

CSU Major Institutional Grants

Moderated by:

Dr. Frank A. Gomez
Executive Director, STEM-NET
Office of the Chancellor



Speakers

Kimberley Cousins and Timothy Usher, CSU San Bernardino
Center for Advanced, Functional Materials at CSUSB

Arturo Pacheco-Vega, Cal State LA
CREST Center for Energy and Sustainability at Cal State LA

Keith Trujillo, California State University, San Marcos
CUREs Working with the Division of Training, Workforce Development, and Diversity (TWD) at
NIGMS: Changes and Opportunities in the Alphabet Soup

Alexander Rudolph, Cal Poly Pomona
Structure- Cal-Bridge: A CSU-UC Partnership Engaging Underrepresented Students in STEM

Lisa Hammersley, Sacramento State
The California State University Louis Stokes Alliance for Minority Participation (CSU-LSAMP): A
Collaborative, Comprehensive Approach to Broadening Participation in STEM

Nicholas Kioussis, CSU Northridge
PREM – Computational Research and Education for Emergent Materials

CREST Center for Advanced Functional Materials at CSUSB

Kimberley Cousins and Timothy Usher – CSU San Bernardino

Collaborators: At CSUSB: Physics - Sara Callori, Paul Dixon; Chemistry & Biochemistry Douglas C. Smith, Renwu “John” Zhang. External: UNL MRSEC, UB Zurek group, NASA-Armstrong, COD, VVC



Kimberley Cousins, Professor of Chemistry & Biochemistry

Timothy Usher, Professor of Physics

kcousins@csusb.edu; tusher@csusb.edu

<https://www.csusb.edu/center-advanced-functional-materials>



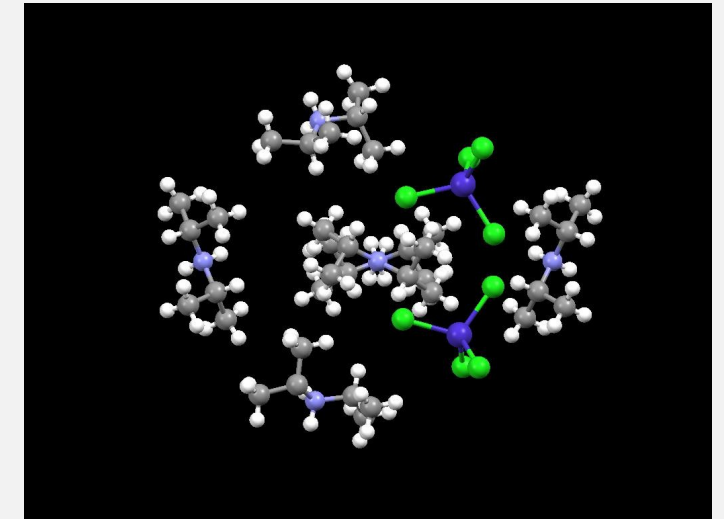


Project Overview

- NSF- CREST I: 2013 – 2020 \$5M #1345163; CREST II: 2020 – 2025 \$5M.
“ ... enhance the research capabilities of minority-serving institutions ...”
- Started with core team (Cousins, Smith, Usher) with prior smaller grant from DoD - HBCU/MSI 538k. # W911NF1210080 2012 – 2015.
- Interdisciplinary & student focused from inception: value of quality undergraduate research in changing students’ lives and pathways
- **Vision statement:** *from CREST II proposal*
- The Center for Advanced Functional Materials will support the development of new materials with interesting properties, and promote understanding of structure/function relationships in a range of functional materials. At the same time, we will promote educational and professional development opportunities for faculty and students on multiple sites, enhancing the quality of the experience and progress through synergistic collaboration.

Activities

- Primary research emphasis for CREST I: Organic ferroelectric materials
 - Expanded to inorganic thin films and applied systems
 - Computation \leftrightarrow synthesis \leftrightarrow experiment
- Academic year and summer research at CSUSB
 - Including Upward Bound HS students and COD community college students/faculty
 - Group/supergroup/leadership meetings and frequent individual interaction between groups
- Winternships at community colleges: VVC and COD
- CSUSB students travel to UB Chemistry and UNL Materials for summer research
- Grad students from UB Chemistry and UNL Materials visit CSUSB for a quarter
- CSUSB & VVC students travel to NASA Armstrong for the summer
- Reciprocal partner site faculty visits



Results



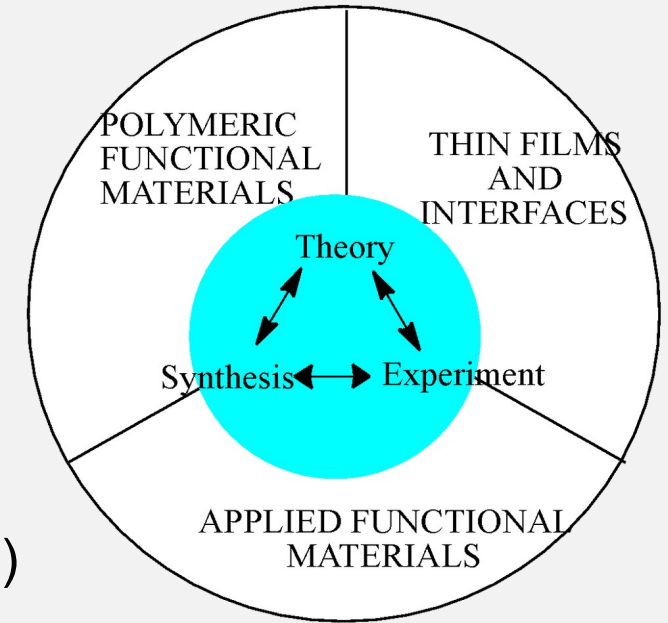
- 13 publications since 2015 (h-index 4) *about double baseline efficiency*
- 2 provisional patents and one patent pending
- Four novel crystalline materials + new thin films; demonstrated activity in several known materials
- Needs analysis for MS Materials Science degree program—program under development
- Additional grants awarded:
 - **Two** NSF-Major Research Instrumentation awards
 - **Three** CREST supplements
 - 3 XSEDE allocations
 - ancillary: Multi-institutional **S-STEM** grant for Community College transfer pathway (Cousins PI)
- 118 CSUSB student participants (plus 138 Community College and 25 High school)
- 74 CSUSB CAFM graduates; 36 in graduate programs

Lessons Learned

- Administrative support:
 - Sufficient administrative support is essential; Sufficient space an issue
 - Support staff (coordinator/director) essential
 - Assigned time/summer support for faculty essential for research progress in the CSU
- Collaboration:
 - Personal “exchange particles” important for remote collaborations
 - Interdisciplinary perspective valuable in solving problems
 - Collaborations with others extremely benefaction
- Students:
 - Trade off between encouraging good students to pursue external opportunities and research progress with undergraduates
 - CREST students much more successful than similar non-research students at CSUSB
 - Community college students and faculty really want research opportunities

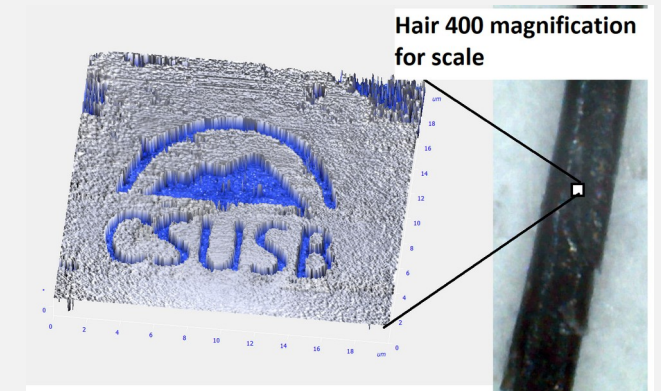
Next Steps/Long-Term Plans

- CREST Phase II: Feb 1, 2020-Jan 31 2025 (NSF#1914777)
- New competition, not simply a renewal
- New Hires in Chemistry/Physics to expand team
- MS Materials Science (professional internship + research tracks)
- NSF-IRES proposal pending
- *Crest II additional Collaborators: NIST, San Bernardino Valley College, Cal Poly Pomona (Stieber group)*
- Seek continued support: individual investigator grants, NSF-PREM and interdisciplinary programs



Summary

- **Collaboration is productive and rewarding**
 - Find talented people you can work with
- Institutional grants require faculty champions *plus* administrative support & buy-in
 - Additional funding often follows
 - Keep applying (0% chance of funding for proposals not submitted)
- Programs like CREST are *life-changing* for first generation students (and the faculty who teach them)
 - Student confidence and competencies greatly improved
- *Institutional Change* is a key component to success and sustainability
- How can STEM-Net and the System help individual campuses? (for example, patent application infrastructure)





CAL STATE LA
CALIFORNIA STATE UNIVERSITY, LOS ANGELES

CREST Center for Energy and Sustainability



CREST Center for Energy and Sustainability at Cal State LA

Arturo Pacheco-Vega – Cal State LA

Collaborators: Feimeng Zhou, Frank A. Gomez, Matthias Selke and Guo-Meng Zhao

Arturo Pacheco-Vega, Professor

Department of Mechanical Engineering

apacheco@calstatela.edu

<http://ceas.calstatela.edu/index.cfm>



Project Overview

- NSF CREST - CEaS: phase I: 2008 - 2016; phase II: 2016 – 2021 (\$10M total)
- **Mission:** Conduct transformative research to promote energy diversity, efficiency, and sustainability while training diverse and talented engineers and scientists to catalyze change in this field
- **Research Thrust Areas (phase I):** 4 areas
 - Fuel Cells
 - Photovoltaics
 - Combustion
 - Carbon Sequestration
 - Education and Outreach
- **Supplements (phase I):** 3 projects
 - Modeling and Simulation
(Became new research component)
 - Development of Absorption Spectrometer for Combustion
 - Structural Insulation Panel



Project Overview

- **Phase II:**

- **Research Thrust Areas:** 3 areas

- Microfluidic-based Fuel Cells and Optimization
 - Advanced Materials for Photovoltaic Cells
 - Superconducting materials for energy applications
 - Education and Outreach

- **Supplements:** 3 projects

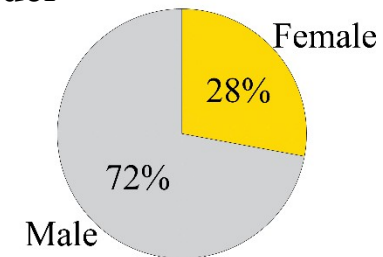
- Solid State Supramolecular Crystals for Photovoltaic Cells
 - Development of Clean Power Technologies
 - Development of Sustainable Water Management Technologies

- **People Involved:**

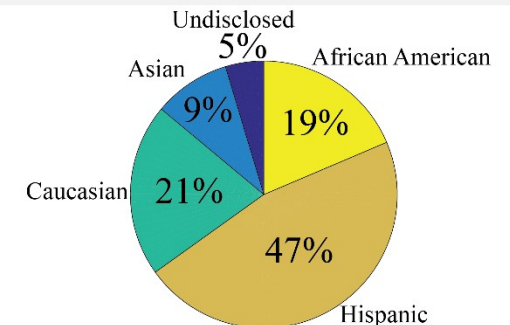
- Faculty: 11 (original grant) + 9 new members
 - Departments: 8 departments (2 colleges)
 - Staff: 1 project coordinator, 1 program assistant, 1 student assistant, 3 post-doctoral associates
 - Students: 43 total (21 have graduated)

