



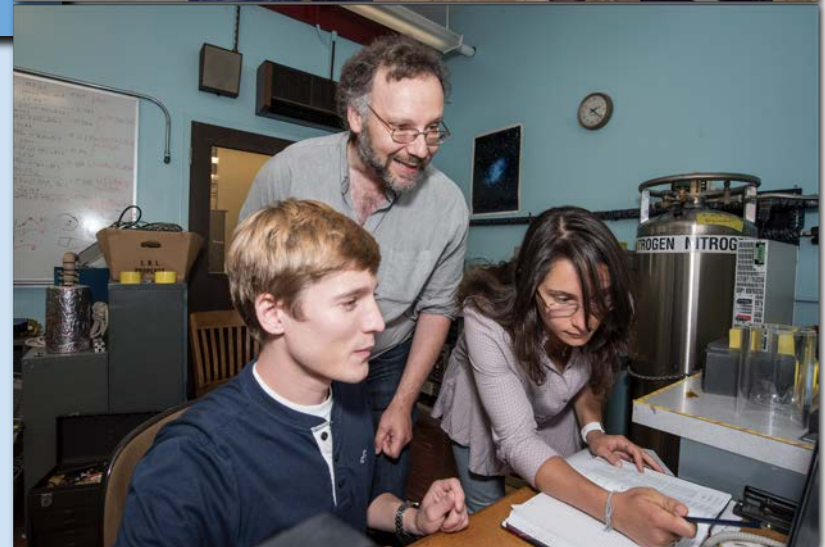
NSSC Virtual Scholar Showcase

Nuclear Science and Security Consortium Program and Metrics

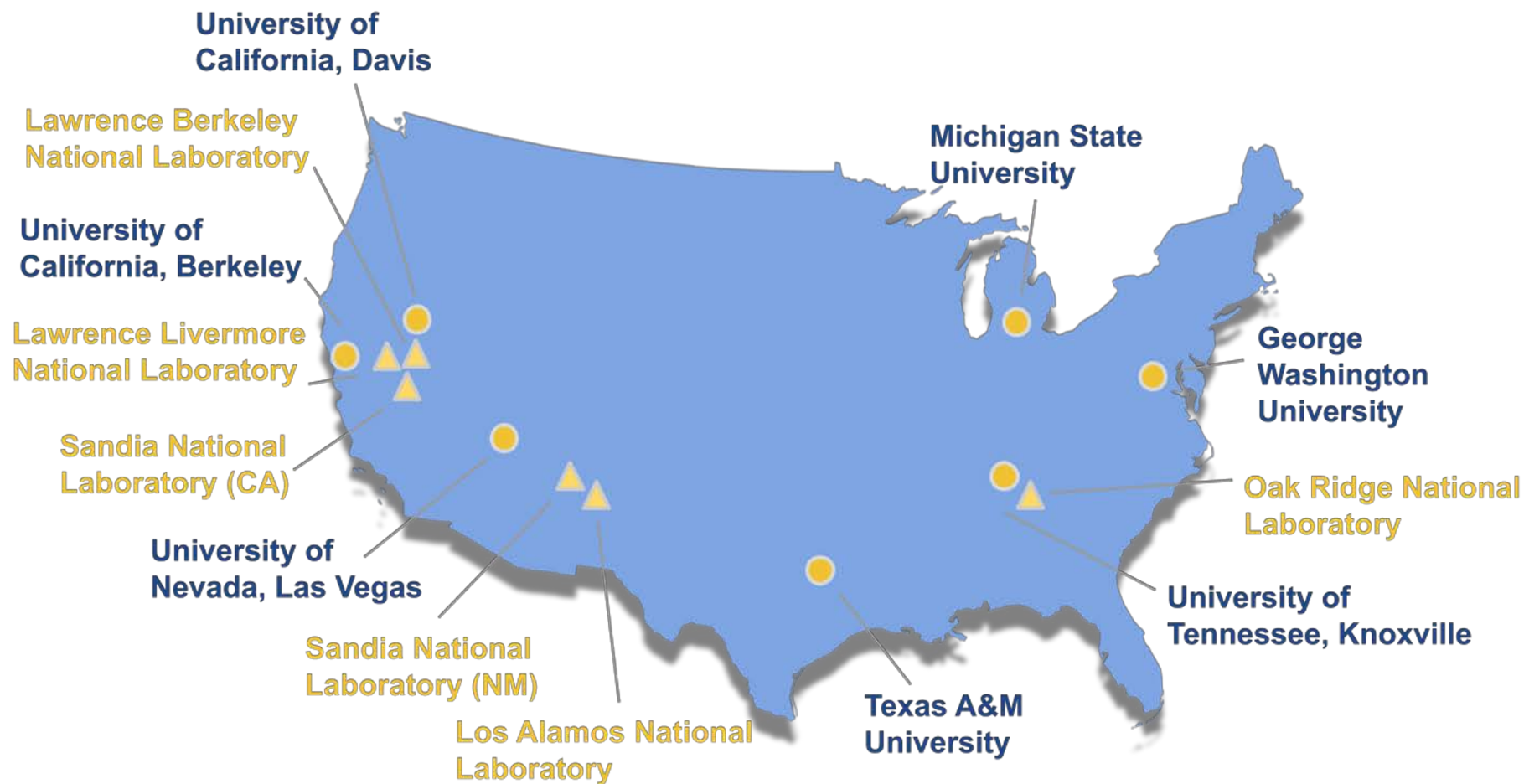
June 2, 2020

Dr. Jasmina Vujic
University of California, Berkeley

- **Recruit and train top students** in relevant nuclear disciplines
- Connect students with a **core set of disciplines** that support the nonproliferation and nuclear security mission
- **Expand national laboratory collaboration** to provide students the opportunity to **engage deeply in research** under the guidance of lab scientists



