Intensity Frontier Neutrino Subgroup Workshop!

Briefing to the ~~House Science Committee Staff~~

The Nuclear Science & Security Consortium

Training the Next Generation

National Nuclear Security Administration

Professor Karl van Bibber

Executive Director, NSSC
Chairman, Department of Nuclear Engineering
University of California Berkeley

February 27, 2013

Rayburn House Office Building 2325

The New Landscape of Young Talent

- Most major Nuclear Science & Engineering programs in the US have doubled in size over the past decade
- Clear inflection point 2001 – correlation with 9/11
- Students view the nuclear issue holistically as a societally important problem worthy of their career
  - NE departments have broadened their scope accordingly
- We enjoy a large pool of well-prepared US students
  - They're interested in national security and can obtain clearances

The NSSC seeks to capitalize on this opportunity and provide a large influx of trained S&E for the non-proliferation mission

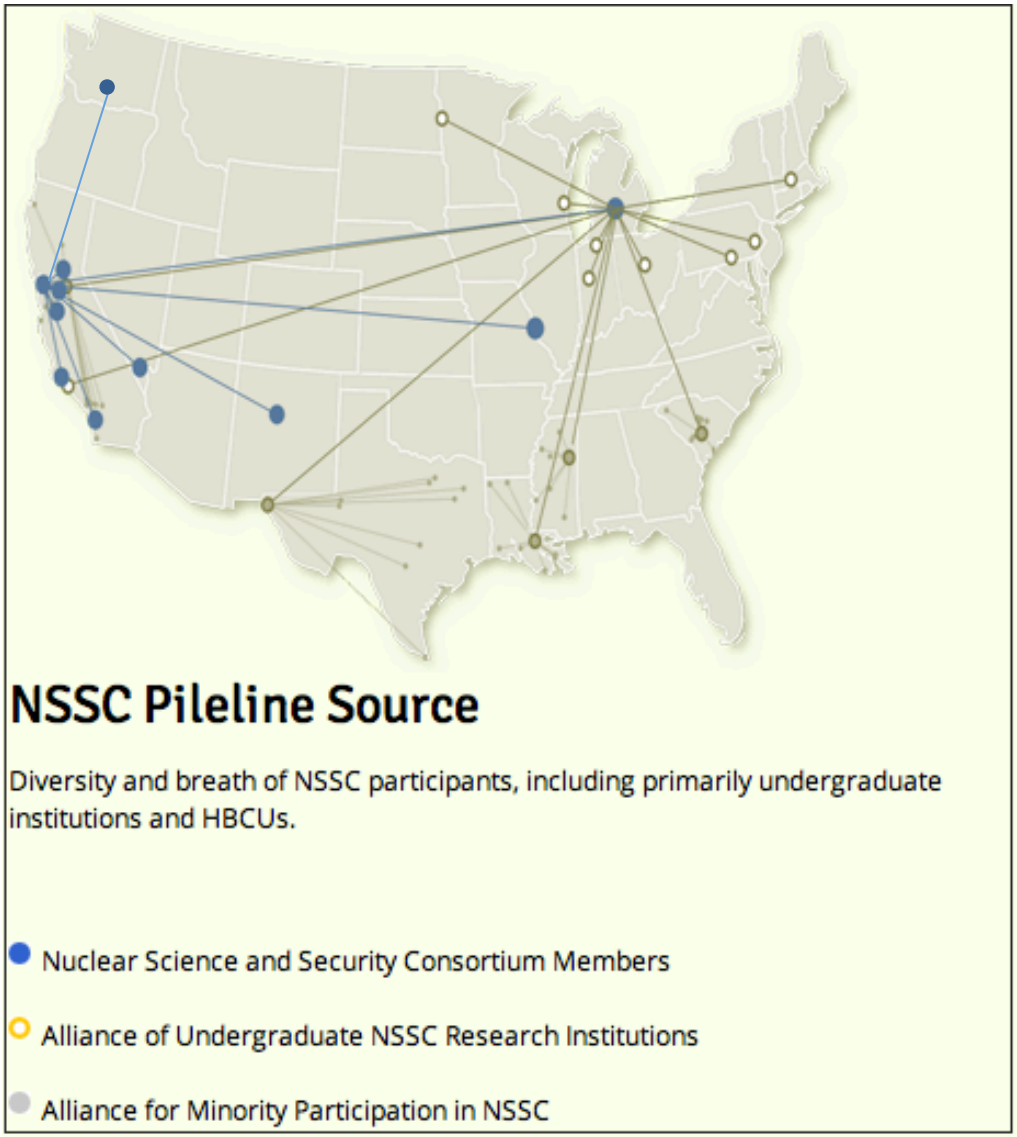
The NSSC reflects the priorities of the new NPR

"Investing in the scientific and technical underpinnings of our program is critical to implementing the President's nuclear security agenda and to preventing nuclear terrorism or nuclear proliferation. As we push the boundaries of science and discovery, partnerships like the Nuclear Science and Security Consortium are a vital part of our effort to invest in the future of our programs by building a strong pipeline of new technical talent to our laboratories."

Anne Harrington
NNSA Deputy Administrator for Defense Nuclear Nonproliferation

In 2010, DOE/NA-22 issued a FOA for a $25M / 5 year program.
In 2011, a UC Berkeley-led consortium was awarded the grant.