- **Student Demographics:**

Gender



Ethnicity



Arturo Pacheco-Vega

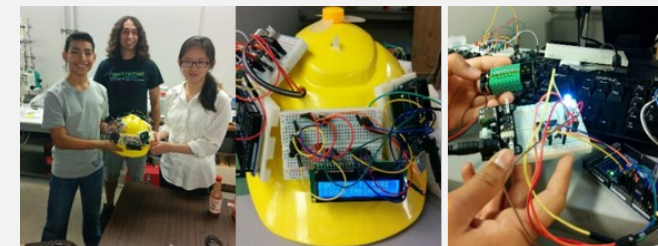
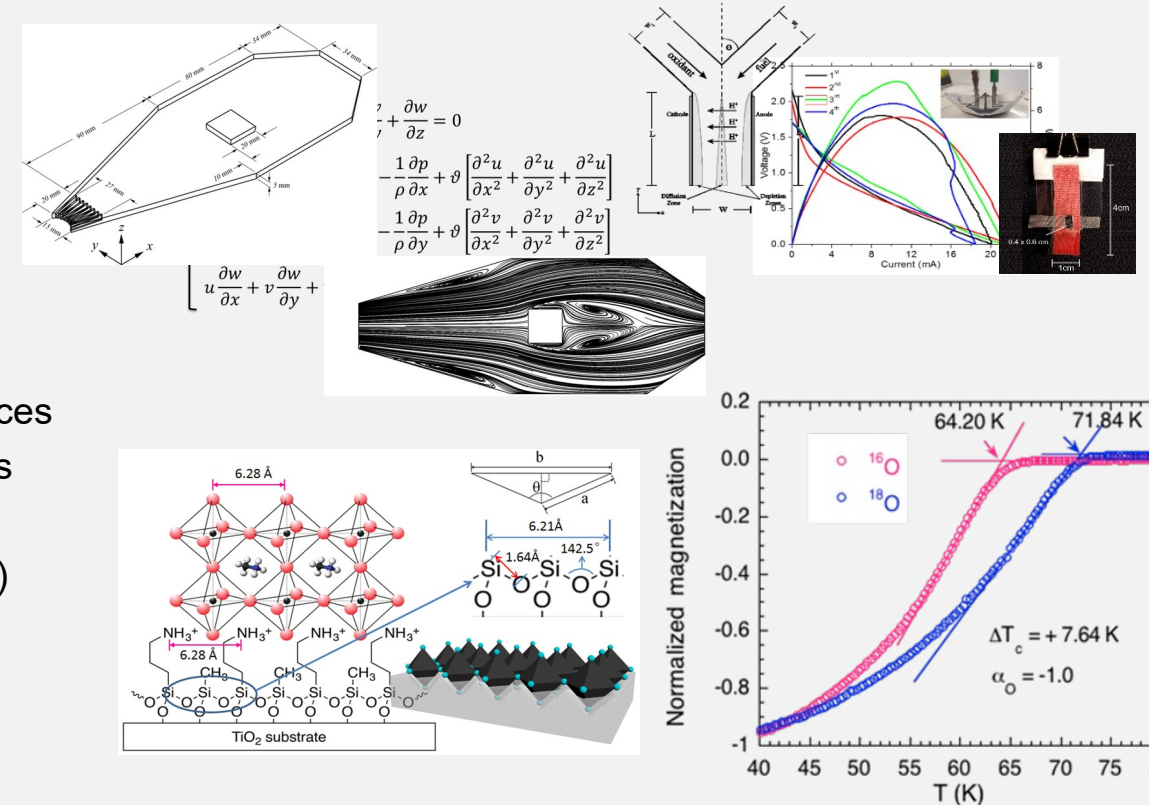
Cal State LA/Department of Mechanical Engineering

apacheco@calstatela.edu



Activities

- Primary research emphasis for CEaS phase II:
 - Experiments and modeling of membraneless and paper-based microfluidic FCs and batteries
 - Experimental work on advanced materials for photovoltaic devices
 - Low-temperature experiments to test superconducting materials
 - Modeling and Simulation of a variety of energy systems
 - Education and Outreach (on-campus and community - BOOST)
- Long-year research at CEaS
 - Research carried out in individual labs
 - Periodic leadership and CEaS meetings
- Summer research at CEaS
 - Including Upward Bound HS students and ELAC community college students (collaboration with USC)
- Seminar series and workshops



Arturo Pacheco-Vega

Cal State LA/Department of Mechanical Engineering

apacheco@calstatela.edu



Results

- Average number of publications: 29 per year (4 times of baseline)
- 112 students directly supported/involved in research (phases I and II)
 - 54% pursued MS and/or PhD degrees
 - 46% onto Industry
- April 2016 – January 2020 (phase II only)
 - 2 books; 4 book chapters; 54 journal publications
 - 26 conference proceedings; 30 presentations, 8 theses
- Developed novel micro-fuel cells and batteries; novel materials to increase efficiency in solar-electric energy conversion; new models of complex thermal systems (fractional order models)



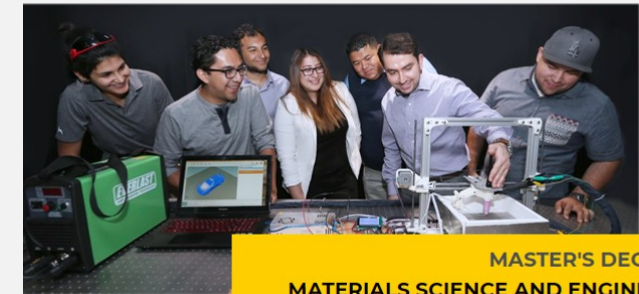
Arturo Pacheco-Vega, Cal State (fractional order models) *Applied Engineering*

apacheco@calstatela.edu



Results

- Institutionalization of Seminar in Interdisciplinary STEM Research
- Creating and Institutionalizing of an MS Degree in MSE
 - Institutionalized in Fall 2018, first cohort Fall 2019
- Total of 34 external grants including phases I and II (~ \$14 M), including three partnership supplements and two MRIs
- Outreach to over 500 middle school students
- 50 college students involved in summer research
- 40 high school students involved in summer research



COLLEGE OF ENGINEERING, COMPUTER SCIENCE, & TECHNOLOGY

NSF-CREST center for energy and sustainability

SEMINAR ENGR 4970
in interdisciplinary STEM research

Jan. 24 - May. 8

FRIDAY 1-2 pm ROOM E&T A-126 GRADING Credit/no Credit

Overview:
This course is designed for students, faculty, and others to present research findings in seminar format.

Course objective:
To provide a global perspective on the state of the art STEM research, and professional development, by promoting discussion of current topics in research and engineering by guest lecturers and staff members.

Refreshments for attendees will be provided before each seminar talk. Please contact (323) 343-5399 with questions or concerns.

CAL STATE LA COLLEGE OF ENGINEERING, COMPUTER SCIENCE, & TECHNOLOGY

MS IN MATERIALS SCIENCE AND ENGINEERING
APPLICATION PERIOD: OCTOBER 1, 2019 - MARCH 16, 2020

MS in Materials Science & Engineering (MSE) is an interdisciplinary program providing a rigorous education in the fundamentals of both Science and Engineering of Materials. The curriculum covers the structure, properties, processing, and performance of materials.

PROGRAM HIGHLIGHTS

- Great opportunities for involvement in MSE research with faculty from various departments
- Fellowships and paid research opportunities
- Access to cutting edge research facilities in the College of Engineering, Computer Science, and Technology (ECST) and the College of Natural and Social Sciences (NSS)
- Opportunity to publish results of research with faculty renowned in their fields
- Pipelines for pursuit of Ph. D.
- Mentoring for success in academia or industry
- Conveniently located near downtown Los Angeles accessible by major freeways

CAREER BENEFITS

- Prepared for industrial or governmental positions
- Gateway to a Ph.D. program in MSE
- Equipped with advanced knowledge of MSE topics
- Equipped to work towards solving environmental challenges through innovations in MSE

RESEARCH PROJECTS & LABS

- Nanomaterials and Nanomechanics
- Additive Manufacturing (3D Printing)
- Computational Materials Science
- Biomaterials
- Semiconductors and Electronic Materials
- Superconductivity and Magnetism
- Fuel Cells, Batteries, and Renewable Energy
- Metallurgy
- Graphene and Carbon Nanotubes

APPLICATION & ADMISSION

Please visit the link or scan the QR code to access the MS program application. Contact MSE-ECST@calstatela.edu with questions. www.calstatela.edu/ecst/mse/admission

MSE

Arturo Pacheco-Vega

Cal State LA/Department of Mechanical Engineering

apacheco@calstatela.edu



Lessons Learned

- Administrative support:
 - Administrative support is very important in order to successfully operate CEaS
 - Staff is essential for operations: (1) Program coordinator, (2) Communications and outreach staff member
 - Research progress is established upon faculty assigned time and summer support
 - Important to incentivize faculty to submit proposals
- Collaboration:
 - Internal and external collaborations are necessary to advance research
 - Leverage CREST-CEaS funds to successfully obtain other extramural funds
 - Development of a strategic plan to sustain CREST CEaS after NSF funding ends
 - Increase efforts to nurture and foster early-career faculty
- Students:
 - Build a pathway for undergraduate students to become CREST –CEaS graduate students

Arturo Pacheco-Vega

Cal State LA/Department of Mechanical Engineering

apacheco@calstatela.edu



Next Steps/Long-Term Plans

- CREST CEaS Phase II: April 1, 2016 – March 31, 2021
- Continue to work toward Institutionalization of CEaS
- Continue work toward developing CEaS as a leading research entity for energy-related challenges in the country



Summary

- Collaborative efforts are very important to achieve success in the CSU, and require:
 - Finding the right people to work and build synergy
 - Enough administrative interest to garner support for the effort
- Institutional grants require leaders both faculty and administration
 - Seek for additional funding based on research interests, people and synergy
 - Collaborate with other institutions to increase opportunities (STEM-NET can be a vehicle)
- CREST, PREM, LSAMP and similar programs are essential to increase the opportunities of talented URM students to succeed in STEM fields
- *Institutional support* is a key component to success and sustainability



Working with TWD at NIGMS

Working with TWD at NIGMS: Changes and Opportunities in the Alphabet Soup

Keith A. Trujillo – CSU San Marcos



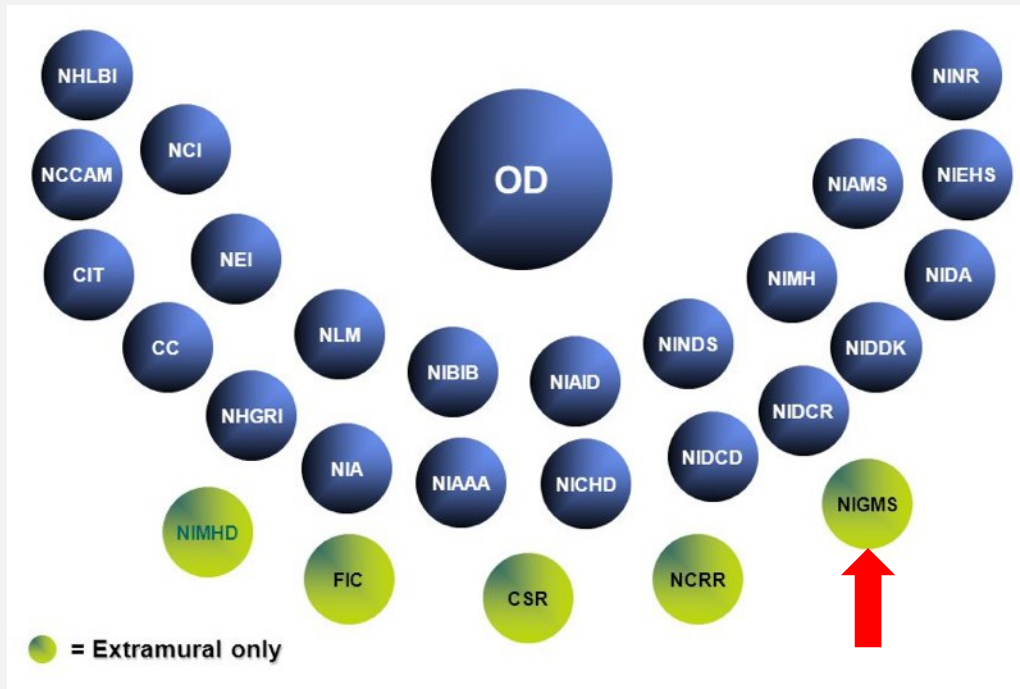
Keith A. Trujillo, Professor

Department of Biology, Office for Training, Research and Education in the Sciences
(OTRES)

keith@csusm.edu

Project Overview

- Undergraduate research training opportunities at NIH



- NIH: 27 Institutes and Centers
 - Many opportunities for funding training
- **National Institute of General Medical Sciences (NIGMS)**
 - Longtime source of funding for increasing diversity in biomedical and behavioral sciences