NSSC2 Partner Institutions



NSSC2 Organizational Chart

NNSA DNN

NSSC EXECUTIVE TEAM

PI/Director: Jasmina Vujic - UCB
Executive Director: Bethany Goldblum - UCB
Deputy Executive Director: Jason Hayward - UTK
NNSA Liaison: Kai Vetter - UCB
Director for Laboratories: Lee Bernstein - UCB/LBNL

ADVISORY BOARD

Chair - Carol Burns - LANL
 Roger Falcone - UCB
 Miriam John - SNL (retired)
 David McCallen - UN Reno
 Benn Tannenbaum - SNL
 Catherine Romano - ORNL
 Mavrik Zavarin - LLNL

POINT OF CONTACT COUNCIL

UNIVERSITY

Chris Cahill - GWU
 Sean Liddick - MSU
 Cody Folden - TAMU
 Mani Tripathi - UCD
 Frederic Poineau - UNLV
 Jason Hayward - UTK

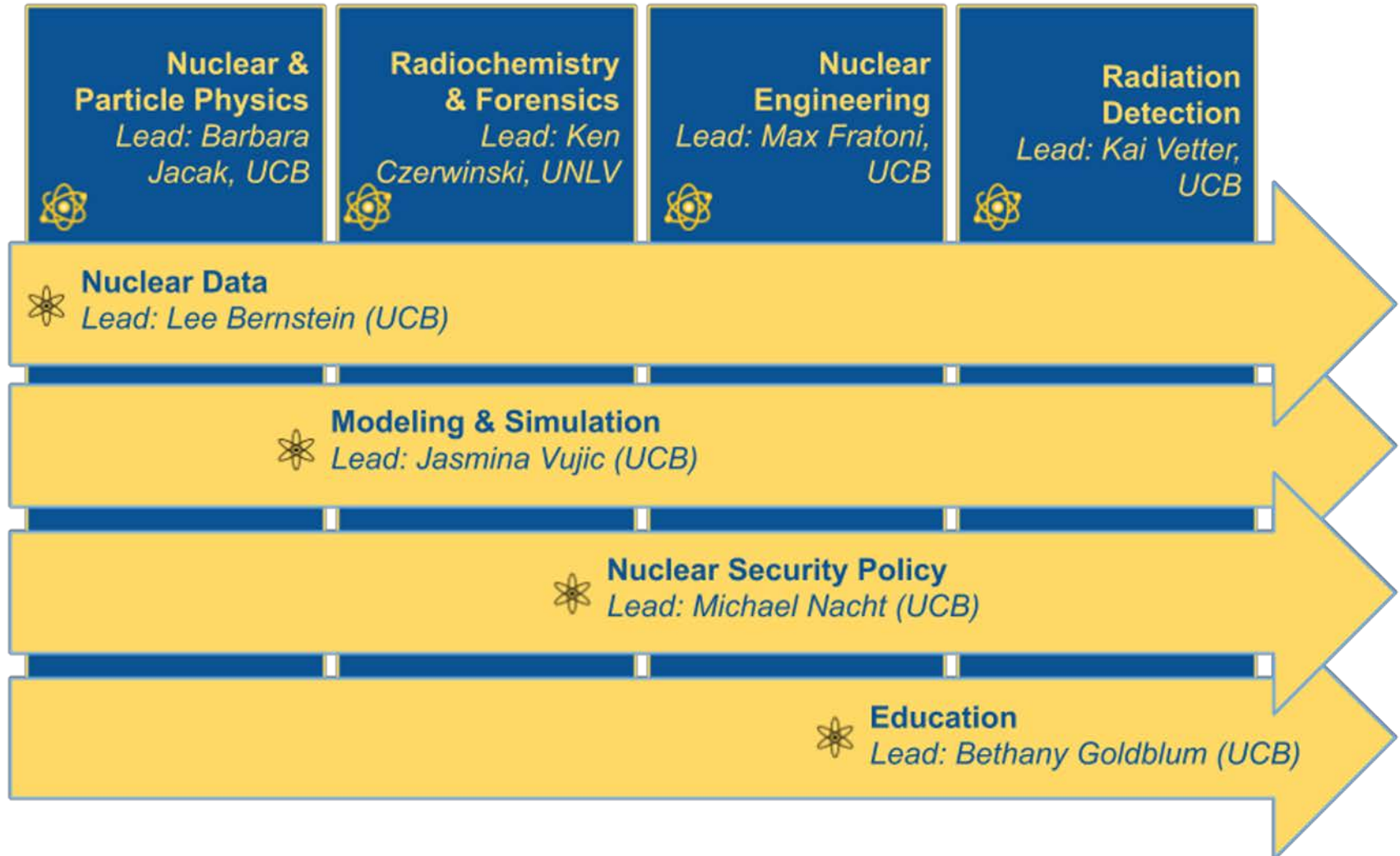
LABORATORY

Margie Root - LANL
 John Valentine - LBNL
 Vladimir Mozin - LLNL
 Dave Williams - ORNL
 David Peters - SNL

