

# Penn State Research

A Discussion with  
The Academic Leadership Forum

*Lora G. Weiss, Ph.D.*  
*Senior Vice President for Research*

*March 2, 2021*



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# Agenda

- The Many Dimensions of Penn State Research
- Deans' Perspectives
- SIMBA Update
- Compliance, Finance, and Cost Training
- Closing Remarks



# National Science Foundation Higher Education Research & Development Rankings

- Penn State has 16 research fields ranked in the top 10
- Tied for #1 in the country
- Testament to our
  - Excellence
  - Breadth
  - Depth

#1 Materials Science  
#2 Materials Engineering  
#2 Mechanical Engineering  
#2 Psychology  
#2 Mathematics  
#4 Sociology  
#4 Industrial/Manufacturing Engineering  
#4 Electrical Engineering  
#5 Total Engineering  
#6 Anthropology  
#7 Computer & Information Sciences,  
#7 Aeronautical & Astronautical Engineering  
#8 Chemical Engineering  
#8 Atmospheric/Meteorology  
#9 Geological & Earth Sciences  
#9 Astronomy

Source: National Science Foundation Higher Education Research and Development Survey FY2019, released Jan 2021



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# Dimensions of Penn State Research

Who



Research in Colleges  
and Campuses



Interdisciplinary  
Research Institutes



Undergraduate  
Research



Graduate  
Research

How



Sponsored Research & Seed Grants



Research Support & Operations



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# Federal Research Funding Agencies



Defense



Health & Human  
Services



Energy



NASA



NSF



Agriculture



Commerce



Veterans Affairs



Transportation



Interior



Homeland Security



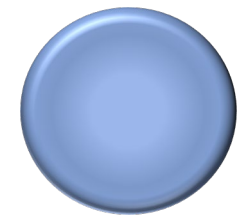
Environ Protection



Smithsonian



Education



Other



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# Foundations



W. M. KECK FOUNDATION



# Alignment with National Research Priorities

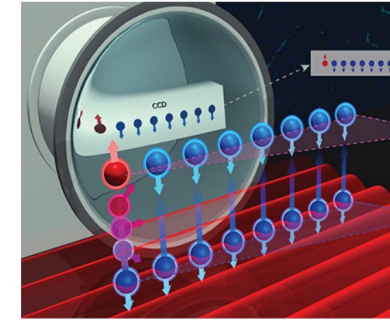
President's Budget Request FY 2021



Federal Industries of the Future



Artificial Intelligence



Quantum Information  
Science



Advanced  
Manufacturing



5G

National Security



BioTechnology

plus

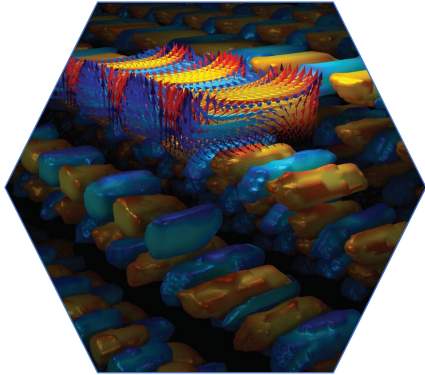
Health & Wellness    Space Exploration



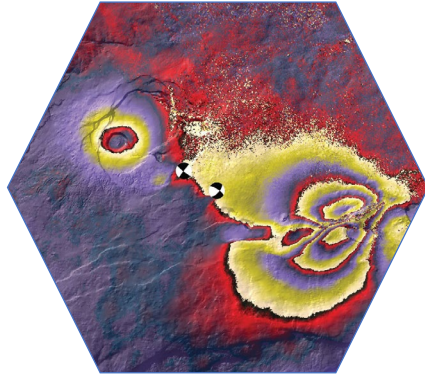
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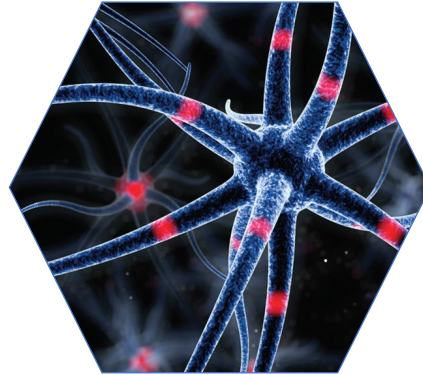
# Interdisciplinary Research Institutes