Keith A. Trujillo

CSU San Marcos

keith@csusm.edu

Project Overview

- Undergraduate research training opportunities at NIGMS

Division of Biophysics, Biomedical Technology, and
Computational Biosciences

Division of Genetics and Molecular, Cellular, and Developmental
Biology

Division of Pharmacology, Physiology, and Biological Chemistry

Division for Research Capacity Building

Division of Training, Workforce Development, and Diversity

- NIGMS 5 Divisions
 - Training, Workforce Development and Diversity (TWD)
 - “...supports programs that foster research training and the development of a strong and diverse biomedical research workforce.”
- Undergraduate programs
 - RISE, MARC, Bridges, PREP

Keith A. Trujillo

CSU San Marcos

keith@csusm.edu

Activities

- CSUSM funded by NIGMS TWD for nearly 20 years

- Focus on juniors and seniors

- Prepare for PhD in biomedical sciences

- MARC – Maximizing Access to Research Careers (T34)
- RISE – Research Initiative for Scientific Enhancement (R25)

- **Goal:** “...to increase the nation's pool of students from **underrepresented groups** who have the research experience and science preparation to matriculate and succeed in **biomedical Ph.D. programs.**”

Keith A. Trujillo

CSU San Marcos

keith@csusm.edu

Francisco Fernandez, Harvard



Activities

- CSUSM funded by NIGMS TWD for nearly 20 years
 - Focus on freshmen and sophomore CC students
 - **Bridges to the Baccalaureate (T34)**
 - Facilitate transfer of community college students to 4-year universities
 - Partner with Palomar and MiraCosta (Dr. Denise Garcia, PI)
 - **Goal:** “...to prepare a **diverse cohort** of community college students to transfer to and complete a bachelor's degree in **biomedical research fields.**”

Sharon Patray, Johns Hopkins



Activities

- Changing landscape at NIGMS TWD
 - MARC now reserved for research-intensive institutions
 - Most CSUs no longer eligible
 - Because of changes less money available for training at CSUs
 - **U-RISE (T34) replaces RISE**
 - Reserved for non-research-intensive institutions
- **Goal: “...to diversify the pool of students who complete a Ph.D. degree in biomedical research fields.”**



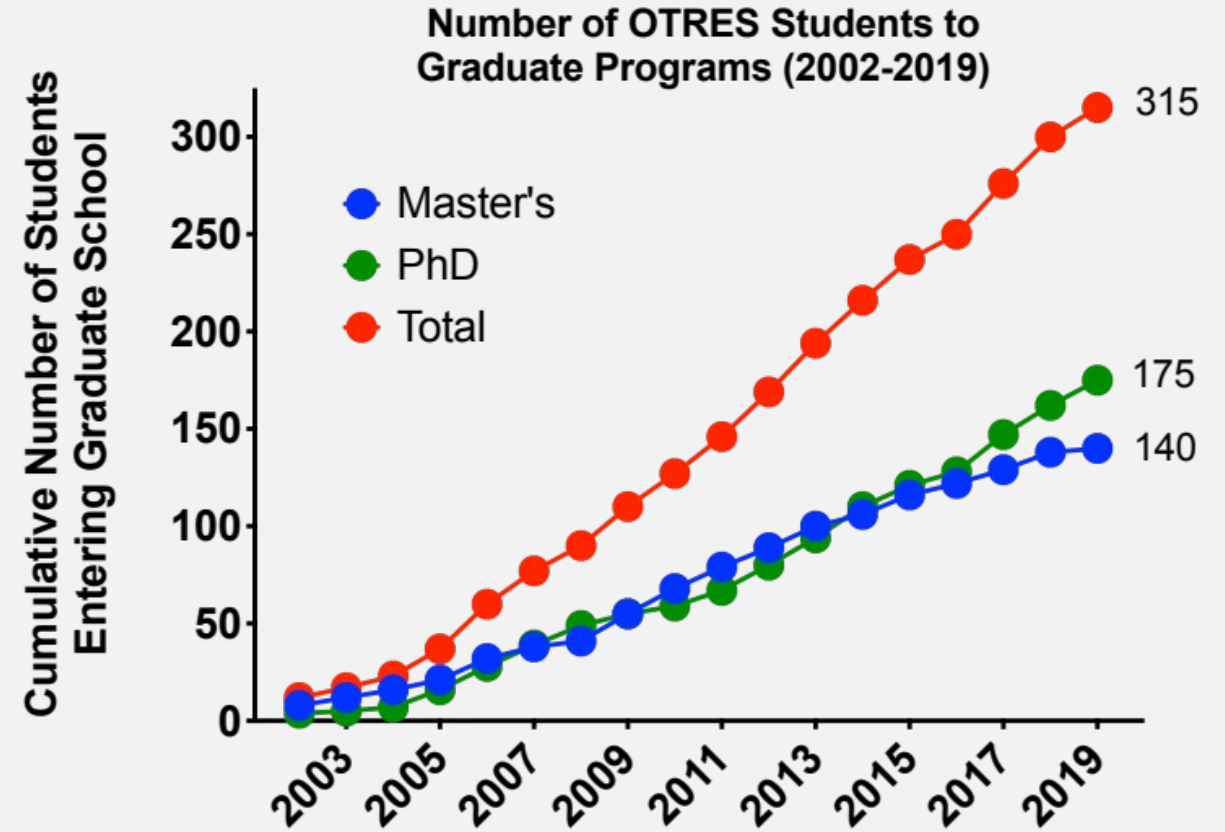
Results

- Student success at OTRES
 - More than 300 to grad school
 - Underrepresented
 - First generation
 - Low income

Keith A. Trujillo

CSU San Marcos

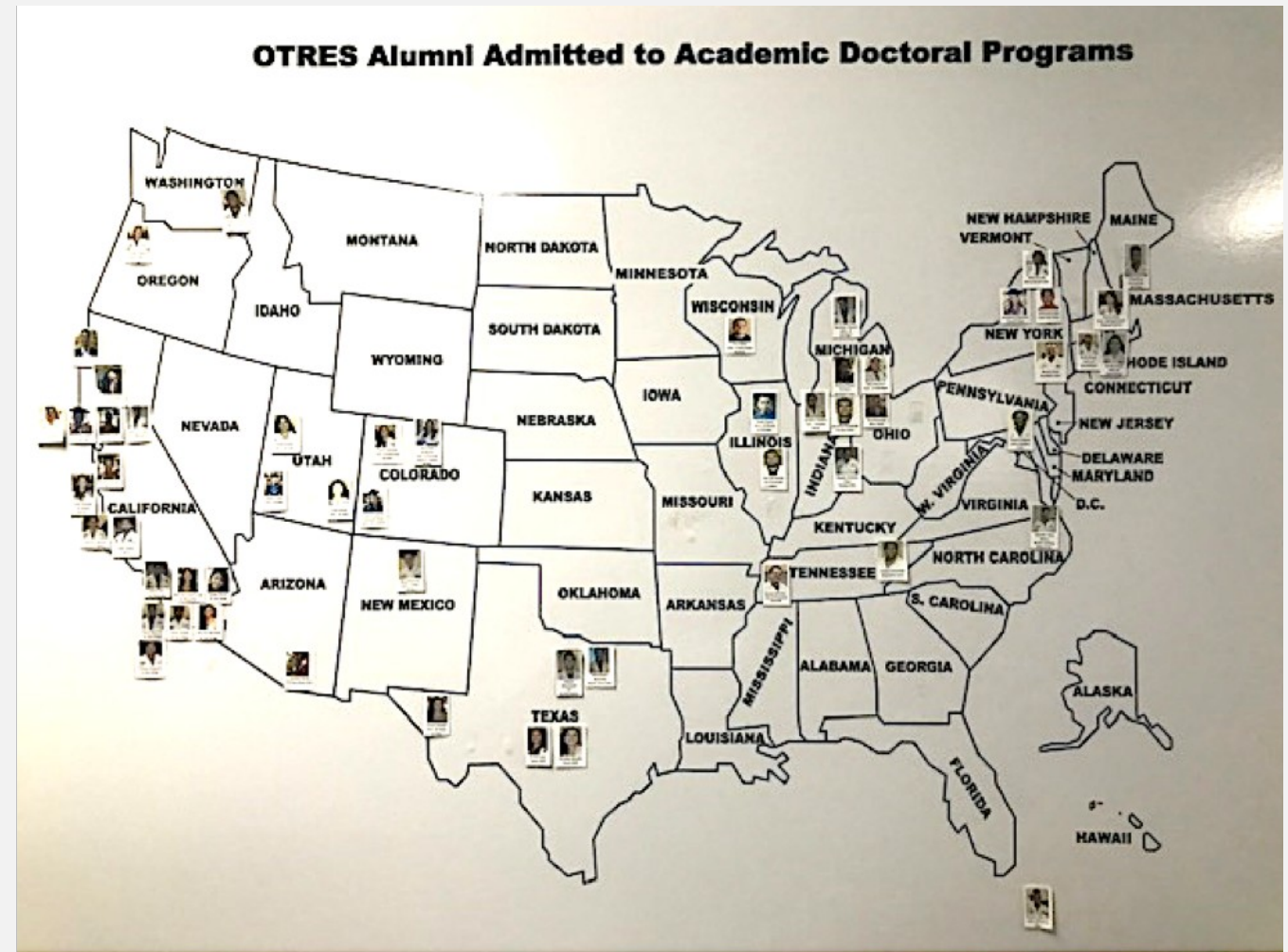
Working with TWD at NIGMS



keith@csusm.edu

Results

- Student success at OTRES
 - Top PhD institutions nationally
 - Harvard, Yale, Stanford, Johns Hopkins, Michigan, several UCs...



Keith A. Trujillo

CSU San Marcos

keith@csusm.edu

Results

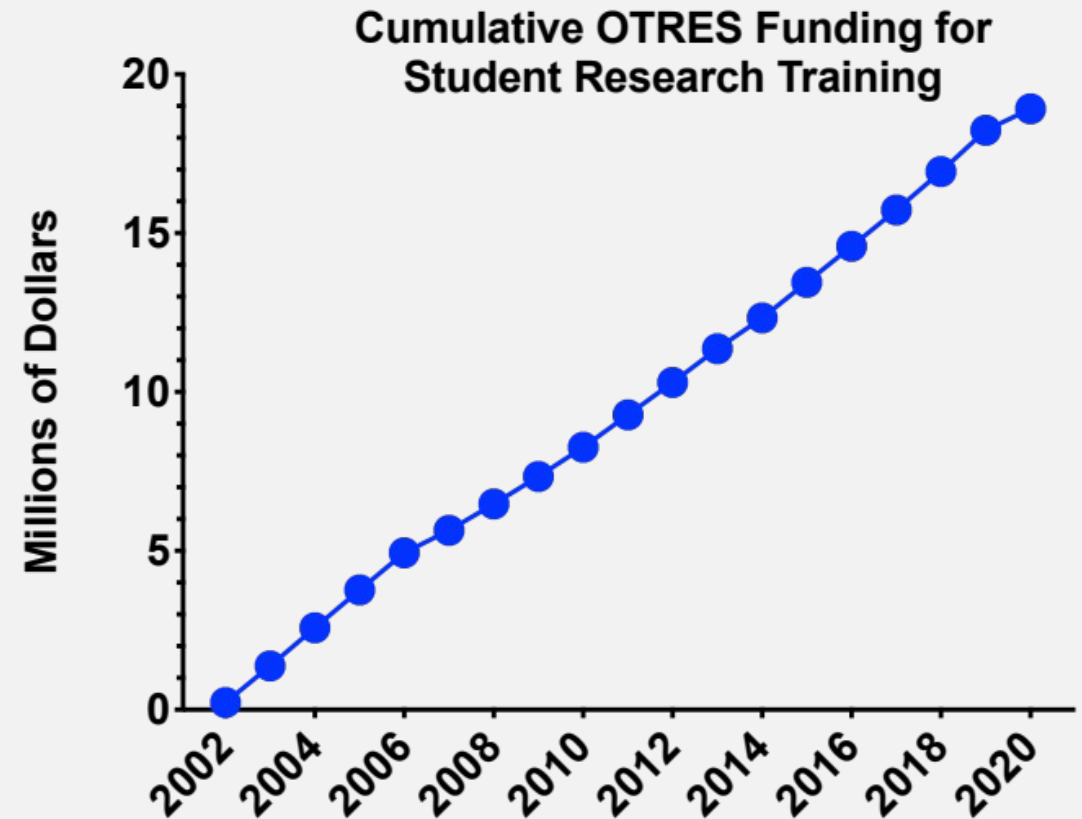
- Grant success at CSUSM
 - ~\$19 million
 - RISE, MARC, Bridges
 - Financial support
 - Academic support
 - Career awareness and guidance
 - Research opportunities
 - Assistance with applications

Keith A. Trujillo

CSU San Marcos

keith@csusm.edu

Working with TWD at NIGMS



Lessons Learned

- NIH has programs targeted to CSU-like institutions
 - Institutions that serve students from underrepresented group
 - Prepare students to succeed in graduate studies and become leaders in biomedical sciences
- Helps to consolidate programs and offer comprehensive approach
 - NIH, NSF, ED...
 - Financial support, academic support, career awareness and guidance, research opportunities, assistance with applications...