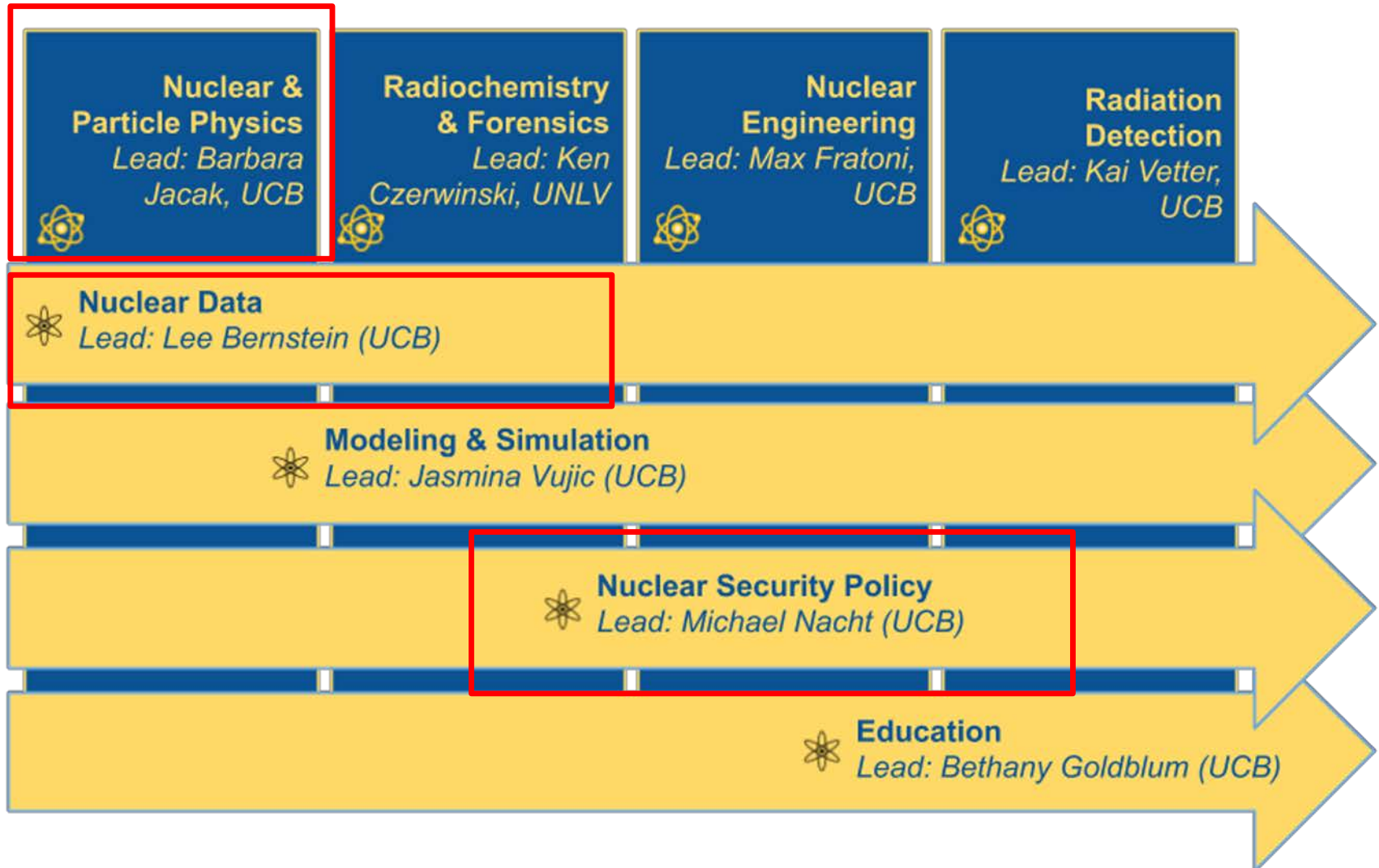
NSSC SUPPORT STAFF

Program Manager: Charlotte Carr
Financial Analyst: Derek Johnson

NSSC2 Research Focus Areas and Crosscutting Areas








Virtual Scholar Showcase: Day 1 Focus




NSSC1 History (2011-2016)



2011 - NSSC established as the first NSA academic consortium

Nuclear Physics Eric Norman	Nuclear Chemistry & Radiochemistry Ken Czerwinski	Nuclear Engineering Rachel Slaybaugh	Radiation Detection & Instrumentation Kai Vetter	Nuclear Security Policy Michael Nachi
				
<ul style="list-style-type: none"> • Nuclear reactions & structure physics • Neutron physics • Low background measurements • Anti-Neutrino Reactor Monitoring • Nuclear data 	<ul style="list-style-type: none"> • Isotope ratio measurements • Actinides in soil samples • Radiochemical separations • Fallout sample characterization • Molecular nuclear forensics methods 	<ul style="list-style-type: none"> • Modeling and simulation • High performance computing • Detector material characterization • Beta-delayed gamma ray analyses 	<ul style="list-style-type: none"> • Gamma-ray imaging systems • Position sensitive HPGe detectors • Image reconstruction and 3D data fusion • Background radiation characterization 	<ul style="list-style-type: none"> • Cross domain deterrence • International cooperation on nuclear security • Complexity science for nuclear security • Nuclear Policy Working Group

