discoveries: Delivering solutions to challenging problems in science and technology (*signature strengths*)

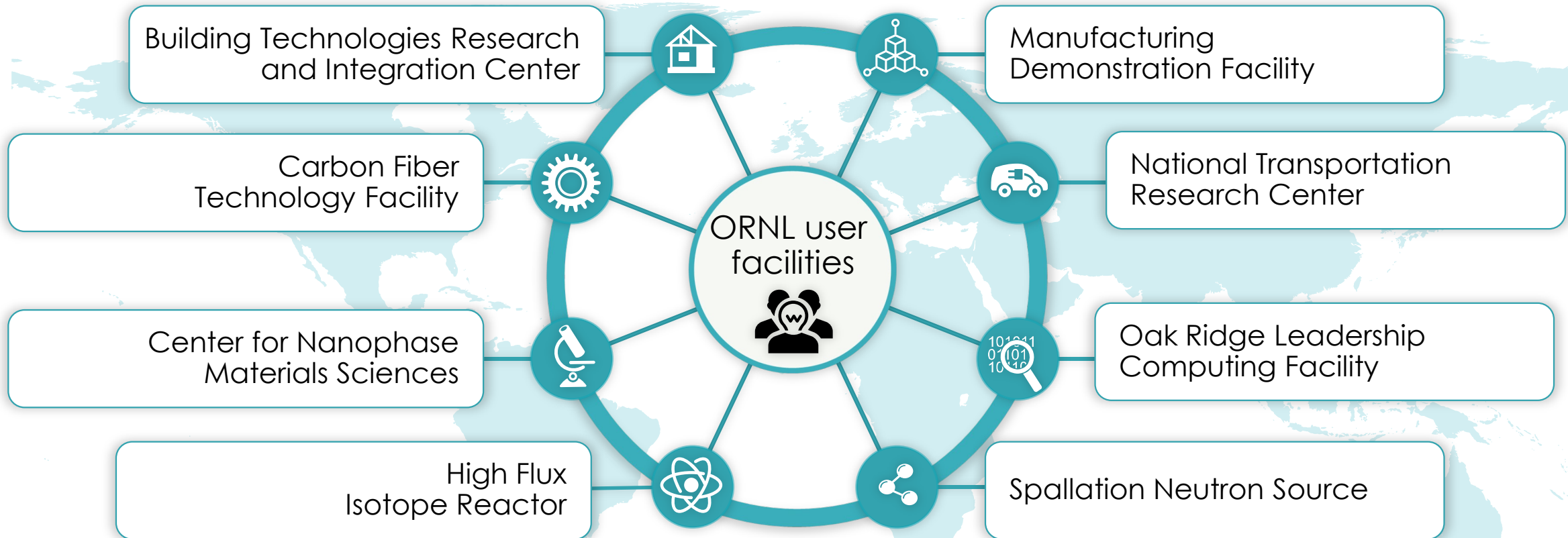


Discoveries: Delivering translational research for national priorities



Mission first. People always.

Facilities: ORNL's distinctive facilities bring thousands of R&D partners to Tennessee each year



Highlights of NA-22 Relevant Work

- Nuclear Nonproliferation
- Internships of Consortiums
Fellows



<https://dnn-consortium.ornl.gov>



NUCLEAR NONPROLIFERATION at ORNL: REDUCING **NUCLEAR RISK**

Delivering science, technology, and operational solutions to nonproliferation challenges