Next Steps/Long-Term Plans

- U-RISE
 - Optimistic for funding beginning in 2020 (excellent score)
- Bridges to the Baccalaureate
 - Continued funding through 2023
- Bridges to the PhD
 - Submit proposal in 2020 in collaboration with UC campuses
- Seek other NIH funding opportunities



Summary

- NIH is good source of funding for CSU campuses
 - Student prep for grad studies and careers in biomedical sciences
 - Research support for faculty (topic of another talk)
- NIGMS TWD is major source of NIH undergraduate funding
- NIH landscape is changing
 - Need to be nimble and responsive to change
 - Need to prepare early and pay careful attention to program announcements



Cal-Bridge: A CSU-UC Partnership Engaging Underrepresented Students in STEM

Cal-Bridge: A CSU-UC Partnership Engaging Underrepresented Students in STEM

Alexander L. Rudolph – Cal Poly Pomona

Alexander Rudolph, Professor and Director Cal-Bridge

Cal Poly Pomona, Department of Physics and Astronomy

alrudolph@cpp.edu



Cal-Bridge: A CSU-UC Partnership Engaging Underrepresented Students in STEM

Cal-Bridge Mission Statement

The Cal-Bridge Program mission is to increase the number of students from traditionally underrepresented groups completing bachelors and **PhD degrees** in physics, astronomy, computer or information science, and eventually other STEM fields. Students selected for the program become Cal-Bridge Scholars



Cal-Bridge: A CSU-UC Partnership Engaging Underrepresented Students in STEM

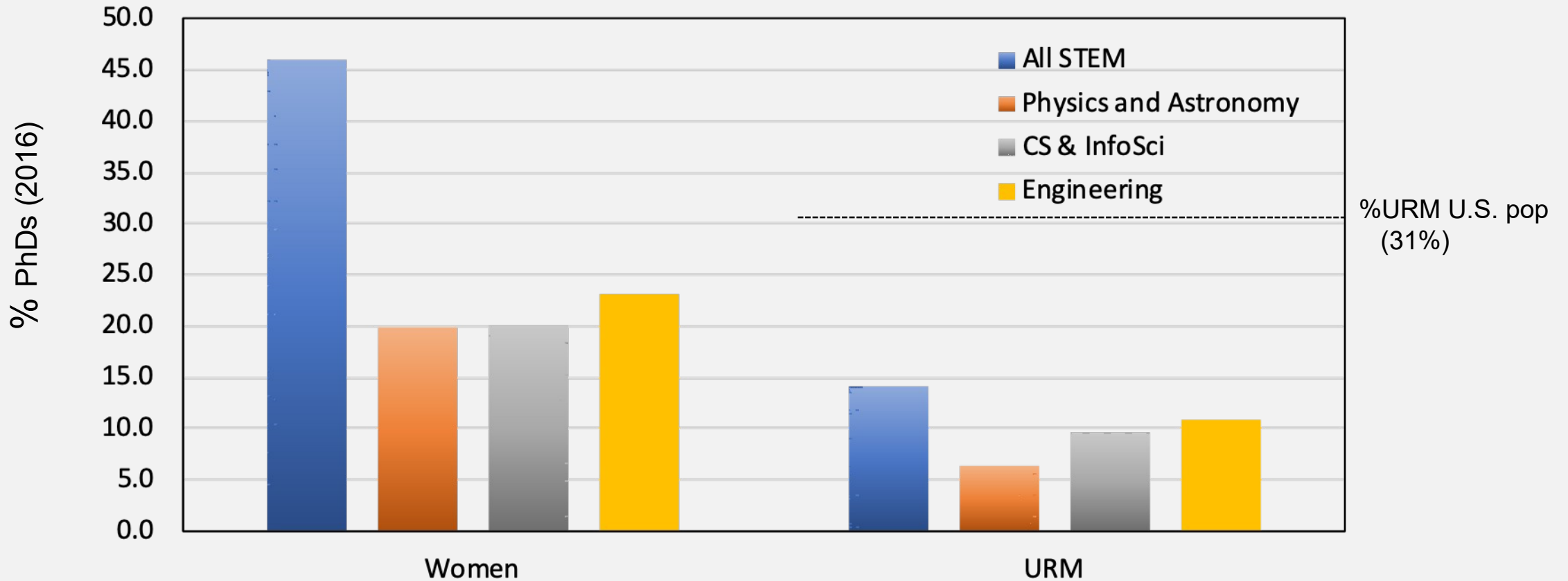
Why focus on STEM graduate programs?

- Lack of diversity in STEM PhD programs is even more acute than at the undergraduate level
- PhDs in STEM often lead to higher paying and sometimes more satisfying careers than a BS alone
- The problem of a diverse faculty won't be solved unless we first diversify PhD programs
- Many of the solutions we use in the Cal-Bridge program are relevant to undergraduate education