2012 – New course: Nuclear Security Policy and Technology



Nuclear Science and Security Consortium

Abstract

In April 2011, US President Barack Obama spoke about nuclear weapons in the 21st century during a speech in Prague. He warned of the dangers associated with global nuclear proliferation and the risk of eventual access to nuclear weapons, and outlined his intent to reduce the risk nuclear weapons play in US national security policy with an ultimate vision of a world without nuclear weapons. President Obama also made the following commitment: "As long as these weapons exist, the United States will maintain a safe, secure and effective arsenal to deter any adversary, and guarantee that advance to our allies." When the Nuclear Posture Review (NPR) was released a year later, it included five key objectives:

1. Preventing nuclear proliferation and nuclear terrorism
2. Reducing the role of US nuclear weapons in US national security strategy
3. Maintaining strategic deterrence and stability of reduced nuclear force levels
4. Strengthening regional deterrence and reassuring US allies and partners
5. Fostering a safe, secure, and effective nuclear arsenal

These objectives and the detailed, multi-decade planning that occurred to establish the baseline vision, objectives, and resource requirements for implementation. Since the Cold War ended in the early 1990s, the US has dramatically reduced both the overall quantity and the number of types of US nuclear weapons. These reductions are continuing under the New START Treaty, enabled by US Extension Program for weapons that will remain in the US nuclear arsenal, as well as important upgrades to key elements of the US nuclear weapons infrastructure.

Current restrictions on "new military capability" for the US nuclear arsenal constrain the scope of the Life Extension Program. Life extending the Cold War stockpile is necessary to eliminate technology obsolescence and address aging concerns, and is sufficient for ensuring a strong US nuclear deterrent for the foreseeable future. However, a lot has changed since the 2000 release of the Nuclear Posture Review, both geographically and technologically, and we should anticipate continuing, rapid, and perhaps even disruptive change into the future. A high level treatment of emerging threats as well as possible implications for US deterrence will be discussed.

About Ms. Sheryl Hingorani

Sheryl Hingorani leads Sandia's Systems Analysis and Engineering organization, which performs systems analysis, exploratory engineering, both domestic and international training missions, and program development focused on highest priority US national security needs. She is also responsible for managing Sandia's Nuclear and Radiological Security portfolio, and is the Sandia interface with the U.S. Department of Homeland Security's Domestic Nuclear Detection Office.

Webinar
Challenges and Complexities of 21st Century Deterrence

Sheryl Hingorani
Sandia National Laboratories

April 14, 2015
3:00 - 4:00pm

View the live webcast at:
<https://support.gotomeeting.com/join/600044612>

2013 – The NSSC webinar series debuts



2014 – NSSC LANL Summer Program partnership begins

2014 – NSSC supports 5 MSIs



2015/16 – NSSC1 concludes having supported:

- 127 Undergraduates
- 139 Grad Students
- 34 Postdocs
- 42 Faculty Members

2016 - NSSC re-competes and is awarded funding for an additional five years



NSSC Phase 2 begins.
New partners UTK, TAMU, GWU & ORNL are introduced.



2017 – NSSC2 holds annual Fall Engagement Workshop and Advisory Board Meeting at LBNL