**URANIUM SCIENCE
& TECHNOLOGY**



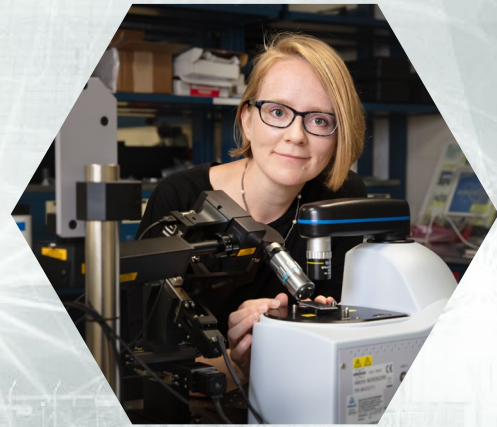
**ADVANCED
REACTORS**



**RADIOLOGICAL & NUCLEAR
MATERIAL SECURITY**



**INTERNATIONAL SAFEGUARDS
& POLICY**



**URANIUM
CHEMISTRY & PROCESSING**



**NUCLEAR DETECTION
& ANALYSIS**



**TRANSPORTATION
SECURITY**



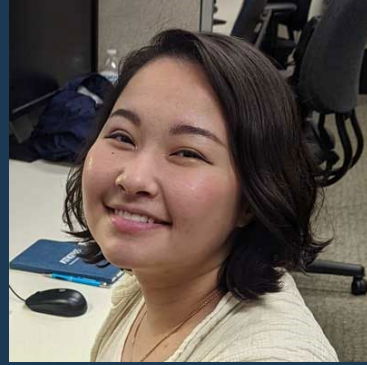
**NONPROLIFERATION
VERIFICATION**

RECENT CONSORTIUMS FELLOWS AT ORNL: INTERNS AND RESEARCH STAFF



Bernadette Brezinski

- NSSC - 2022 Intern
- UTK – BS / Nuclear Engineering
- Signal processing



Dinara Ermakova

- NSSC – 2022 Intern
- UCB – PhD / Nuclear Engineering
- Renewable energy sources



Krysten Stiefel

- NSSC – ORNL Staff
- MSU – PhD / Nuclear Chemistry
- Criticality safety in high radiation environments (isotope production)



Matthew deJong

- NSSC – 2023 Intern
- NCSU – PhD / Mat'l Sci. & Eng.
- Characterization of AM materials



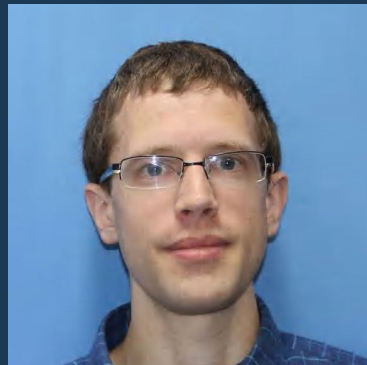
Lance Drouet

- NSSC – 2023 Intern
- UTK – PhD / Nuclear Engineering
- AI/ML techniques for nuclear data



Jordan Stomps

- ETI – 2022 Research Collaborator
- UWM – PhD / Nuclear Engineering
- AI/ML for nonproliferation applications



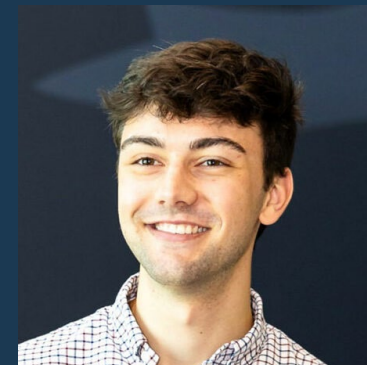
Brad Nethercutt

- ETI – 2022 Post-Doc
- UWM – PhD / Nuclear Engineering
- AI/ML for nonproliferation applications



Patrick Snarr

- ETI – 2023 Research Collaborator
- UTA – PhD / Mech. Engineering
- AM of nuclear fuel surrogates



Brad Nethercutt

- MTV – 2023 Intern
- PSU – PhD / Nuclear Engineering
- Signatures for nuclear forensics



Jason Nattress

- MTV – ORNL Weinberg Fellow
- UM – PhD / Physics
- Nuclear detection technologies

Lance Drouet, 3rd Year PhD, Nuclear Engineering, UTK



Doctoral Research: Investigating the use of AI / ML techniques on nuclear data and data generated from simulated low-fidelity models to improve the optimization of nuclear system design.

ORNL 2023 Summer Internship

- **Mentor:** Rike Bostelmann (Nuclear Energy & Fuel Cycle Division)
- **Assignment:** Investigate the impact of nuclear data uncertainties for safeguards applications
- **Results:**
 - An enhanced understanding of the impact of nuclear data for the prediction of spent fuel inventory
 - Confidence in his career pursuit and continuing his PhD



Doctoral Research: Characterization of additively manufactured materials to determine how the microstructure of oxide dispersion strengthened (ODS) steel synthesized via Laser Powder Bed Fusion (LPBF) is influenced by changes in the preceding metal powder.

ORNL 2023 Summer Internship

- **Mentors:**
 - Chad Parish (Materials Sciences & Technology Division)
 - Holden Hyer (Nuclear Energy & Fuel Cycle Division)
- **Assignment:** Understand both the processing & characterization sides of additive manufacturing
- **Results:**
 - Learned to print samples via LPBF
 - Learned to characterize the grain structure of samples using microscopic instruments
 - Learned to improve data collection
 - Collected data useful for his dissertation