Cal-Bridge: A CSU-UC Partnership Engaging Underrepresented Students in STEM

Women and URM are vastly underrepresented in STEM



Alexander L. Rudolph

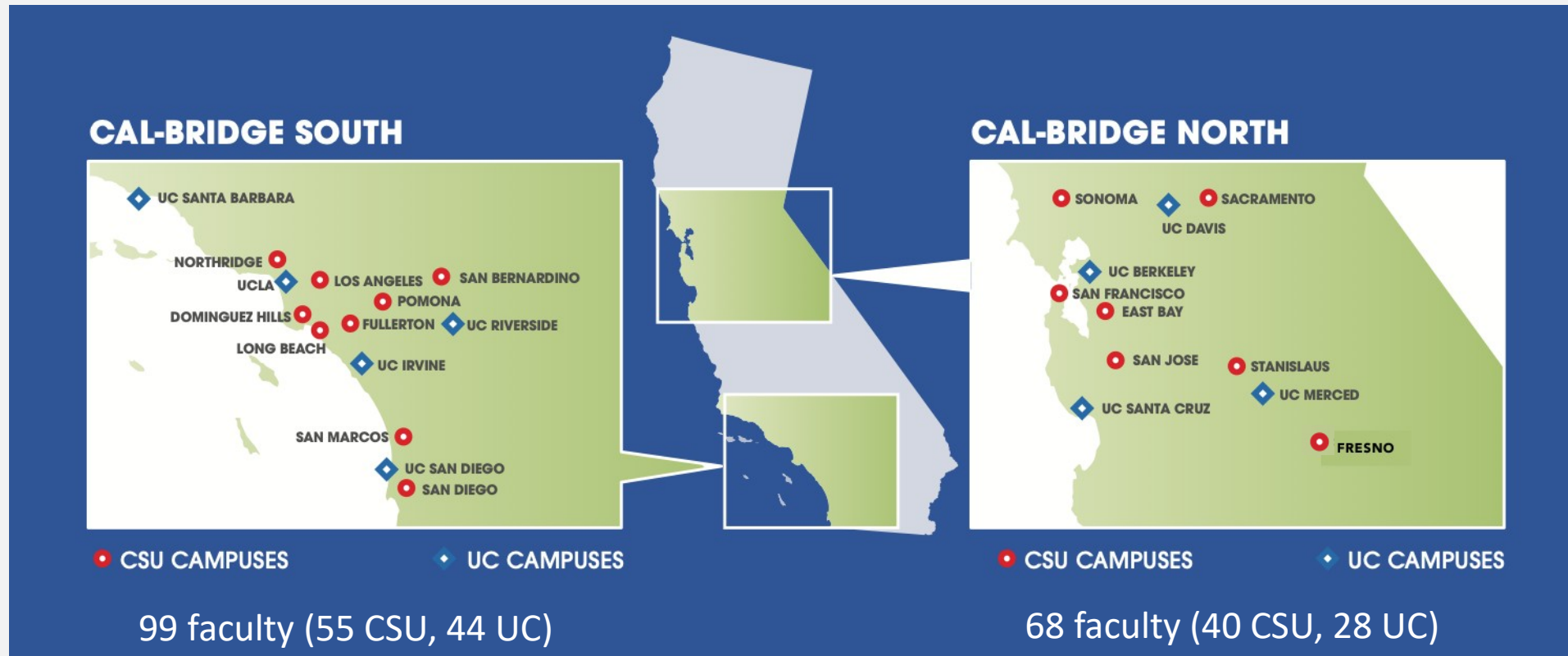
Cal Poly Pomona/Physics and Astronomy

alrudolph@cpp.edu

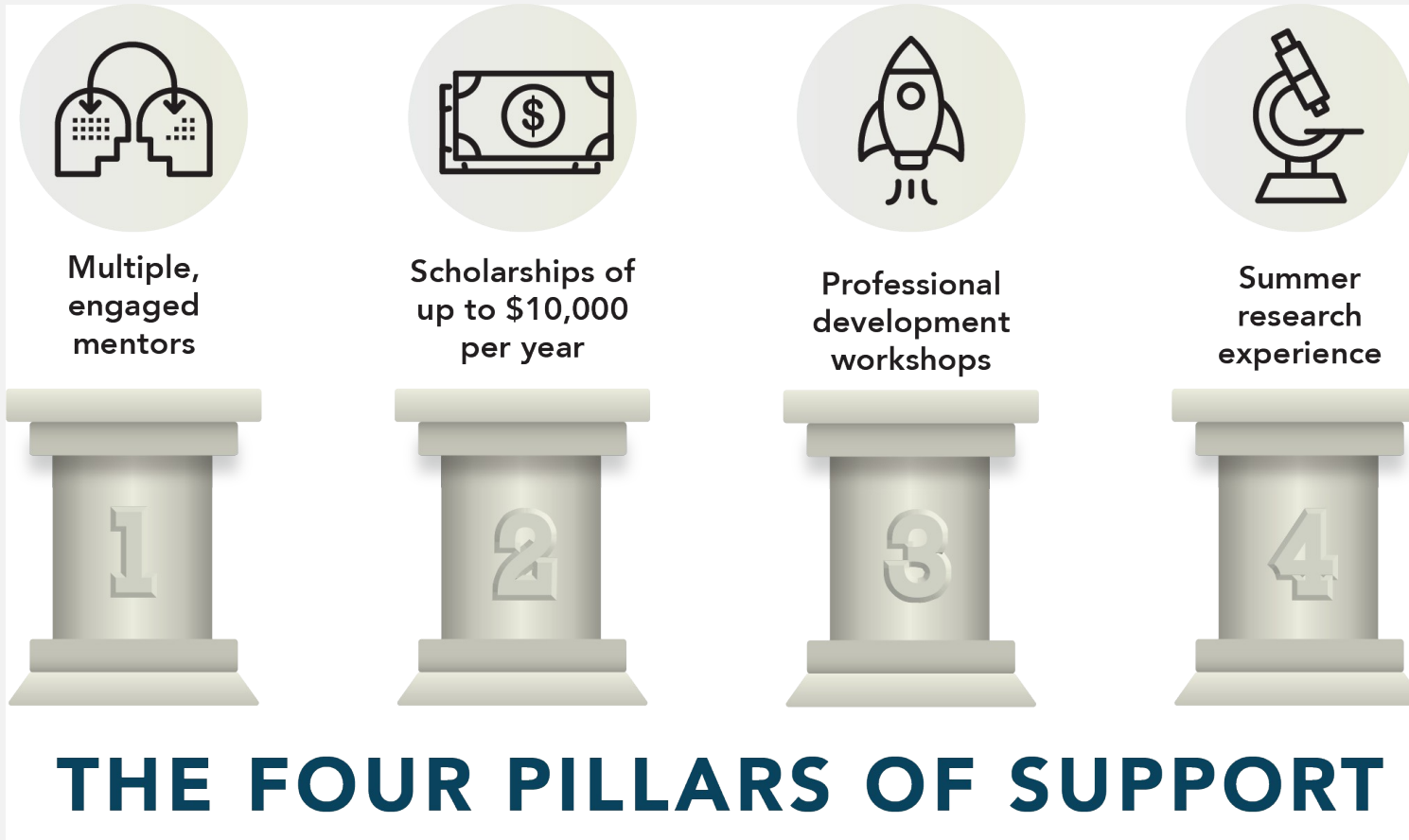


Cal-Bridge: A CSU-UC Partnership Engaging Underrepresented Students in STEM

Over 150 faculty from 16 CSUs and 9 UCs in the Cal-Bridge Network



Cal-Bridge is a 3-year program: 2 years UG + 1 year Graduate





Cal-Bridge: Student Voices



Cal-Bridge: A CSU-UC Partnership Engaging Underrepresented Students in STEM

Cal-Bridge is having great success: 99 scholars in 6 cohorts



Cal-Bridge Cohort 6 South

82% ACCEPTANCE RATE TO PHD PROGRAMS

70% UNDERREPRESENTED MINORITIES

67%+ 1ST GENERATION COLLEGE STUDENTS

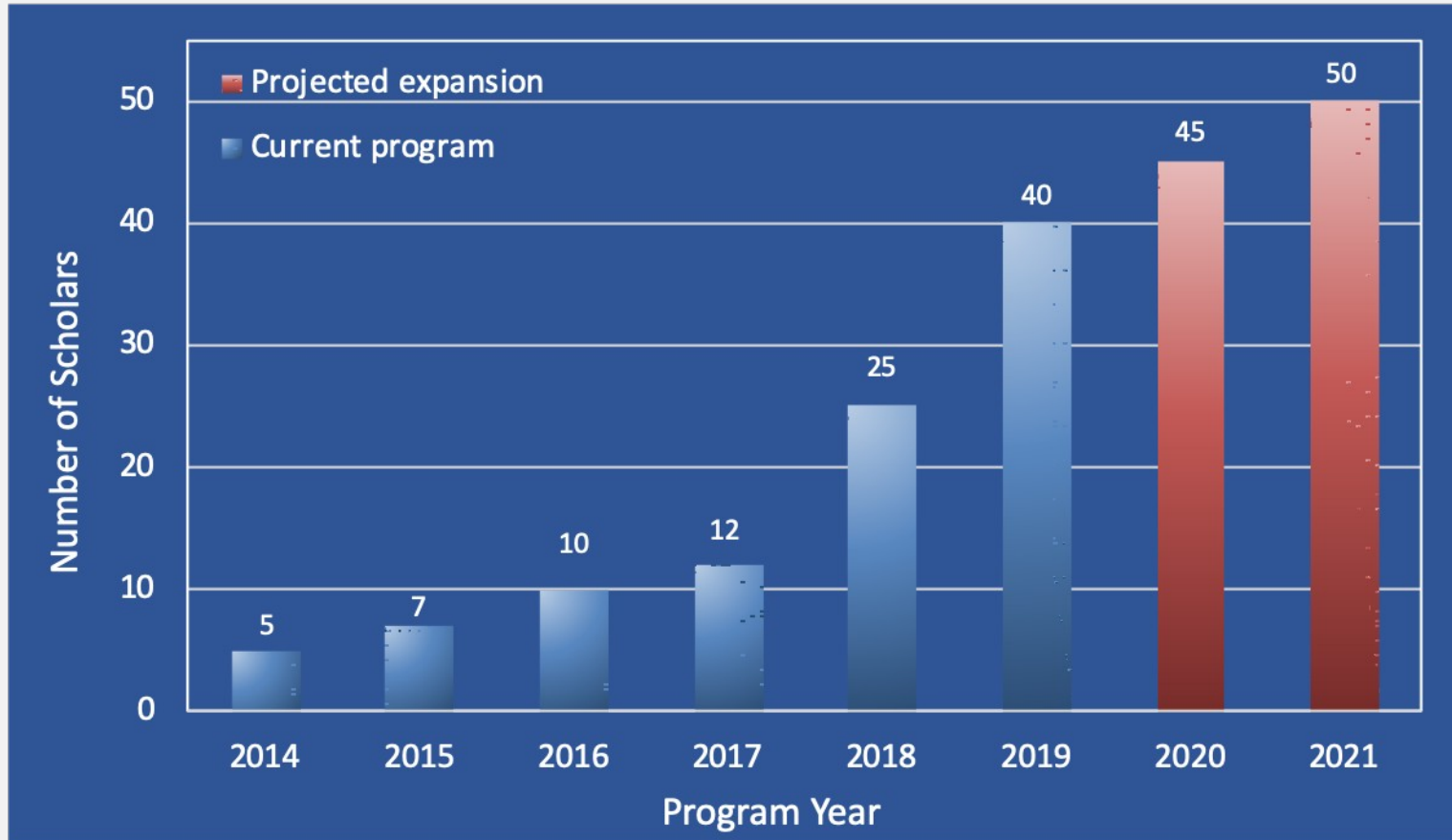
44% IDENTIFY AS WOMEN

22% IDENTIFY AS URM WOMEN



Cal-Bridge: A CSU-UC Partnership Engaging Underrepresented Students in STEM

Cal-Bridge will create 40-50 new URM PhDs per year

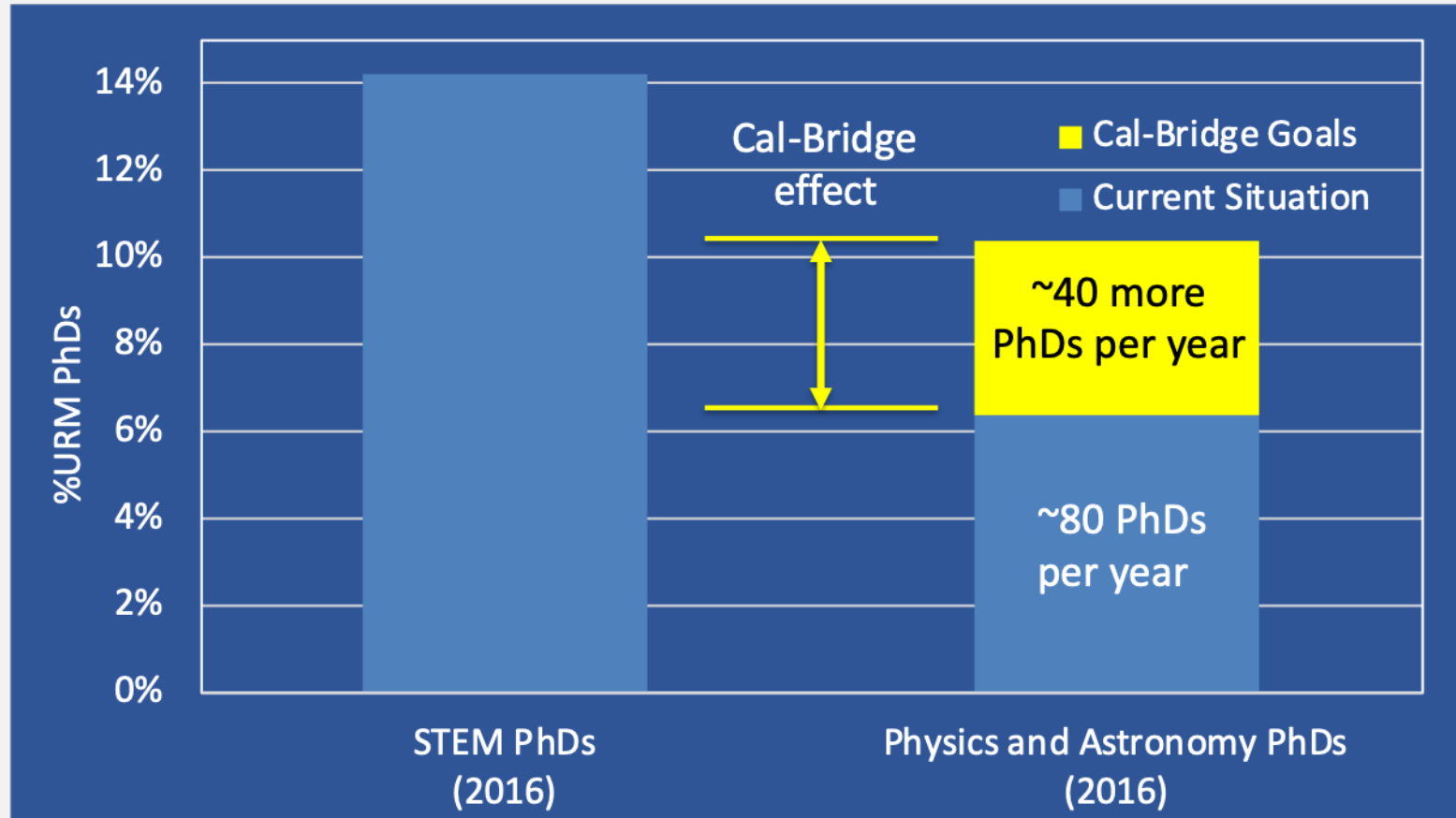


Alexander L. Rudolph

Cal Poly Pomona/Physics and Astronomy

alrudolph@cpp.edu

Cal-Bridge can cut the gap with the rest of STEM by 50%





Cal-Bridge: A CSU-UC Partnership Engaging Underrepresented Students in STEM

Expansion to other STEM fields

- **Small pilot in Computer and Information Sciences planned for fall 2020**
 - 4-6 scholars in first year
 - Led by CS faculty in both CSU and UC systems
 - Start statewide and then potentially split as program grows
- **Other potential fields include Math, Chemistry, and Engineering**

The California State University Louis Stokes Alliance for Minority Participation (CSU-LSAMP): A Collaborative, Comprehensive Approach to Broadening Participation in STEM.