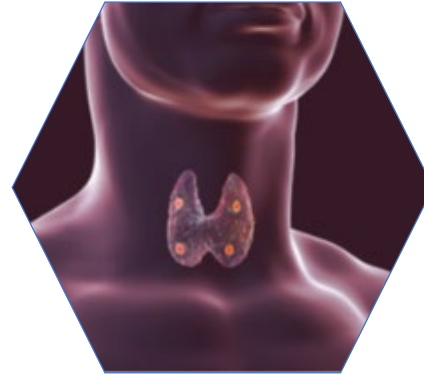
Materials Research  
Institute



Institute for  
Computational & Data  
Sciences



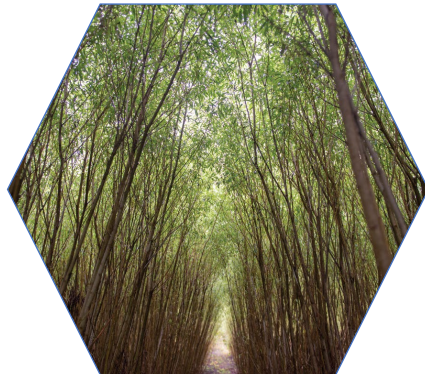
Huck Institutes of  
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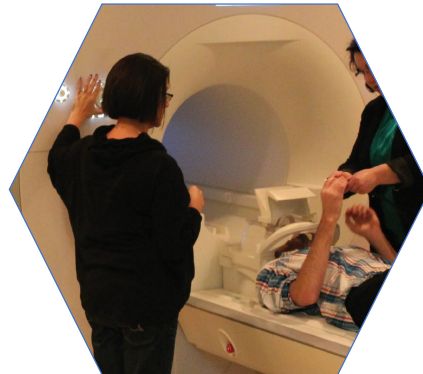
Penn State Cancer  
Institute



Clinical and Translational  
Science Institute



Institutes of Energy  
and the Environment



Social Science  
Research Institute



Applied Research  
Lab

*...it's the culture*

*Profoundly  
different approach  
to leveraging our  
expertise*



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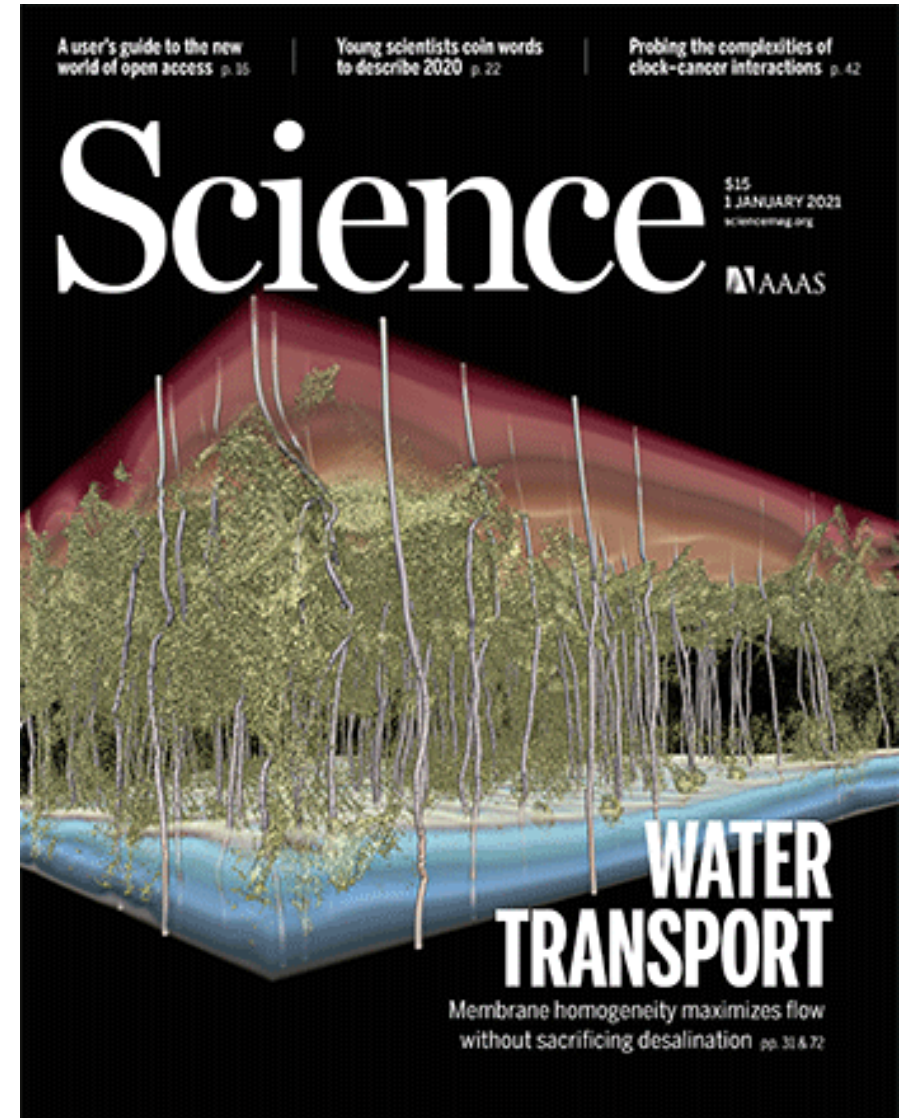
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# Materials Research Institute