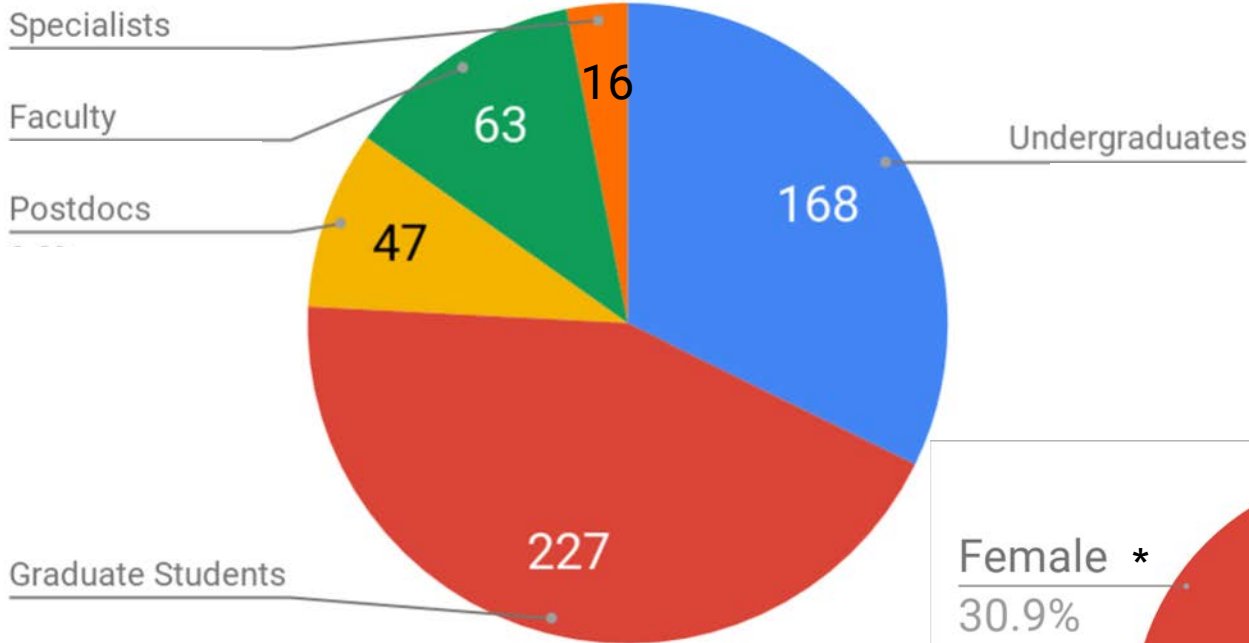


2018 – NSSC GW Boot Camp on Nuclear Security Policy is held for the first time



2019 – A total of **112** NSSC alumni are working in the national labs or other government positions. The NSSC pipeline to the national labs continues to grow!

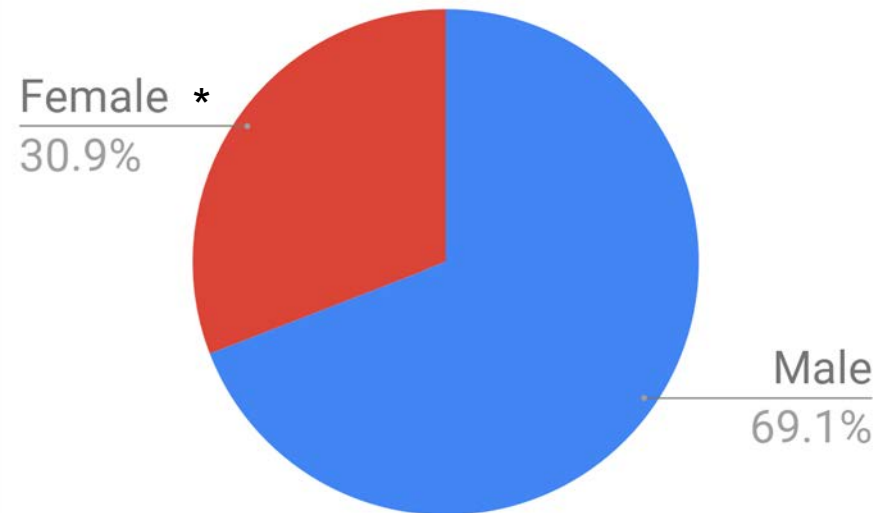
NSSC Personnel 2011 - Present



Completed:

108 Ph.D. degrees
67 M.S. Degrees
111 B.S. Degrees

Gender ratio of NSSC scholars



**521 people have been
supported by NSSC**

NSSC Metrics Overview 2011 - Present

333 Peer Reviewed Publications

Thibault Laplace (UCB)
“Low energy light yield of fast plastic scintillators,”
Nuclear Instruments and Methods in Physics Research (Oct 2018).



176 Awards

Daine Danielson (UCD) and Travis Smith (UTK) won
2019 Innovations in Nuclear Technology R&D Awards



508 Poster Presentations

Kevin Glennon (TAMU)
presented “A Forensic Investigation of Legacy Separated Pu” at LANL.
Kevin also won Outstanding Presentation in Chemistry at LANL

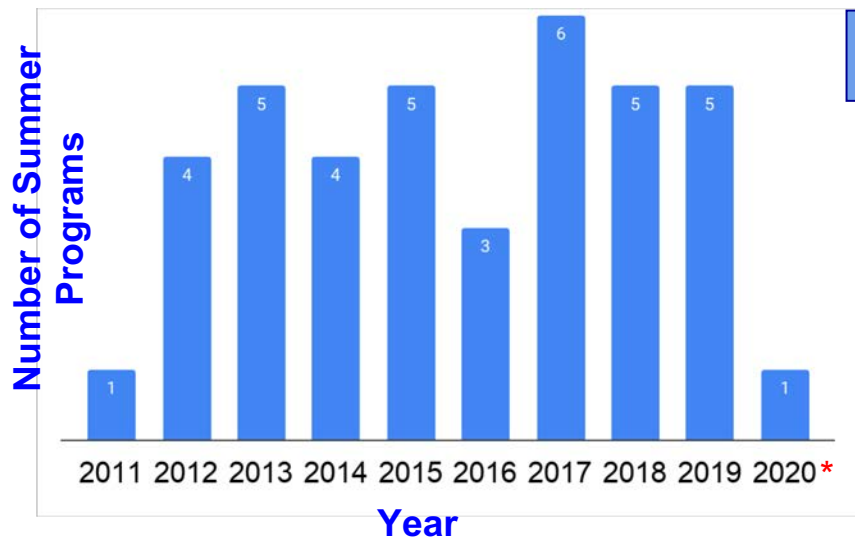


756 Oral Presentations

Stephanie Lyons (MSU) “ β -decay of neutron-rich Co with Total Absorption Spectroscopy” Nuclear Seminar, Technical University Darmstadt, Germany.