Lisa Hammersley – Sacramento State



Lisa Hammersley, Interim Dean and Lead Project Director of CSU-LSAMP

Sacramento State, College of Natural Sciences and Mathematics

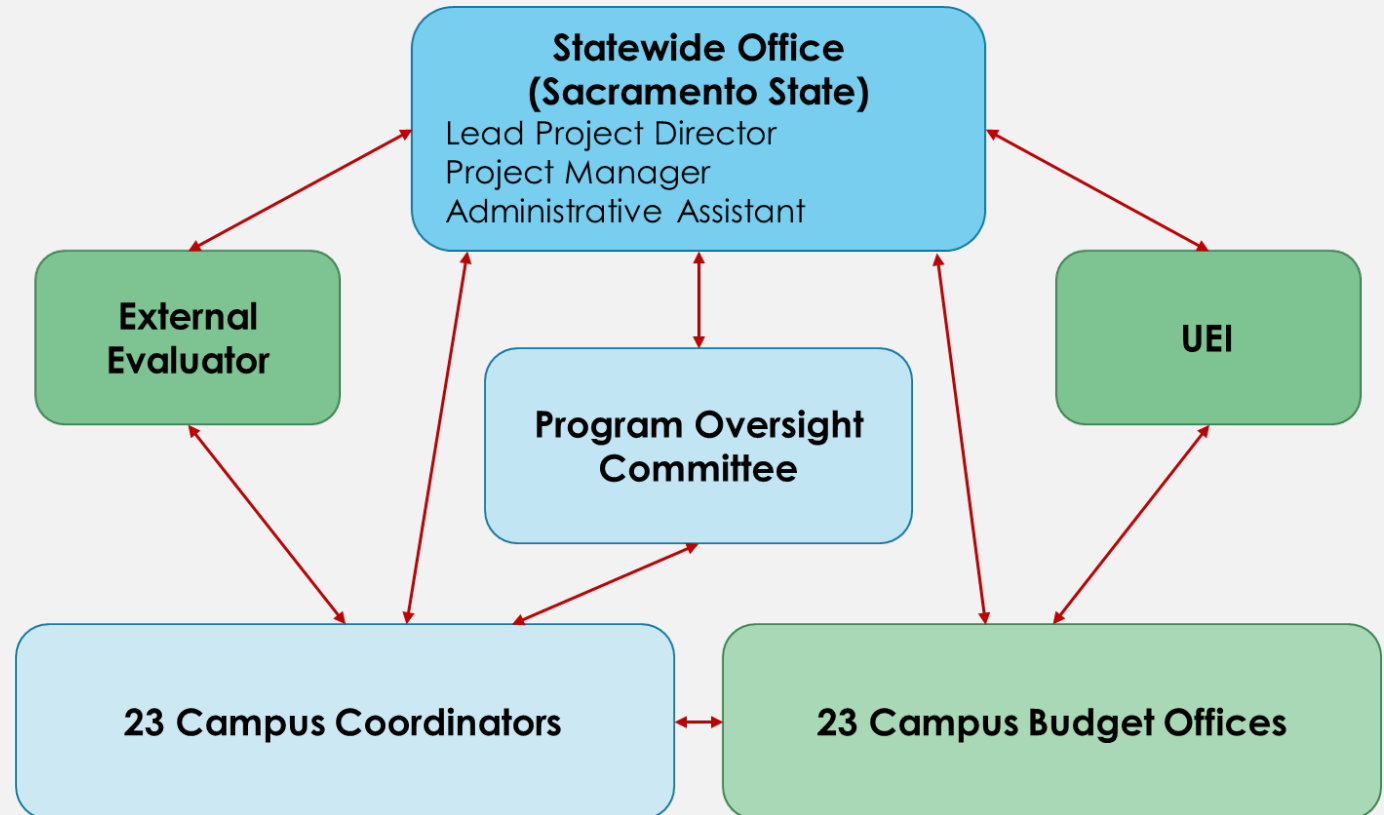
hammersley@csus.edu

Project Overview

- Established in 1993/94
- Served 26,896 students
- Jointly funded by NSF (\$800,000/year) and the CSU Chancellor's Office (\$800,000/year)
- Currently in our sixth five-year funding cycle (will be 30 years of NSF support at the end of this cycle)
- Started as 18 campuses and now includes all 23
- Goals:
 - Increase the number of undergraduate degrees in STEM awarded to URM students
 - Increase the number of URM students progressing to graduate programs in STEM
 - Disseminate best practices in broadening participation

Project Overview

- Serve ~3,000 students/year
- Program size varies (20-600)
- Varying level of campus support
- Administration of program varies by campus
- **How do we maintain a strong and cohesive alliance?**
 - Collegial decision-making
 - Programmatic structure that allows flexibility while maintaining consistency



Lisa Hammersley

Sacramento/College of NSM

hammersley@csus.edu

Activities

Activities fall under three main categories, as defined by the LSAMP program office:

- **Academic Integration**

- Supplemental instruction
- Summer bridge
- Transition support activities
- Textbooks

- **Professionalization**

- Research/internships
- International experience
- Presentation/publication of research
- Grad school prep activities
- Facilitator/mentor/trainer

- **Social Integration**

- LSAMP Advising
- Communications
- Peer mentoring
- Conferences (not presenting)
- Student cohesion activities

Activities

Campuses select one of three emphases:

- **Academic Preparation**

Emphasis on providing academic support in “gatekeeper” courses and facilitating transitions with the primary goal of improving preparation/performance, persistence to baccalaureate degree, and qualifications for advancement to graduate programs and professional careers in STEM.

- **Professional Preparation**

Emphasis on engaging students in research and other professional development activities with the primary goal of enhancing professional development and student competitiveness for, and success in, advancing to graduate programs and professional careers in STEM.

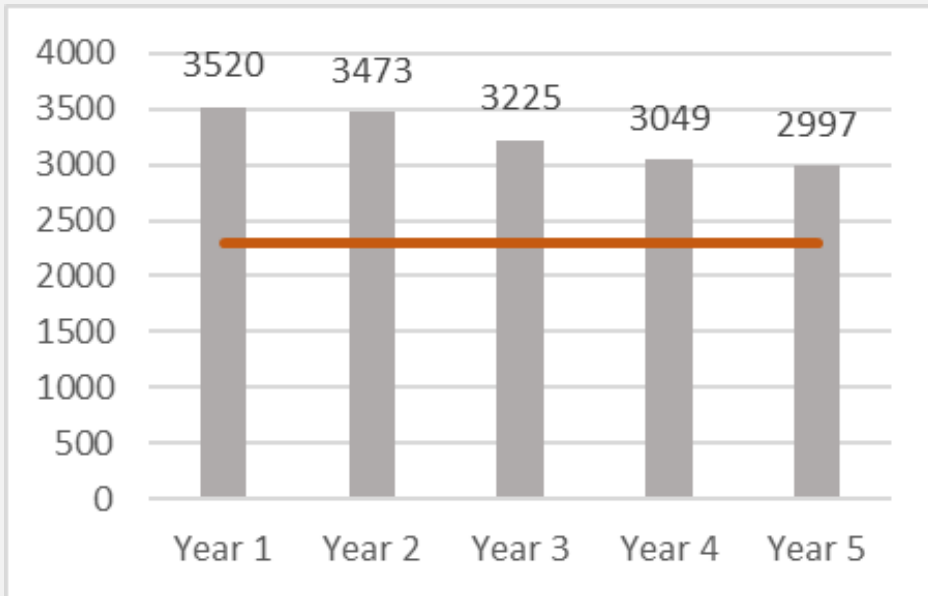
- **Dual Emphasis**

A program with substantial activities at different stages in the pipeline, including academic support activities, transitional activities, and research and professional development activities.

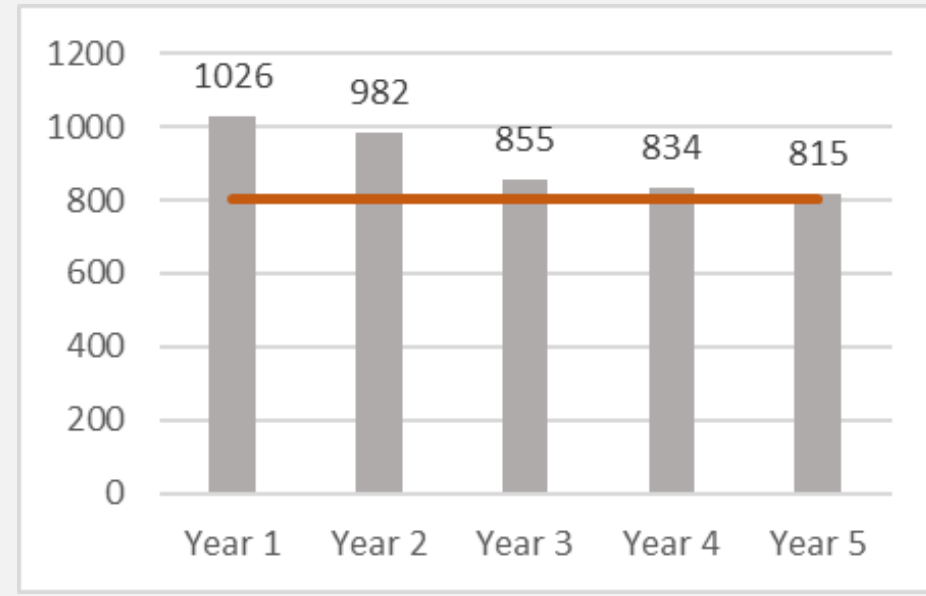


Results (Phase V: 2013- 2018)

Engage at least 2,300 level-1 participants



Engage 800 in Supplemental Instruction



Lisa Hammersley

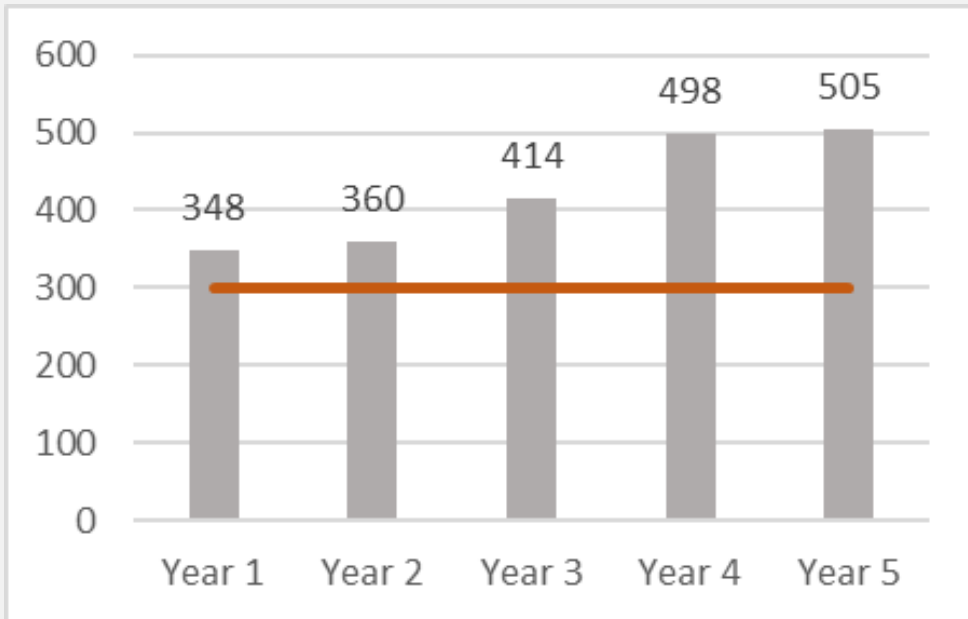
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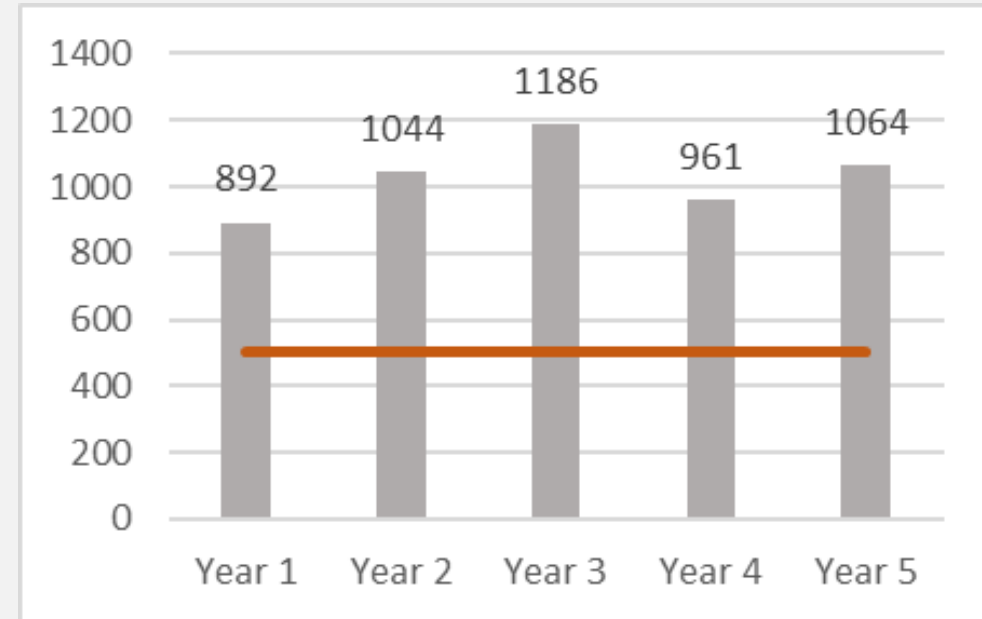