Closing Remarks

- Opportunities at ORNL
- Imagine YOU at ORNL

<https://dnn-consortium.ornl.gov>





Educational Programs Information

Academic Year 2023 - 2024

ORNL Undergraduate and Graduate Opportunities

INTERNSHIP PROGRAMS

- **DOE WDTS Program: Science Undergraduates Laboratory Internships for Undergraduates ([SULI](#))**
 - Summer 2024: 10 weeks - Apply by January 9, 2024
- **NNSA-Minority Serving Institutions Internship Program ([NNSA-MSIIP](#))**
 - Summer 2024: 12 weeks – Apply by October 22, 2023
- **[ORNL Programs](#)**
 - [Undergraduate Research Student Internship](#) and the [Technical and Professional Internship Programs](#)
 - Summer 2024: 10 weeks – Apply by February 22, 2024
 - [Graduate Research Student Internship](#) and the [Technical and Professional Internship Programs](#)
 - Summer 2024: 10 weeks – Apply by February 22, 2024
- **[The GEM Fellow Internship Program at ORNL](#)**
 - Summer 2024: Apply by November 15, 2023

RESEARCH COLLABORATIONS PROGRAMS

- **DOE WDTS Programs**
 - **[Office of Science Graduate Student Research Program \(SCGSR\) for PhD Students](#)**
 - Award period is 3-12 consecutive months
 - 2024 Applications due by November 8, 2023
 - Participants must start between June 20, 2024 and October 7, 2024
- **ORNL Programs**
 - **[Graduate Research at ORNL \(GRO\) for PhD Students](#)**
 - Award period is 3-12 consecutive months
 - Award vary based on arrangements between ORNL mentor (s) and the student's university
 - Program is designed to be flexible in the time spent doing research at the student's home university and ORNL

Apply to one of each type before the deadlines at <https://education.ornl.gov>

Imagine YOU at ORNL: Helping to build a diverse and talented STEM workforce

Postdoctoral
research
programs



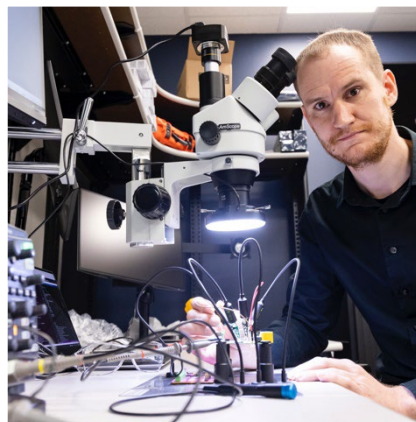
Distinguished
staff fellowships



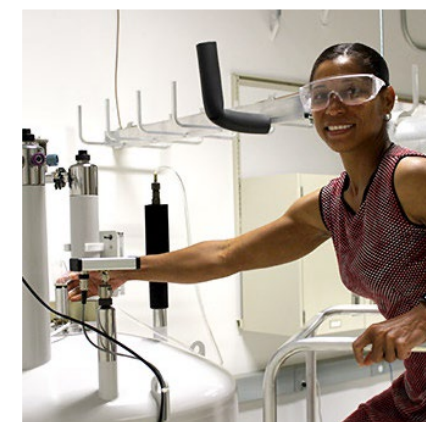
Visiting faculty
opportunities



Undergraduate
and graduate
programs



Innovation
Crossroads



Imagine YOU at ORNL: Helping Change the World

Ensuring
the nation's
energy
future

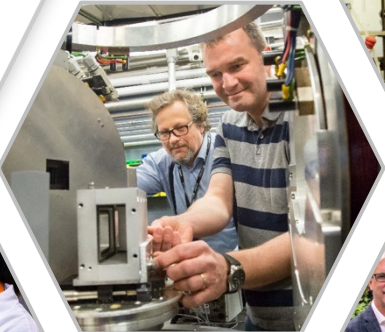
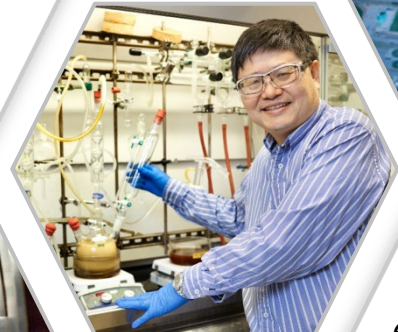
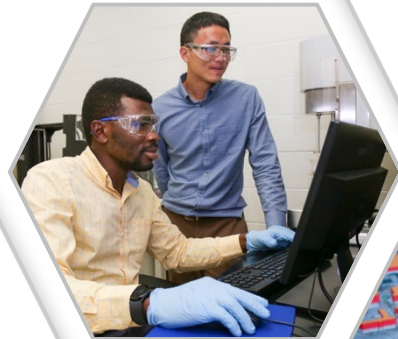
Strengthening
national
security

Conducting
world-
leading
research

Focusing
on the most
difficult
problems

Expanding
energy justice
through
innovation

Delivering
impactful
break-
throughs



Thank You!