NSSC Summer Programs



NSSC has supported 39 Summer Schools



UC Davis Nuclear Analytical Techniques Summer School



GW Boot Camp on Nuclear Security Policy



NSSC LANL Keepin Nonproliferation Science Summer Program

*The majority of summer programs for 2020 have been cancelled due to COVID-19

NSSC-LANL Keepin Nonproliferation Science Summer Program

Dates	NSSC Participants	Other Participants	Total
June 22 - Aug 14, 2020	2	12	14
June 17 - Aug 9, 2019	5	11	16
June 18 - Aug 8, 2018	14	13	27
June 19 - Aug 1, 2017	12	8	20

Goals:

- Create **working relationships** between NSSC students and LANL scientists
- Increase number of students performing **programmatic research** with LANL
- Turn research and training into **careers at the national laboratories**

At the end of the summer program all participants present oral **“lightning presentations”** for LANL personnel on their summer research project

Many participants return to LANL to conduct dissertation research, or in postdoc or staff positions.

Program alumni who have been awarded a Seaborg Summer Fellowship to return to LANL

1. Katherine Luebke (UNLV)
2. James Louis-Jean (UNLV)
3. Kevin Glennon (TAMU)

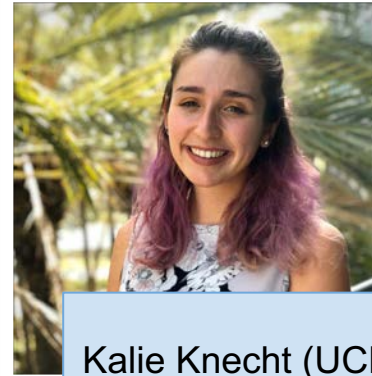


NSSC 2020 | Innovating Online Remote Summer Program

The NSSC LANL Keepin Nonproliferation Science Summer Program goes VIRTUAL for Summer 2020:

- Program fully supported with all participants working with lab mentors on lab directed projects remotely
- Enrichment activities and lectures moved online
- Plans for onsite opportunities in the future

- For the first time **two days of Keepin program lectures will be available to be audited online** for non-program participants, including members of other NA22 consortia



Kalie Knecht (UCB) working remotely with Caleb Roecker (LANL)



Corey Ahl (UTK) working remotely with Madison Andrews (LANL)

Objectives:

- Support the educational process
- Provide data from laboratory demonstrations
- Benefit university research projects



*Evaluation of prompt
gamma-ray emissions from
neutron interrogation of
meteorites*

Instrumentation:

- **Neutron generators:** DT, DD, Cf, Cm, (α ,n)
- **Gamma-ray detectors:** HPGe, LaBr₃, CZT, NaI(Tl), etc.
- **Neutron detectors:** ³He, EJ-301, EJ-309, Stilbene
- **Imaging:** X-Ray and Neutron transmission

Materials:

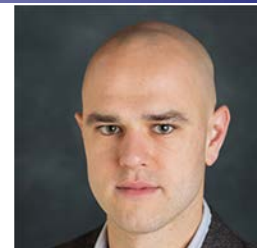
- Gamma-ray and neutron sources
- Low- and high-Z shielding
- Pu material samples
- U mass and enrichment standards
- Containers and enclosures



NSSC Sponsored Courses

NSSC has supported 9 courses held at four partner institutions

Course	Institution
Nuclear Security: The Nexus Between Policy and Technology	UC Berkeley
A Hands-On Introduction to Radiation Detection	UC Berkeley
Special Topics: Nuclear Data	UT Knoxville
Radiochemical Methods in Nuclear Technology and Forensics	UC Berkeley
Radiation Detection and Nuclear Instrumentation Lab Course	UC Berkeley
Advanced Concept for Radiation Detection & Measurements	UC Berkeley
Nuclear Criticality Safety	UC Berkeley
Nuclear and Radiochemistry	UC Irvine
Designed Emphasis in Nuclear Science (DENS)	UC Davis