Results (Phase V: 2013- 2018)

Engage 300 in transition programs



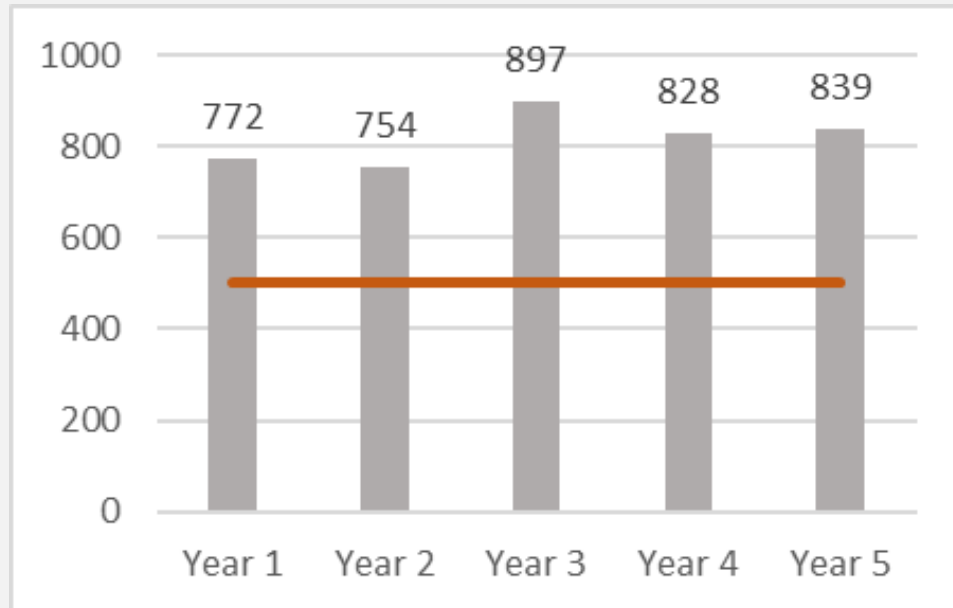
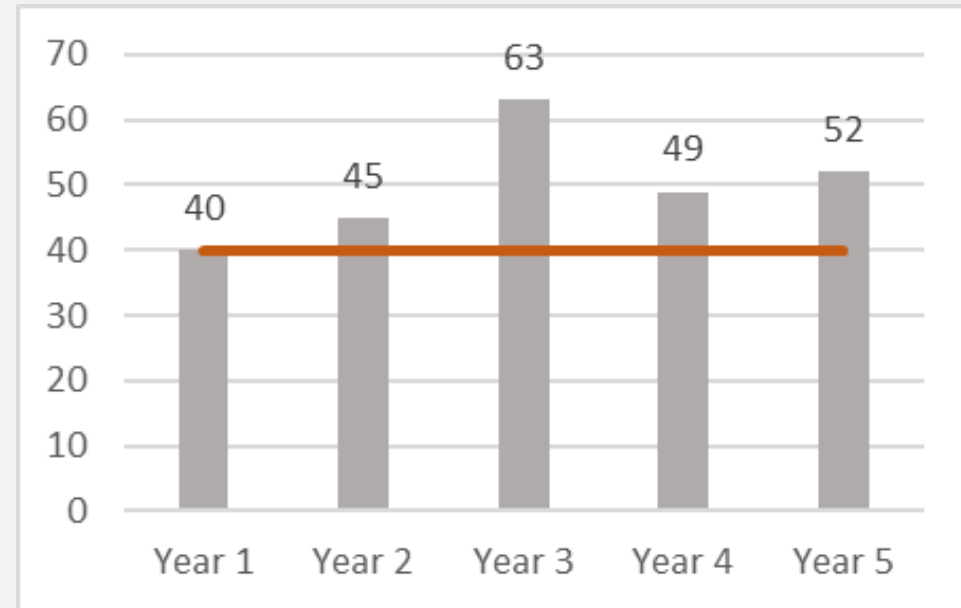
Engage 500 in prof devt activities



Lisa Hammersley

Sacramento/College of NSM

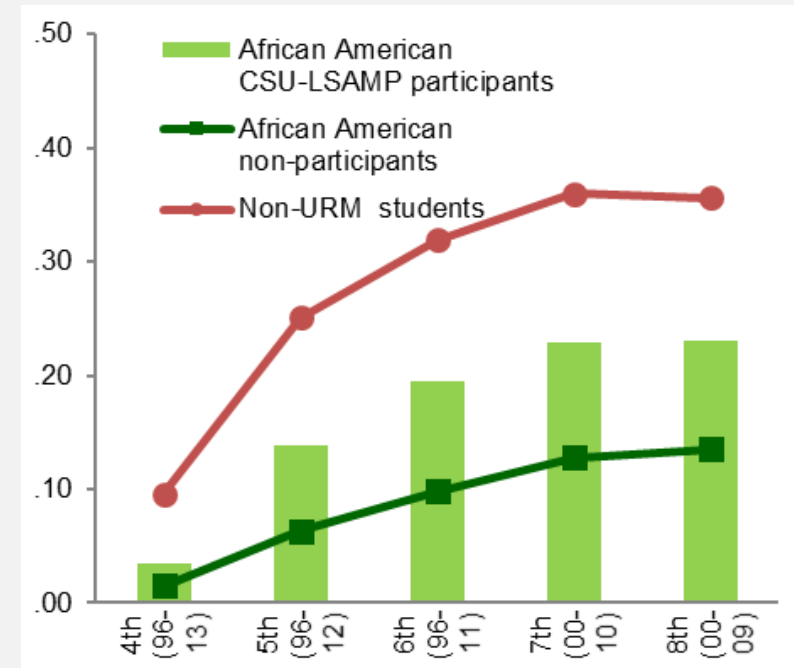
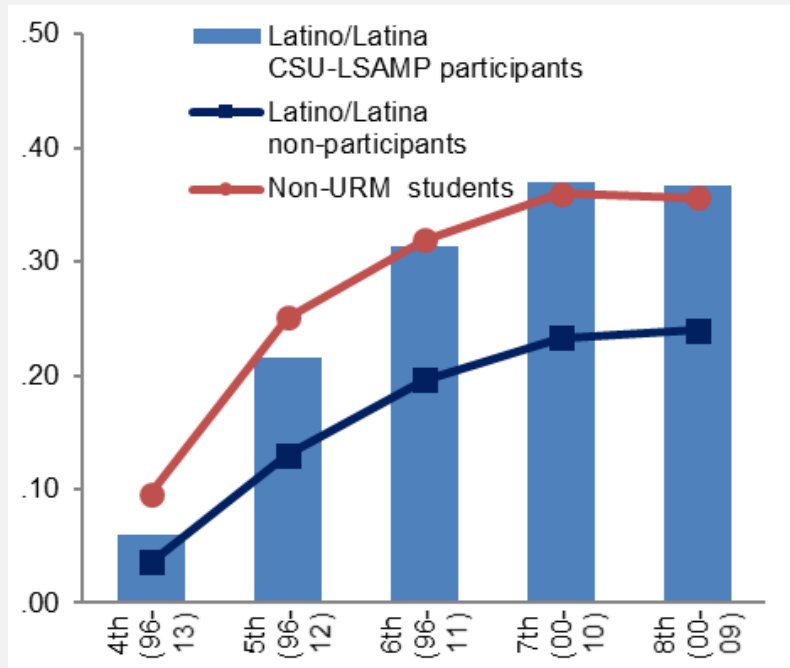
hammersley@csus.edu

Results (Phase V: 2013- 2018)**Engage 500 in research****Engage 40 in international research experiences***Lisa Hammersley**Sacramento/College of NSM**hammersley@csus.edu*

Results (Phase V: 2013- 2018)

41% of CSU-LSAMP graduates matriculated into graduate programs

- Fourth-through-eighth-year average STEM graduation rates, 1996-2013 cohorts

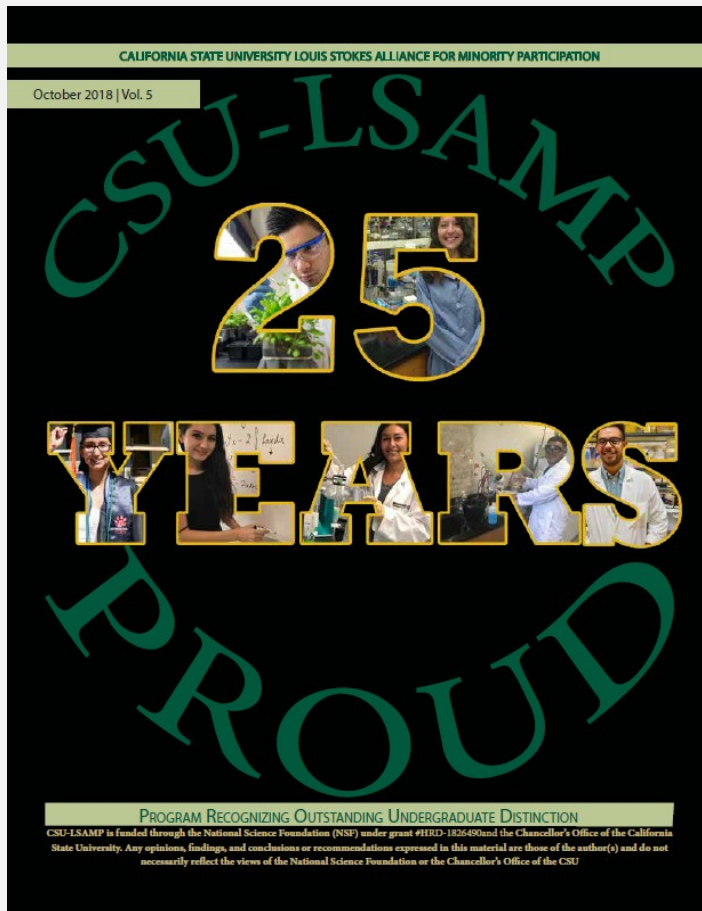


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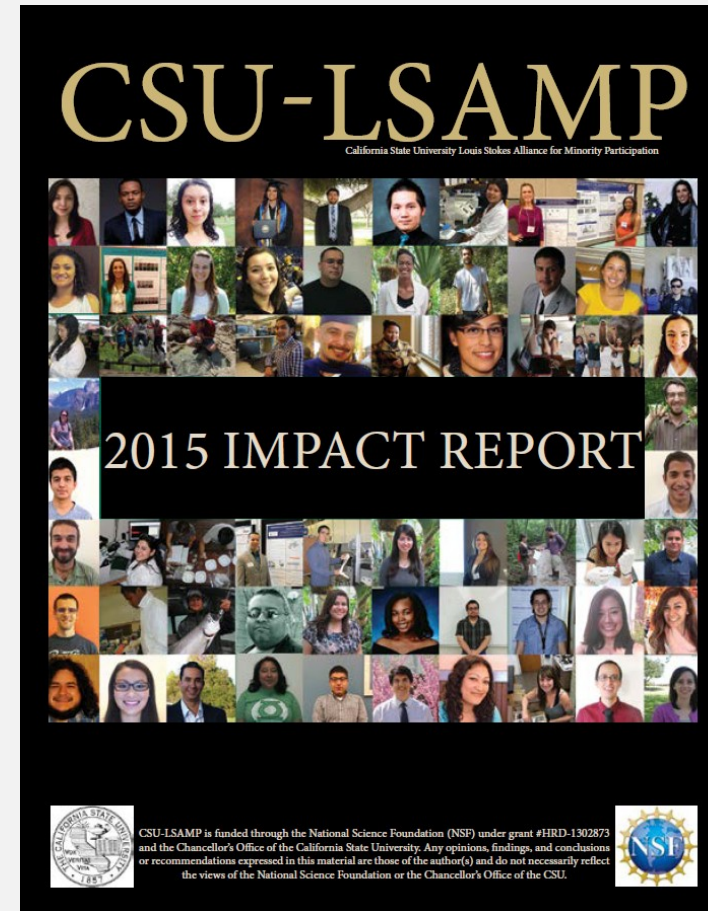
hammersley@csus.edu