The NSSC – 7 universities & 4 national security labs



University of California Berkeley

University of California Davis

University of California Irvine

University of California San Diego
(Institute for Global Conflict & Cooperation)

Michigan State University

University of Nevada Las Vegas

Washington University

Lawrence Berkeley National Lab

Lawrence Livermore National Lab

Los Alamos National Lab

Sandia National Lab

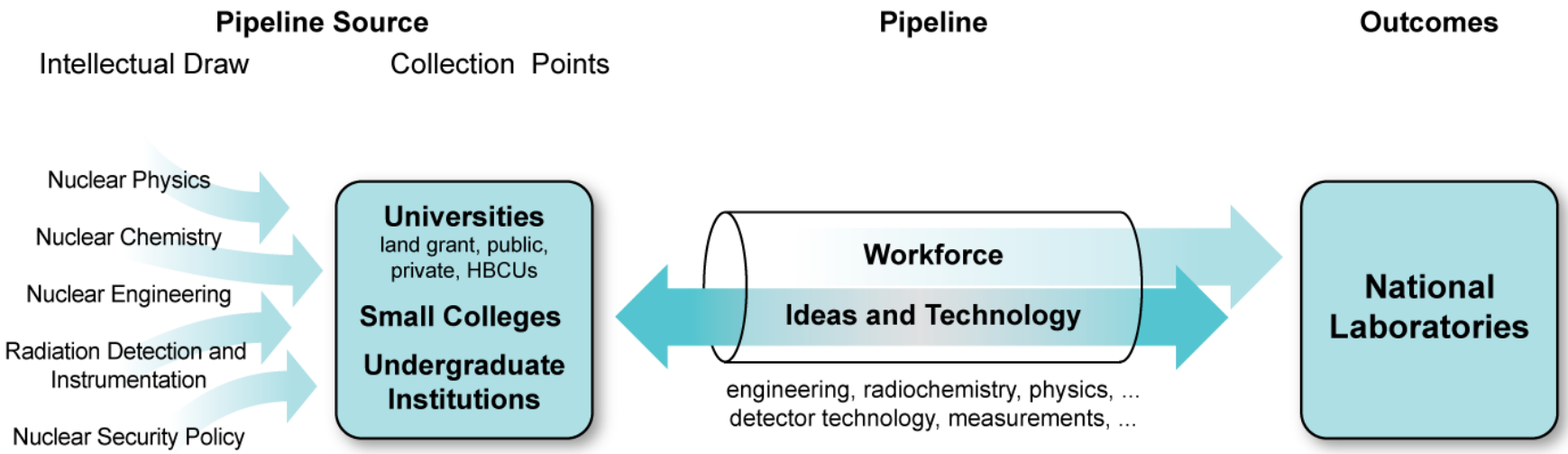
NSSC inauguration June 10, 2011

Goals & approaches of SUCCESS PIPELINE

***S**even **U**niversities **C**oordinating **C**oursework and **E**xperience from **S**tudent to **S**cientist in a **P**artnership for **I**dentifying and **P**reparing **E**ducated **L**aboratory-**I**ntegrated **N**uclear **E**xperts*

- Create a steady-state flow of 30 advanced students per year from top research universities across all relevant nuclear fields
- "End-to-end approach" – recruitment of best undergrads and grads to nuclear research, transition to laboratory & federal jobs, retain
- Recruit broadly, focusing on disciplinary excellence, not necessarily immediate relevance to specific NA-22 problems
- Select those who combine (i) broad perspective, (ii) solid science & engineering foundation, (iii) highly developed specialization

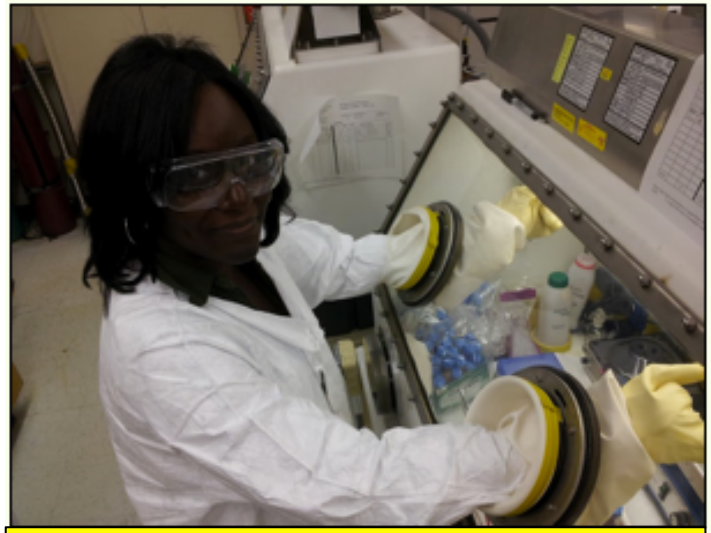
SUCCESS depends critically on exciting research programs and unique facilities



The NSSC supports and draws from institutions deeply invested in truly basic research, including neutrinos!

NNSA added an additional $1.5M for a Minority Serving Institution (MSI) component

- Funds arrived just before summer 2012
- We published a call for NSSC-MSI Summer Research Fellowships
- Four students were accepted and worked at a partner institution
  - Expect to do around 15 next year
- We have just awarded 5 multi-year research grants for MSIs
  - Univ. Texas El Paso, Clark Atlanta, South Carolina State, Hampton, Fisk
  - All about $250K
  - Funding PIs at HBCUs, HSIs, etc. to do collaborative research with NSSC partner institutions
  - To support students, infrastructure, etc.



Brittany Rogers of Alabama A&M worked with Prof. Heino Nitsche at UCB for 8 weeks this summer, learning plutonium chemistry & radiochemical techniques.

The NSSC has enabled high caliber, high visibility activities, such as summer schools

UNLV – Radchem Fuel Cycle School

What Are Your Plans This SUMMER?

Radiochemistry Fuel Cycle SUMMER SCHOOL

WHEN: **June 4 - July 13, 2012**

WHERE: **University of Nevada Las Vegas**

WHO: **Undergraduate students in chemis physics, health physics, or nuclear engineering**

This 6-week summer school focuses on training undergraduates in the fundamentals of radio with an emphasis on the nuclear fuel cycle. Students will receive at least **$ 3,600** for participa program. Travel costs, housing one meal per day are also covered. Visits to national nuclear included. Trips to General Atomics, San Onofre Nuclear Generating Station, and the Nevada planned. The course has morning lectures and afternoon laboratories. Five weeks are devot independent laboratory research projects.

Applicants must be US Citizens. Applications are due by April 3 2012. Twelve students will be participation. Selected applicants will be notified by April 7, 2012 contingent upon funding. requires a statement of interest, resume, transcript (unofficial acceptable) and letter of recor

The program, in its third year, is sponsored by the Department of Energy-Nuclear Energy and the Radiochemistry Program at the University of Nevada Las Vegas.