## Penn State on Cover of Science

- Image from Penn State's Materials Characterization Lab
- 3D nanostructure of membranes based on biological cellular membranes
- Used to maximize water transport during desalination
- Interdisciplinary research: biology, materials, water
- Electron microscopy image



Jan 1, 2021



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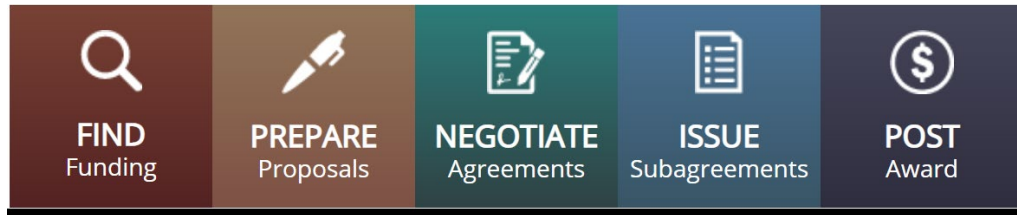
# Materials Research Institute – cont'd

## *A Strategy for Unrivaled Success*

- 1992: Materials Research Institute created
  - Initial strategic investment of ~\$500,000
- 2020: More that \$150M in materials-related research awards
- Ranked #1 in materials science and #2 in materials engineering
  - When combined, no other university comes close
- Unrivaled core facilities
- Critical and strategic partner for Industry
  - Morgan, Corning, PPG, Lockheed Martin, Volvo, Dow, Murata
  - 12 Centers of Innovation for Industry interactions
- Interdisciplinary: 330 faculty from 5 colleges, 17 departments
  - Educating undergraduates, graduate students, postdocs, and industry



# Research Support & Operations



## Office of Sponsored Programs



## Office of Industrial Partnerships

Commercialization, Intellectual  
Property, Technology Transfer

# Awards in FY20	
• Federal	1628
• State	244
• Industry	797
• Foundations	213
• Other	<u>817</u>
<b>TOTAL # AWARDS</b>	<b>3699</b>



## Office for Research Protections



## Research Operations

Streamlining Complexity for Efficient Operations:  
Labs, Lab Safety, Facilities, Equipment, Budgets,  
Analytics, IT, HR, Communications, ...

# Federal Compliance – Recent Examples

## National Defense Authorization Act, Section 889

- Prohibits use of any telecommunications equipment, system, or services from specific international providers

## Cybersecurity Maturity Model Certification

- Must meet additional requirements to safeguard critical information and data, including financial, legal, infrastructure, and export control

## Disclosure of Current, Pending, and Other Support

- Developed in response to undue foreign influence activities
- Includes: laboratory personnel, equipment, supplies, lab space, non-monetary commitments