Special Topics: Nuclear Data
with Prof. Heilbronn and Prof. Sobes

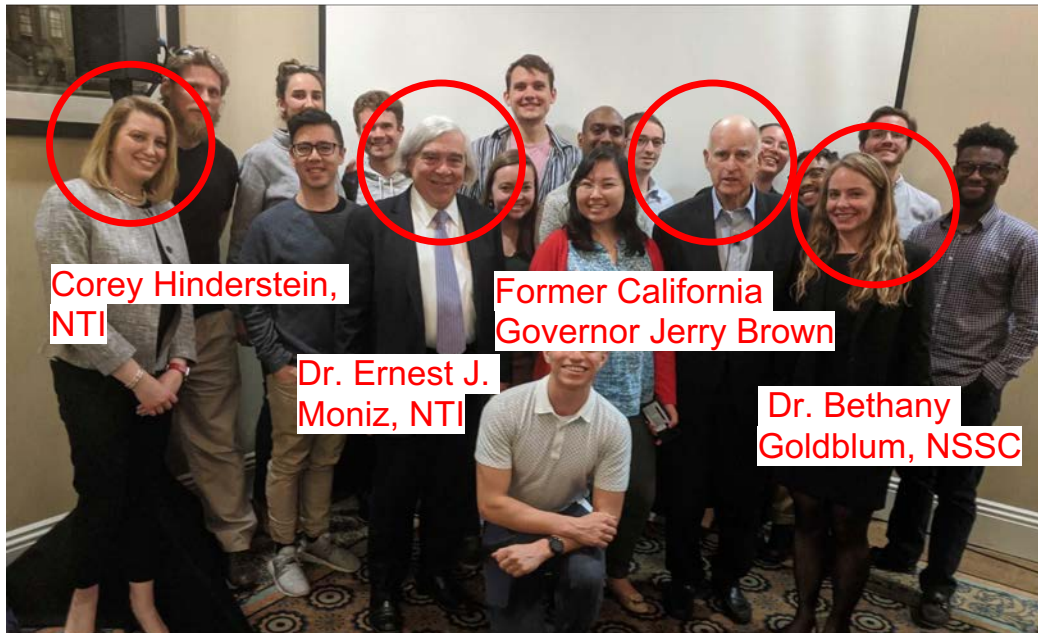


Nuclear Security: The Nexus Between Policy and Technology
with Prof. van Bibber and Prof. Nacht



A Hands-On Introduction to Radiation Detection
with NSSC Specialist Dr. Ali Hanks

Since 2013, NSSC webinars have been connecting students to scientists at all of our partner institutions



Corey Hinderstein,
NTI

Former California
Governor Jerry Brown

Dr. Ernest J.
Moniz, NTI

Dr. Bethany
Goldblum, NSSC

Former U.S. Secretary of Energy **Dr. Ernie Moniz**, former California Governor **Jerry Brown**, and NSSC Executive Director **Dr. Bethany Goldblum** with students at the panel discussion on “How Close to Doomsday? Nuclear Dangers and Stopping a New Nuclear Arms Race”



Mark Chadwick, ALDX, LANL



Christine Anderson-
Cook, LANL



Yana Feldman, LLNL

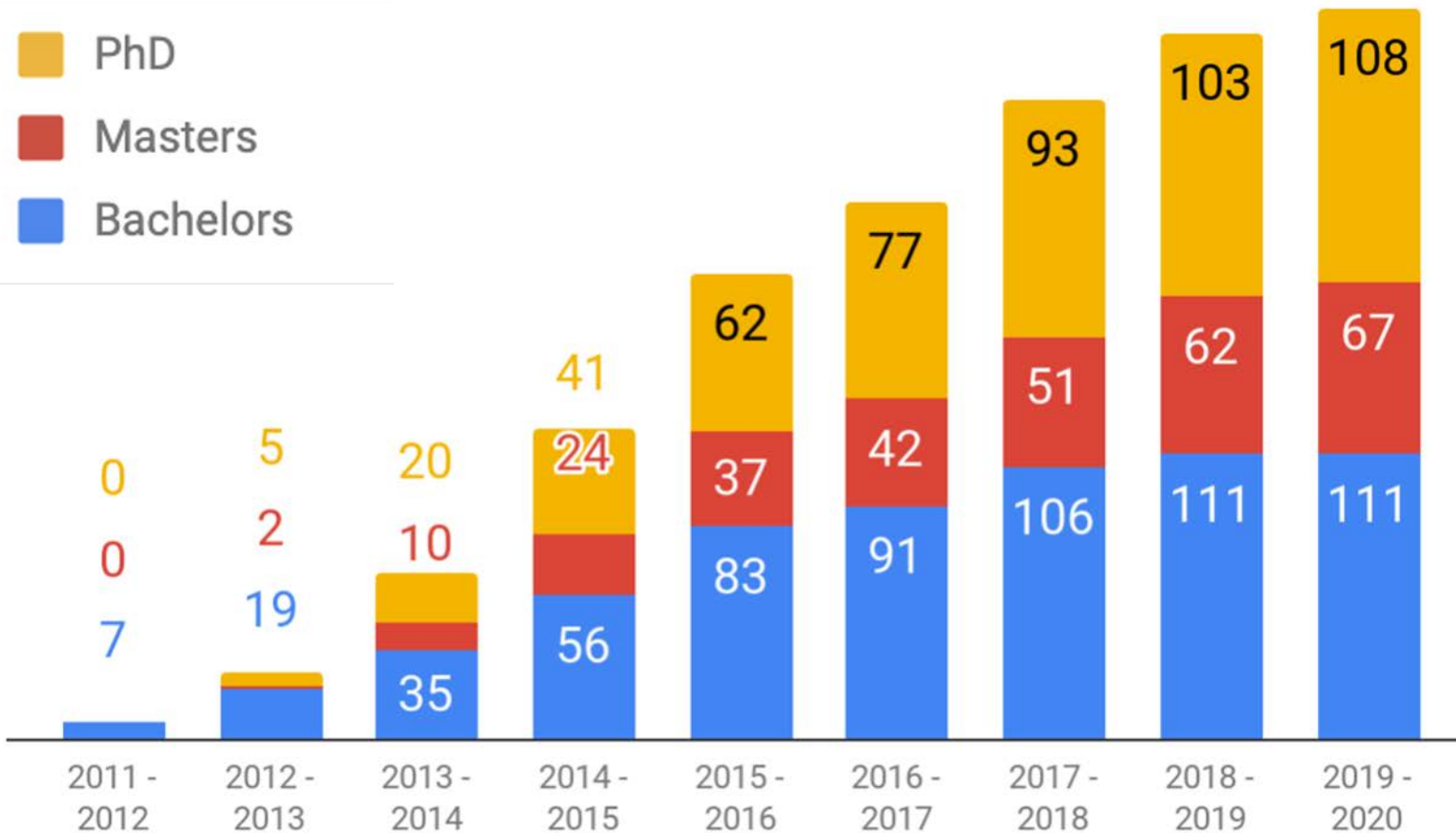


Naomi Marks, LLNL



Amb. Linton F. Brooks.