Full program details and application are available at: http://radchem.nevada.edu/rfcss.html

Basics of Nuclear Reactor Operations
University of California, Irvine
July 9th – July 20th, 2012

The University of California, Irvine (UCI) is pleased to offer an intensive two week summer course in basic nuclear reactor operations that will prepare you with the theoretical and practical training needed to obtain a Nuclear Regulatory Commission (NRC) Reactor Operator's license.

Hands-on Experie

- Nuclear reactor oper
- Radiation detection a
- Nuclear waste separ
- Neutron activation a

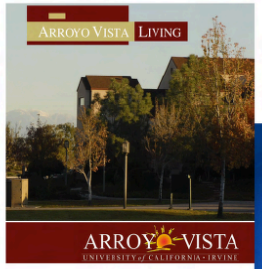
Instructors

- Prof. A. J. Shaka, De
- Prof. Mikael Nilsson, and Materials Scier
- Dr. George Miller, De and Reactor Super

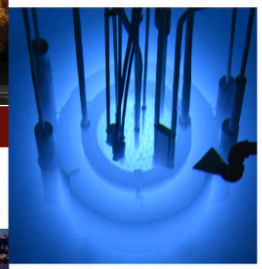
Course Details

Enrollment for up to course, or course mat and transportation, inc accommodations at th (dbl), $51 (sngl) for roo meals a day. Alternati any UC eatery, with th two weeks, although and all labs are within Zip™ Cars With the California climate, you all the basics for pass simulator, a PET sca spectrometer will round

Live...



...learn...



...play.

UC Irvine – Nuclear Reactor Operations

NSSC Summer School in Nuclear Analytical Techniques

UC Davis, June 25 - July 6, 2012

UCDAVIS DEPARTMENT OF PHYSICS

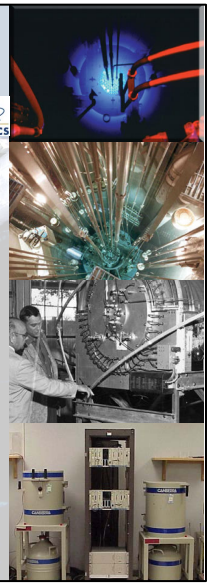
uate and upper-level undergraduate students.
due *May 1* at: http://lux.physics.ucdavis.edu/nssc_summerschool/
ummerschool@physics.ucdavis.edu

Activities:
ctivation Analysis using the MNRC facility
y spectroscopy with High Purity Germanium Detectors
ton scattering at the Crocker Nuclear Laboratory
etector work

Speakers:
athaniel Bowden, Morgan Burks, Kareem Kazkaz
ry)
eau, Kevin Strecker (Sandia National Laboratory)
he, Ben Liu (McClellan Nuclear Research Center)
Daniel Cebra,
e, Robert Svoboda,
athi (UC Davis)

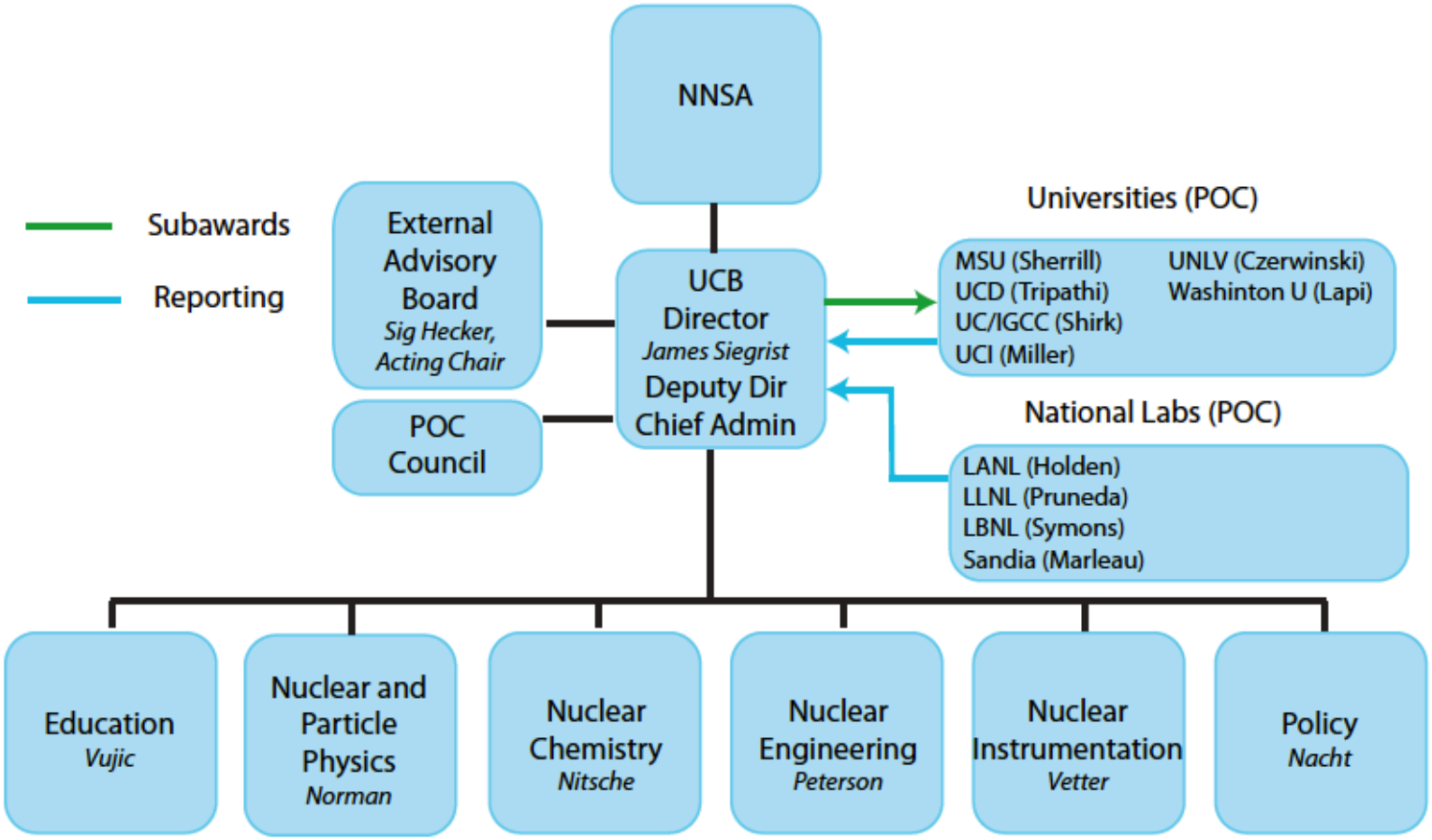
al Contact:
Bob Svoboda
oda@physics.ucdavis.edu
754-9610