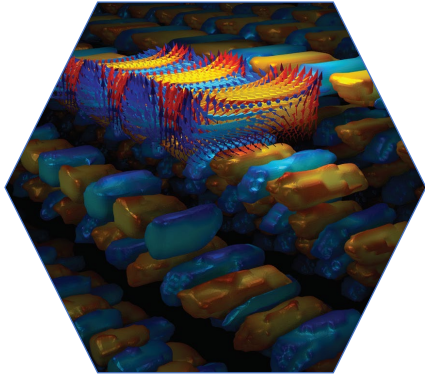
# Insights from Deans



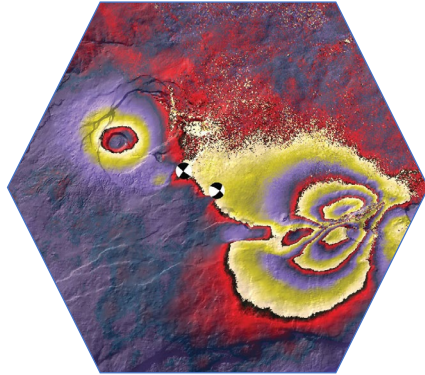
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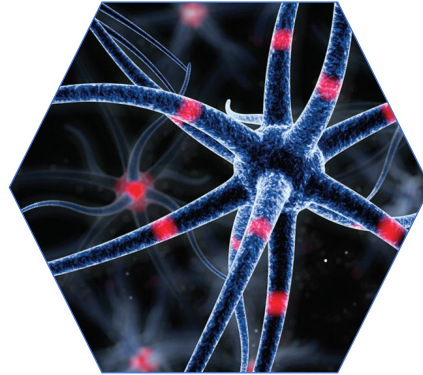
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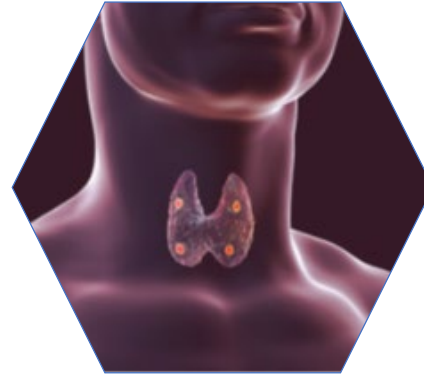
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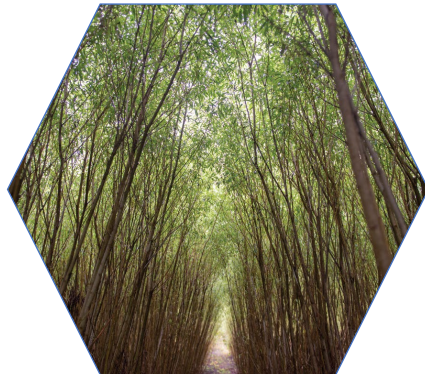
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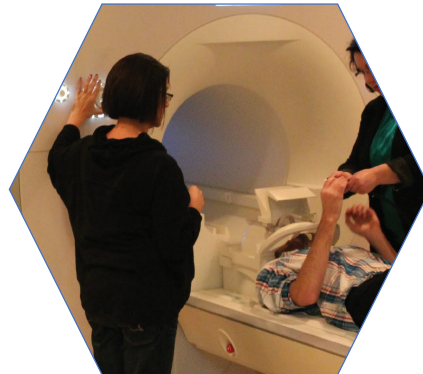
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# Social Science Research Institute

## Four Key Research Areas

- Smart and Connected Health
- The Human System
- Social Disparities
- Transitioning Data to Knowledge and Impact

*Impact of online-technology: Is it displacing important activities such as parent-child interactions, physical activity, and regular sleep?*



## COVID-19 Impact

*Child Maltreatment Solutions Network:  
Impact of social distancing on family wellbeing and child safety*