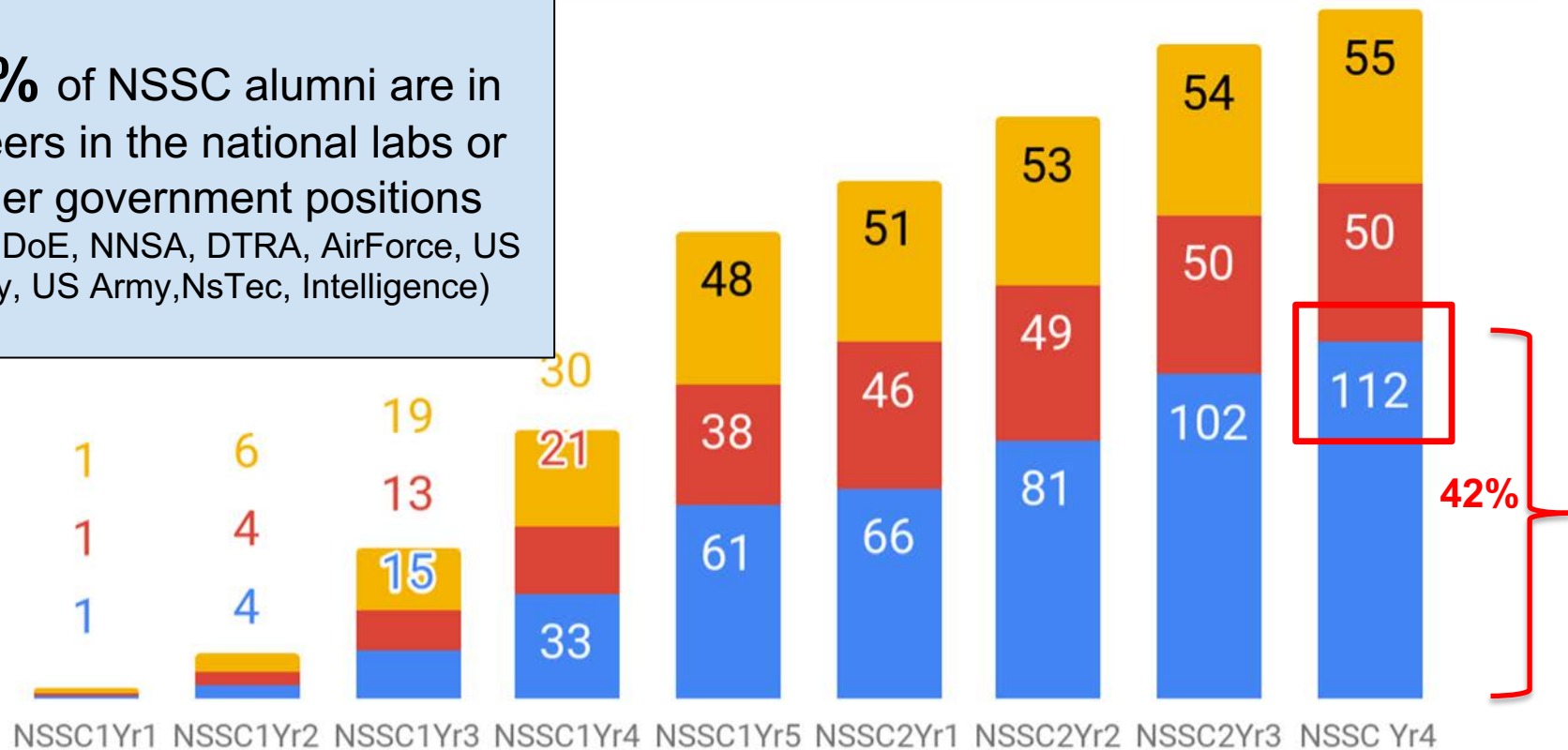
NSSC Cumulative Degrees 2011 - Present



NSSC Cumulative Degrees

NSSC Cumulative Pipeline 2011 - Present

42% of NSSC alumni are in careers in the national labs or other government positions (DoD, DoE, NNSA, DTRA, AirForce, US Navy, US Army, NsTec, Intelligence)



NSSC Cumulative Pipeline

■ In-Field or Industry
 ■ Academia
 ■ National Lab or Other Gov.

NSSC Pipeline to the National Laboratories and Other Government

	LBNL	SNL	LANL	LLNL	ORNL	Other Lab or Gov.	TOTAL
UCB	13	4	4	15	0	18	54
UCD	3	2	1	4	0	1	11
UCI	0	1	0	2	1	0	4
UNLV	0	0	6	5	2	4	17
MSU	1	0	2	1	1	10	15
TAMU	0	0	0	0	0	0	0
UTK	0	0	2	0	2	5	9
Fisk	0	0	0	0	0	1	1
GWU	0	0	0	0	0	1	1
TOTAL	17	7	15	27	6	40	112

Acknowledgements



NSSC Fall Workshop at LLNL

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