Local Organizers:
Bob Svoboda
Mani Tripathi
Dan Cebra
Jim Shackelford
Michael Lerche
Jeremy Mock
Nick Walsh



UC Davis – Nuclear Analytic Techniques

NSSC Organization at Launch



Karl van Bibber appointed as Executive Director, after Jim Siegrist went to DOE
Brad Sherrill (MSU) appointed as Deputy Executive Director
Jay Davis (Hertz Foundation) appointed as Chair of External Advisory Board

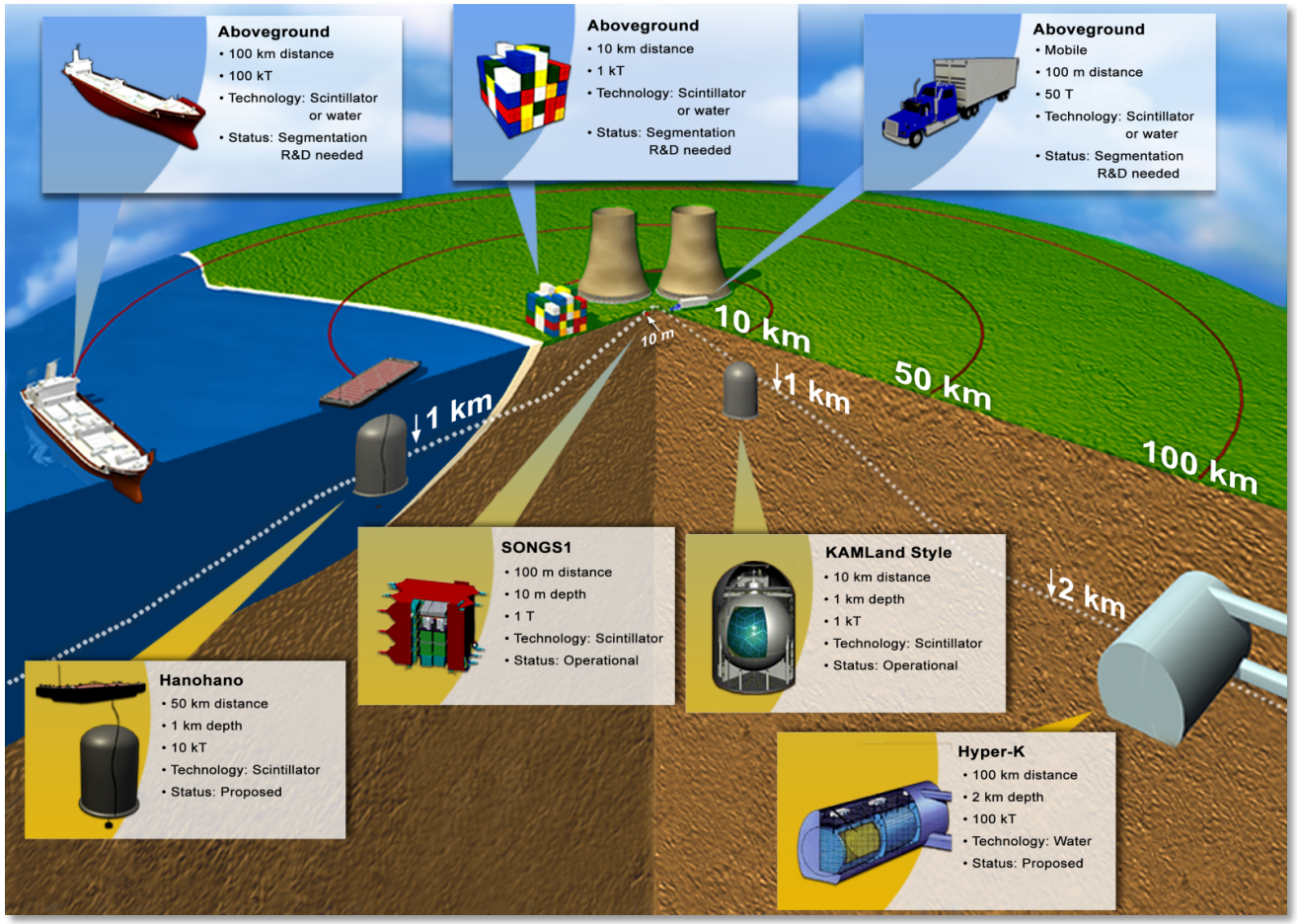
Demographics of our young talent (August 2012)

- Hired in Year I:
  - UGR/Jr. Spec. 18
  - GSR 37
  - Postdoctorals 4
  - MSI Fellows 4
  - **TOTAL 63**
- Data mostly complete
- Drawing from top schools

Educational Background: GSR+PD

Univ. California (all)	10
MIT	3
Univ. Penn.	2
Univ. Mich.	2
Texas A&M	2
Stanford	1
Yale	1
Johns Hopkins	1
Carnegie-Mellon Univ.	1
Purdue	1

NSSC leverages investments of synergistic programs



Tim Shokair (PD)

Sasha Asghari (GSR)

Caleb Roecker (GSR)

Example: NSSC and NA-22 WATCHMAN program parse support for a UC Berkeley postdoc and two grad students – a useful degree of freedom as non-US citizens cannot be funded by the NSSC, but can by the project.