Results



Lisa Hammersley

Sacramento/College of NSM

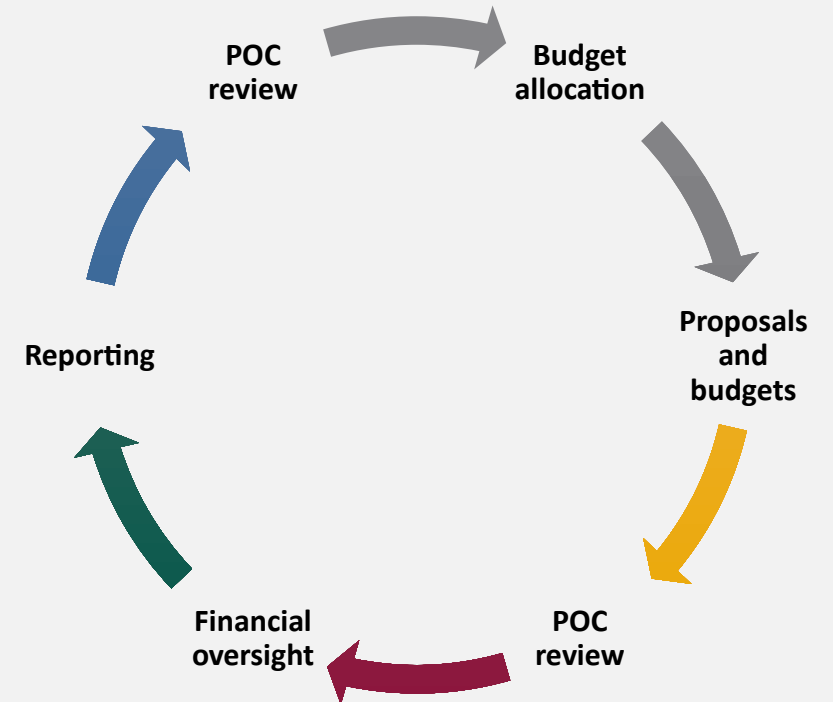


hammersley@csus.edu

Lessons Learned

- With 23 campuses and two sources of funding, we are a complex organization.
- It takes significant effort to maintain cohesiveness and ensure compliance with all fiscal policies (state, federal, CSU) .
- It is important to create a flexible model that allows campuses to leverage resources they already have and support their students in the ways they need supporting.
- When we are all doing the best thing for our own students, the collective results are great.

CSU-LSAMP



Next Steps/Long-Term Plans

The future of CSU-LSAMP

- We are in year 2 of our 6th five-year award
 - Unsure if we'll be allowed to apply for a seventh funding cycle
 - Might make sense to look at splitting into two smaller alliances or multiple, more regional alliances that include community colleges
 - Consider other sources of support
- Consider our future role in the context of GI 2025
 - How do we fully institutionalize and scale up successful models?

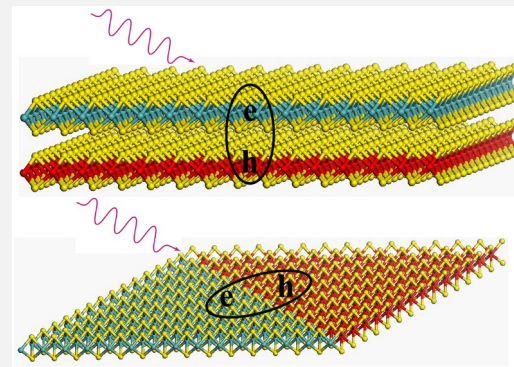
Summary

- CSU-LSAMP has been successfully supporting and graduating URM STEM majors for over 25 years
- CSU-LSAMP has successfully closed the achievement gap for Latinx participants and halved the achievement gap for African American participants
- 41% of CSU-LSAMP graduates have gone on to graduate programs in STEM
- CSU-LSAMP success is based in its comprehensive approach to student support (financial, academic, professional, social)
- It is time to consider the future of CSU-LSAMP: Can successful approaches be institutionalized and scaled up? How can LSAMP continue beyond NSF support? What is LSAMP's role in GI 2025?

PREM – Partnership between CSUN and Princeton on Quantum Materials

Nicholas Kioussis – CSU Northridge

Collaborators: Princeton University



Nicholas Kioussis, Professor
CSU Northridge, Department of Physics
Nick.Kioussis@csun.edu
<https://www.csun.edu/nsfprem>

Project Overview

Vision Statement

- The vision of the PREM is to establish a joint research powerhouse on quantum materials and to increase recruitment, retention and degree attainment by members of underrepresented groups (including women) in materials research.
- **High quality research is our goal and success of (minority) students is our priority.**

Intellectual Merit

This PREM aims to address fundamental problems in quantum materials that have vital scientific and technological importance as well as economical and societal impacts.

IRG1 - Quantum and topological materials, including spontaneous fractional topological quantum Hall effect in frustrated materials, fractional topological physics in periodically driven systems, and detecting fractional statistics for quasi-particles in interaction driven systems.

IRG2 – Electronic excitations, energetics and dynamics in quantum materials, including two-dimensional (2D) semiconductor heterostructures (valleytronics, twistrionics, etc.), organic materials for singlet fission, and 2D hybrid perovskites for photovoltaic applications.

Seed Project - Surface science and defect physics relevant to photocatalytic splitting of water on oxides and 2D materials.

Broader Impacts

The PREM is committed to enhancing broad participation of underrepresented groups in materials research and education through the following thrusts:

- Multipronged recruiting strategies to attract students from underrepresented groups
- Summer programs for research training of undergraduates (REU) and high school teachers (RET) at PCCM
- Organization of Materials and Nano-Science Camps for high school teachers
- Organization of distinguished lecture series, PREM seminar series and annual PREM research symposium
- Establishing partnership with industry and national laboratories (ARL West) for student training and internships
- Materials Science Day/Dia de la Ciencia for outreach
- Curriculum development (labs, courses on quantum materials and data science)

PREM Faculty at CSUN



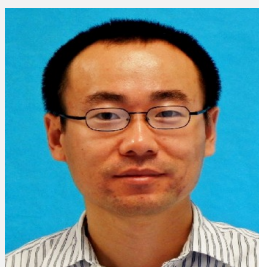
Xu Zhang
Computational
Materials
Theory



Jussi Eloranta
Experimental Physical
Chemistry



Nicholas Kioussis
Computational
Materials
Theory



Li Gao
Condensed Matter
Experiment



Gang Lu
Computational
Materials Theory

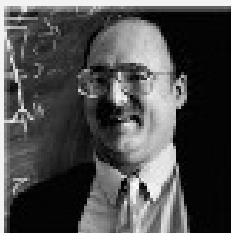


Aziz Boulesbaa
Experimental
Physical Chemistry



Donna Sheng
Computational
Condensed
Matter Physics

PREM Faculty at Princeton



Duncan Haldane
Condensed
Matter Theory



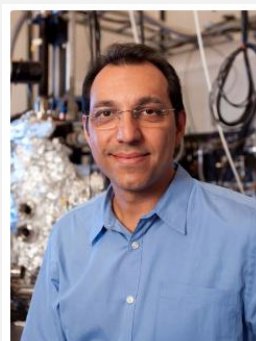
Greg Scholes
Physical
Chemistry
Experiment



Lynn Loo
Chemical
Engineering
Experiment



Nai-Phuan Ong
Condensed
Matter
Experiment



Ali Yazdani
Condensed Matter
Experiment



Annabella Selloni
Theoretical
Chemistry

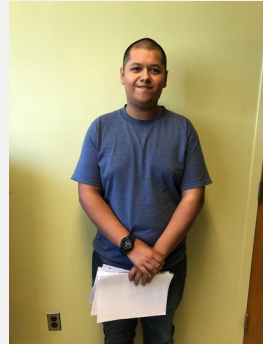


Daniel Steinberg
Director of
Education &
Outreach

PREM Students



Erick Guzman



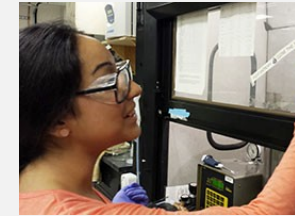
Fernando Ramirez



Nick Carrillo



Caitlin Vaughan



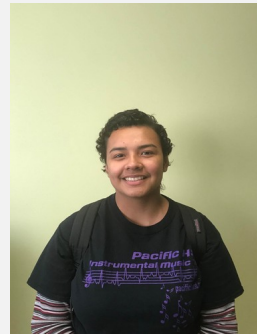
Vanessa Lopez



Jacques Ntahoturi



Juan Gomez



Vanessa Carbajal



Bilman Lopez



Malcom Jackson

Research Experience for Undergraduates

- Each year 4-5 CSUN students
- Students have opportunity to participate interdisciplinary research supervised by Princeton faculty and graduate students (Physics, Chemistry, Materials Science, Chem/Mech/Electrical Engineering) on both theory/modeling and experiments
- Interact with REU students all over the country; wonderful experience for students
- Over 30 PREM students participated REU program at Princeton

RESEARCH EXPERIENCES FOR UNDERGRADUATES

PRINCETON CENTER FOR COMPLEX MATERIALS

REU 2019

APPLY BY FEBRUARY 22

National Science Foundation supported center, sponsoring research opportunities in materials science for undergraduate students

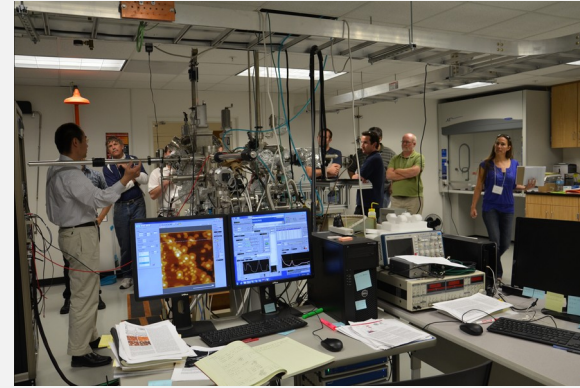
PROGRAM DATES JUNE 10- AUGUST 9

- Research experience at the forefront of materials science and engineering
- Short courses, lectures and social events, both on and off Princeton's campus
- Nine-week REU program
- Easy access by train to New York City and Philadelphia

FOR MORE INFORMATION REGARDING STIPENDS AND RESEARCH TOPICS, PLEASE VISIT OUR WEBSITE AT PCCM.PRINCETON.EDU/REU

Outreach to High Schools

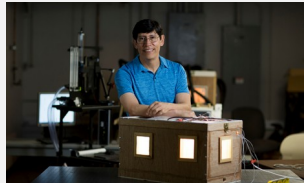
We have organized workshop series on “Nano Science and Materials Research” for high school teachers since 2012. The goal is to inform high school teachers the progress in quantum materials and nano-science research at CSUN and elsewhere. The program consists of lectures, tours to state-of-the-art nanoscience research labs and hands-on activities of fun experiments. The teachers are also provided with instructional materials so that they can disseminate in their classrooms. Plans of recruiting local high school students into the science programs at CSUN are also discussed.



Questions & Answers



Speaker Contacts
Kimberley Cousins and Timothy Usher, CSU San Bernardino
kcousins@csusb.edu, tusher@csusb.edu



Arturo Pacheco-Vega, Cal State LA
apacheco@calstatela.edu

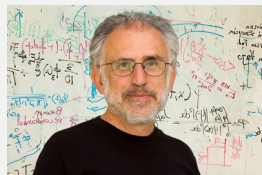
Keith Trujillo, California State University, San Marcos
keith@csusm.edu



Alexander Rudolph, Cal Poly Pomona
alrudolph@cpp.edu



Lisa Hammersley, Sacramento State
hammersley@csus.edu



Nicholas Kioussis, CSU Northridge
nick.kioussis@csun.edu

Next Steps/Closing Remarks

Dr. Frank A. Gomez
Executive Director, STEM-NET
Office of the Chancellor