Summary and Concluding Remarks

- Nuclear Engineering regularly reinvents itself, assuring its relevance, vitality and appeal to top young talent.
- There is currently strong interest in nuclear science and engineering among versatile and well-prepared US students.
- The NSSC represents a successful NNSA initiative to recruit, train and transition this talent to the non-proliferation mission.
- We are off to a good start, but the 'end-game', i.e. hand-off to the laboratories is still in its early phases, a work-in-progress.
- The MSI call elicited a great response, but DOE consolidated its MSI programs recently, and it is unclear whether we will be able to issue another one.

Many thanks to NNSA & we expect great things from our grads!

Follow us at **nssc.berkeley.edu**

Nuclear news nationally

Faculty, students, alums

Job opportunities

Funding competitions

Seminars, workshops

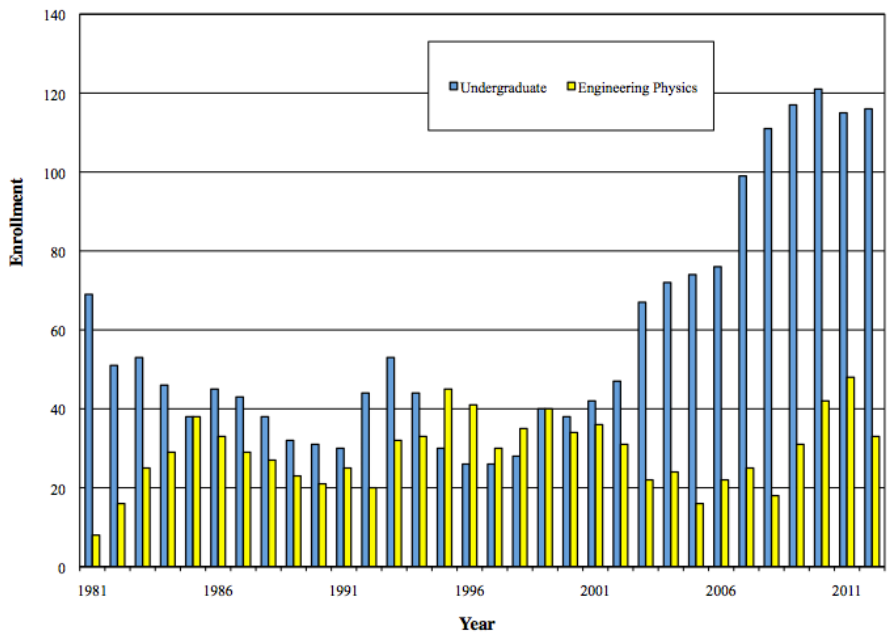
Summer schools

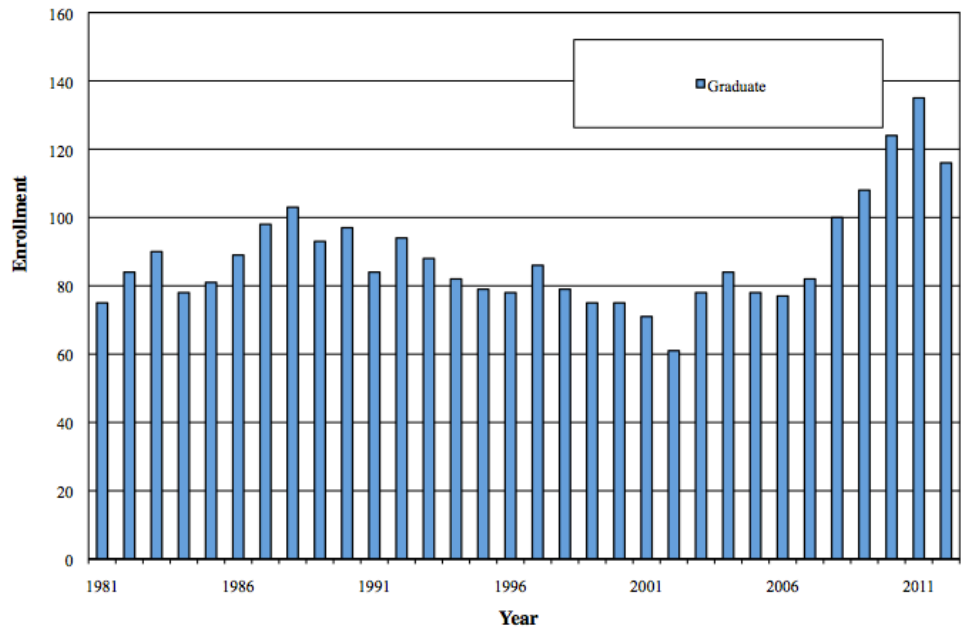
Monthly webinars

Links to similar centers

Backup Slides

Nuclear ST&E is a very hot field – application pressure from top American students is overwhelming

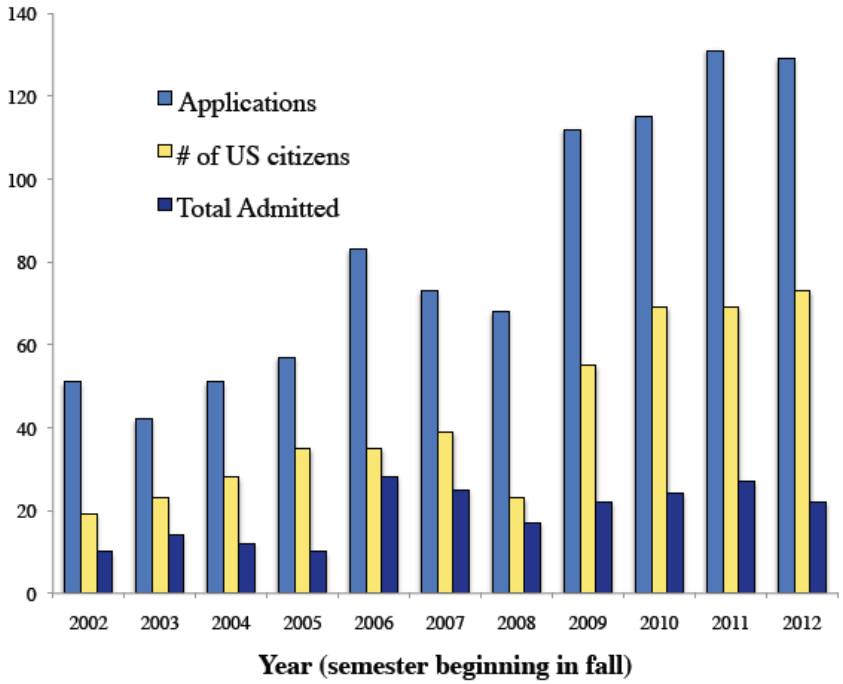


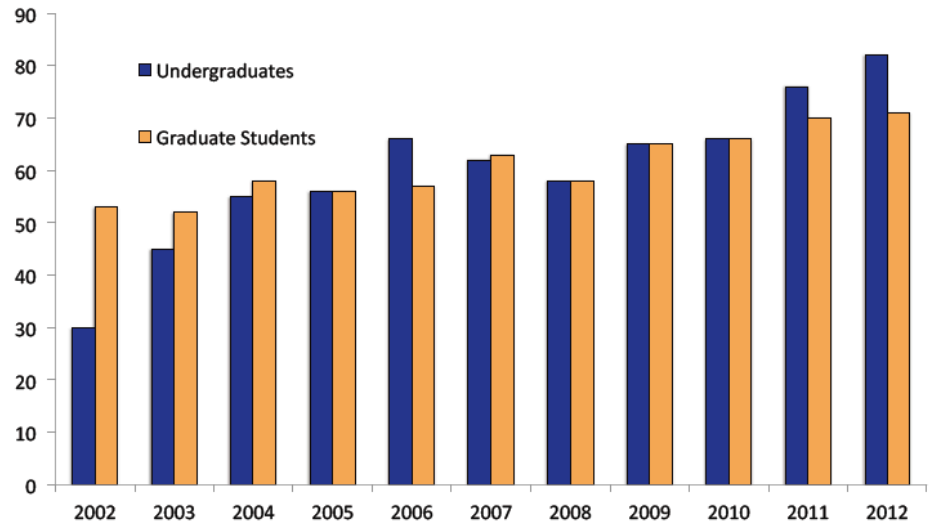


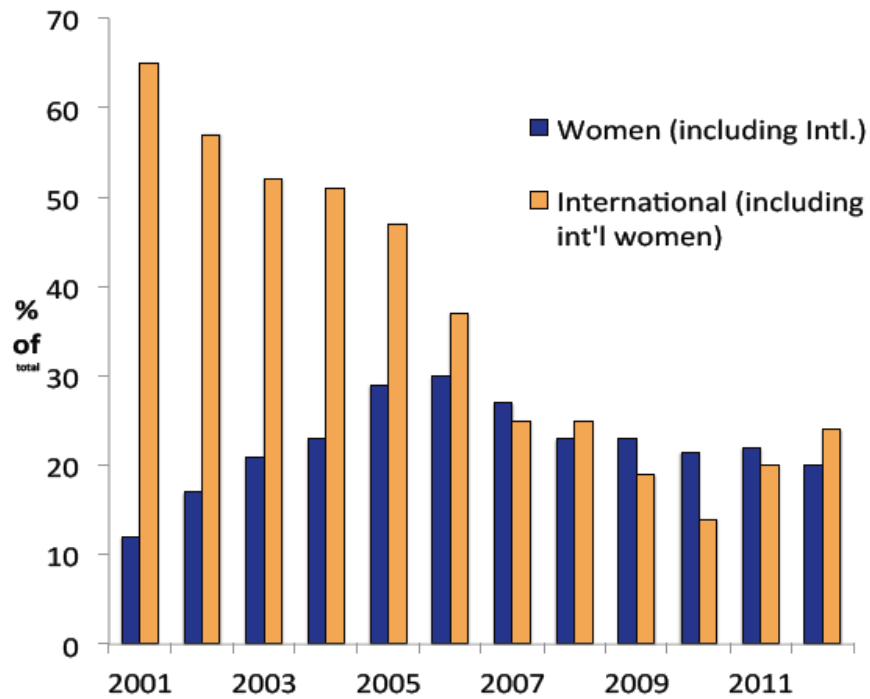
National phenomenon – this is University of Michigan

- Inflection-point everywhere was 9/11
- Growth largely undeterred by Fukushima
- Students resonate with holistic approach to nuclear
- Most programs, UC too, are broad & getting broader

UC Berkeley NE Demographics







Same picture, but University is not allowed unbounded growth & that puts back-pressure on NE department

Management team: current composition

Central Team

PI:	Jasmina Vujic
Exec. Dir.:	Karl van Bibber
Deputy ED:	Brad Sherrill
Administrator:	Alina Sari
RSO:	Derek Johnson

Lab POCs

LBNL:	James Symons
LANL:	Morag Smith
LLNL:	Annie Kersting
SNL:	Craig Tewell
PNNL:	Alma Contrearas

Focus Area Leaders

Physics:	Eric Norman
Instrum:	Kai Vetter
Engineering:	Per Peterson
Chemistry:	Heino Nitsche
Policy:	Michael Nacht
Education:	Jasmina Vujic

University POCs

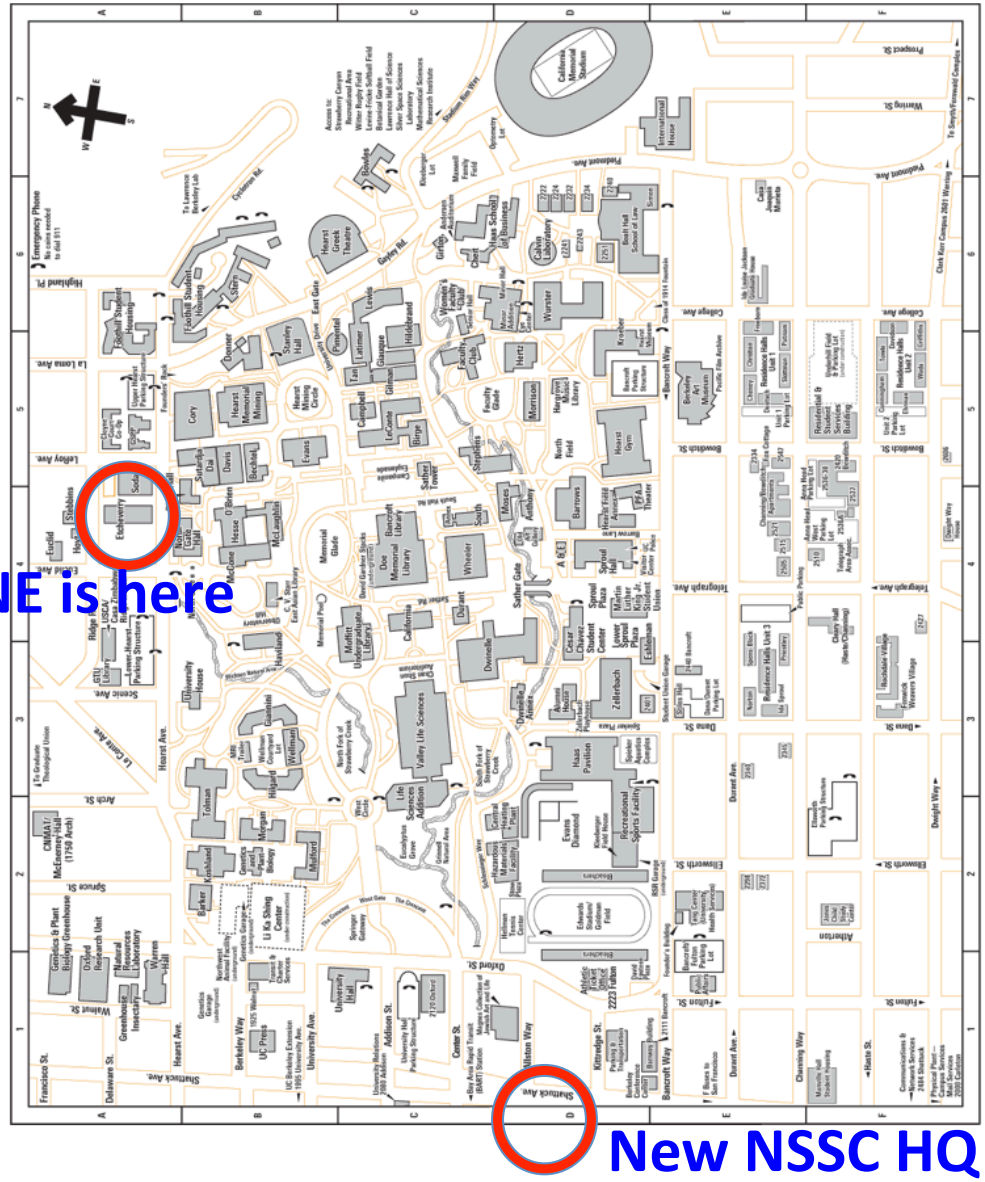
UC Davis:	Mani Tripathi
UC Urvine:	George Miller
UCSD/IGCC:	Tai Ming Cheung
UNLV:	Ken Czerwinski
Wash. Univ.	Suzanne Lapi
MSU:	Michael Thoennessen

NNSA NA-221

Program director:	Col. Dave Lagraffe
Contracts monitor:	Erwin Fragua

Move of the NSSC to 2150 Shattuck

- NSSC was the straw that broke the camel's back for NE
- We moved to the Chase Bldg. (UCB rents >50% of 13 floors)



Student		Position	Mentor	Pursuing		Status	Previous Institution

UNIVERSITY OF CALIFORNIA - BERKELEY

Thomas	Keenan	Jr. Specialist	Rick Norman				
Wang	Barbara	Graduate Student	Rick Norman	Nuclear Engineeri	Ph.D.	Sixth Year	University of Georgia, Athens
Yee	Ryan	Graduate Student	Rick Norman	Nuclear Engineeri	Ph.D.		Queen's University
Dixon	Alex	Undergraduate	Rick Norman	Nuclear Engineeri	B.S.	Graduated UCB, Dec. 2011	
Meyer	Ross	Undergraduate	Rick Norman	Nuclear Engineeri	B.S.	Fourth Year	
Sabella	Jordan	Undergraduate	Rick Norman	Nuclear Engineeri	B.S.	Third Year	
Czeszumska	Agnieszka	Graduate Student	Rick Norman	Nuclear Physics	Ph.D.		B.S. UCB Physics
Munson	Justin	Graduate Student	Rick Norman	Nuclear Engineeri	Ph.D.		University of Missouri, Rolla
Hogan	Daniel	Graduate Student	Kai Vetter/Jim Siegri	Particle Physics	Ph.D.	Fourth Year	University of Kansas
Iyengar	Anagha	Undergraduate	Rick Norman	Nuclear Engineeri	B.S.	Graduated UCB May 2012	Enrolled Ph.D. prog at U. Tenn.
Uribe	Eva	Graduate Student	Heino Nitsche	Nuclear Radiochei	Ph.D.	Second Year	Yale University
Rice	Adam	Graduate Student	Heino Nitsche	Nuclear Chemistry	Ph.D.	Second Year	Carnegie Mellon University
Jones	Stephen	Undergraduate	Heino Nitsche	Chemistry	B.S.	Fourth Year	
Crabbs	Robert	Graduate Student	Kai Vetter	Nuclear Engineeri	Ph.D.	Third Year	B.S. UC Berkeley, Physics
Ready	John	Graduate Student	Kai Vetter	Nuclear Engineeri	Ph.D.	Third Year	B.S. Cal State Sacramento
Folsom	Micah	Undergraduate	Kai Vetter	Nuclear Engineeri	B.S.	Graduate UCB May 2012	
Curtis	Joseph	Graduate Student	Kai Vetter	Nuclear Engineeri	Ph.D.	First Year	B.S. UC Berkeley, Nuclear Eng. 2011
Roecker	Caleb	Graduate Student	Kai Vetter	Nuclear Engineeri	Ph.D.	Second Year	B.S. Purdue
Bates	Cameron	Graduate Student	Kai Vetter	Nuclear Engineeri	Ph.D.	Third Year	B.S. University of Michigan
Negut	Victor	Jr. Specialist	Kai Vetter	Physics	--	--	B.S. UC Berkeley, 2012
Pavlovsky	Ryan	Graduate Student	Kai Vetter	Radiation Detectic	Ph.D.	Second Year	Tennessee Technological University
Schuster	Patricia	Graduate Student	Kai Vetter/Stan Prus	Nuclear Engineeri	Ph.D.	Second Year	University of Michigan
Bergmann	Ryan	Graduate Student	Jasmina Vujic	Reactor Physics	Ph.D.	Fourth Year	MS and BS in nuclear engineering from MIT.
Fisher	Noah	Undergraduate	Jasmina Vujic	Nuclear Engineeri	B.S.	Graduated UCB 2012	
Brown	Josh	Undergraduate	Jasmina Vujic/Bethany				
Daub	Brian	Postdoc	Karl van Bibber	Nuclear Engineeri	Postdoc	First Year	B.S. Carleton College - Physics, Ph.D. MIT - Nuclear Physics
Adams	Nick	Graduate Student	Stan Prussin/Michae	Nuclear Engineeri	MS/MPP	Second Year	UC San Diego
Ahn	Natalie	Graduate Student	Michael Nacht	Goldman School c	Ph.D.	First Year	B.A. Stanford, Int'll Rel & min. CS, 2004, M.A. JHU, Int'l, 2006

UNIVERSITY OF CALIFORNIA - DAVIS

Grant	Chris	Postdoc	Mani Tripathi				
Ott	Rich	Postdoc	Mani Tripathi	Nuclear Physics	Postdoc	First Year	Ph.D. at MIT, and my B.S. at U of Maryland, College Park
Dresser	Charles	Graduate Student	Mani Tripathi	Electrical Enginee	Masters	First Year	CSU Sacramento, B.S. in Physics
Mock	Jeremy	Graduate Student	Mani Tripathi	Physics	Ph.D.	Fifth Year	B.S. in physics from Case Western Reserve University
Uvarov	Sergey	Graduate Student	Mani Tripathi	Physics	Ph.D.	Fourth Year	B.S. in physics from UC Davis
Walsh	Nick	Graduate Student	Bob Svoboda	Physics	Ph.D.	Fifth year	College of William and Marry
Fyhrie	Adalyn	Undergraduate	Mani Tripathi	Physics	B.S.	Third Year	
Mehciz	Burton	Graduate Student	Manuel Lagunas-Sol	Electrical Enginee	Masters	First year	UC Davis
Barberie	Sean	Undergraduate	Mani Tripathi	Physics	B.S.	Third Year	

Student		Position	Mentor	Pursuing		Status	Previous Institution
UNIVERSITY OF CALIFORNIA - IRVINE							
Lastra	Stacey	Graduate Student	A.J. Shaka	Nuclear Forensics	Masters	Second year	Kansas Wesleyan University
Nee	Ko	Graduate Student	Mikael Nilsson	Chemical Enginee	Ph.D.	Fourth year	UC Davis
MICHIGAN STATE UNIVERSITY							
Kohley	Zach	Postdoc	Michael Thoennesse	Physics	Postdoc	Second Year	B.S. Chem., Hillsdale College, Ph.D. Phys. Chem, Texas A&M
Smith	Jenna	Graduate Student	Michael Thoennesse	Nuclear Physics	Ph.D.	Fourth Year	Rhodes College
Suchyta	Scott	Graduate Student	Sean Liddick	Nuclear Chemistry	Ph.D.	Third Year	The Ohio State University
Morse	Chris	Graduate Student	Brad Sherrill	Nuclear Physics	Ph.D.	Third Year	Westmont College
Larson	Nicole	Graduate Student	Sean Liddick				
Stroberg	Ragnar	Graduate Student	Sean Liddick				
Abromeit	Brittany	Undergraduate	Sean Liddick				
WASHINGTON UNIVERSITY							
Bartels	Jennifer	Postdoc	Suzanne Lapi	Radiological Chem	Postdoc	First Year	Ph.D. O. Chem, Wash U. 2012, BS Chem TAMU Corpus Christi 2006
Mastren	Tara	Graduate Student	Suzanne Lapi	Nuclear Chemistry	Ph.D.	Third Year	Maryville University
Wooten	Lake	Graduate Student	Suzanne Lapi	Biomedical Engine	M.S., Ph.D	Fourth Year	B.S. Eng. Phys., B.S.Aero Eng., Minor Physics at U. Kansas
UNIVERSITY OF NEVADA – LAS VEGAS							
Faye	Sherry	Graduate Student	Ken Czerwinski	Radiochemistry	Ph.D.	Fourth Year	B.S. Physics SUNY Oswego
Droessler	Janelle	Graduate Student	Ken Czerwinski	Radiochemistry	Ph.D.	Third year	B.S. Chem & B.A. Multidisc. Studies: Forensic Science, UNLV
Campbell	Keri	Graduate Student	Ken Czerwinski	Radiochemistry	Ph.D.	Third Year	UNLV (mathematics)
McLain	Derek	Graduate Student	Ken Czerwinski	Radiochemistry	Ph.D.	Second Year	B.S. in Chemistry at University of Wisconsin-Milwuakee
Huggins	Michael	Undergraduate	Ken Czerwinski	Chemistry	B.S.	Senior, Graduation Date: Dec. 2012	
Sneed	Daniel	Undergraduate	Michael Pravica	Physics	B.S.	Third year	
Robinson	John	Undergraduate	Michael Pravica				
Hulsey	Brent	Undergraduate	Michael Pravica	Physics/Hipsec	B.S.	Fourth Year	
Dieguez	Sergio	Undergraduate	Michael Pravica	Physics	B.S.	Final Year	
Smith	Quinlan	Graduate Student	Michael Pravica	Physics	Ph.D.		California Lutheran University