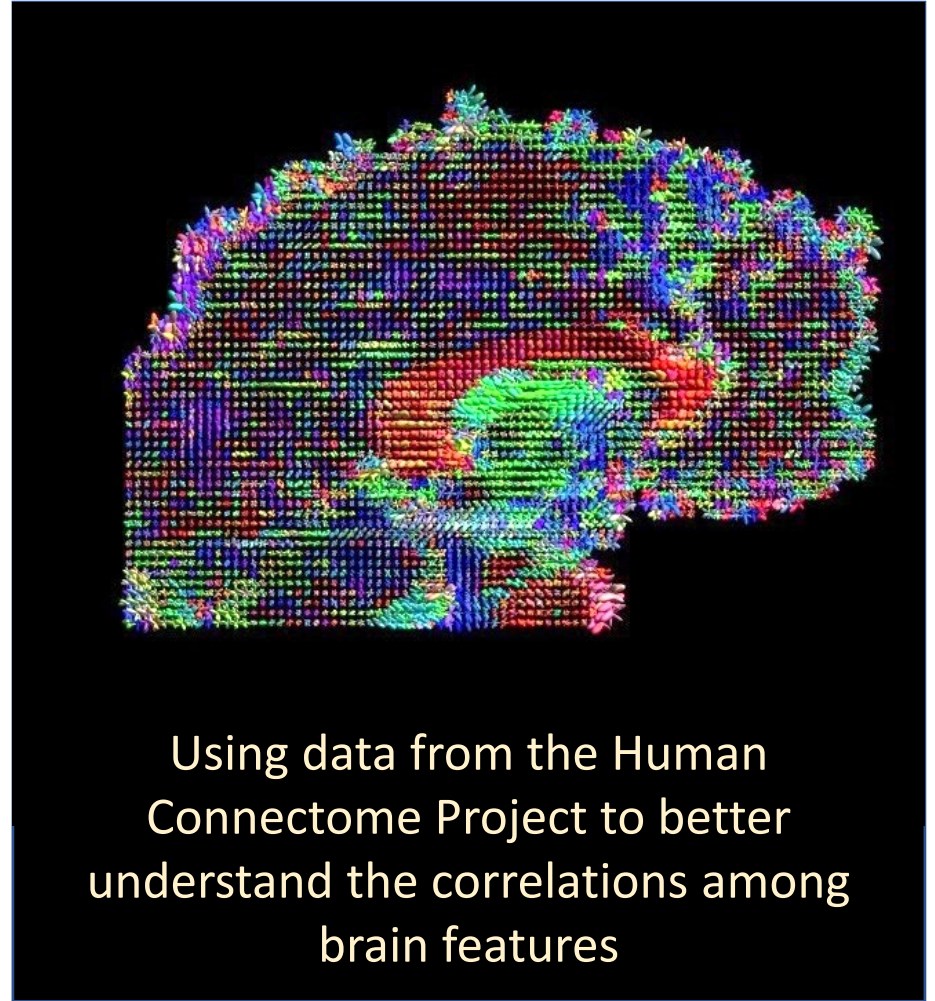
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# Institute for Computational & Data Sciences

- Navigating the complex world of massive analytics
  - Fundamental algorithms to medical applications and meteorological discoveries
  - Applying big data and big simulation methods across the research landscape
- Facilities offer
  - 36,500 computing cores
  - 25 PetaBytes of storage
  - A dynamic software stack of broadly used research applications
  - 890 gigaflops of total peak theoretical performance



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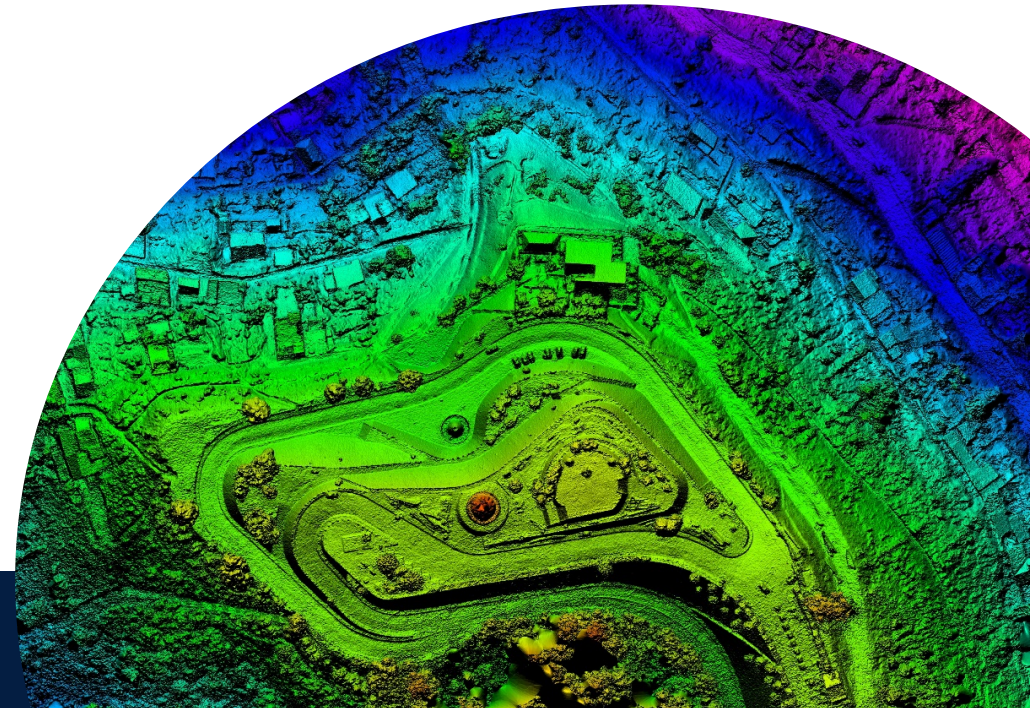
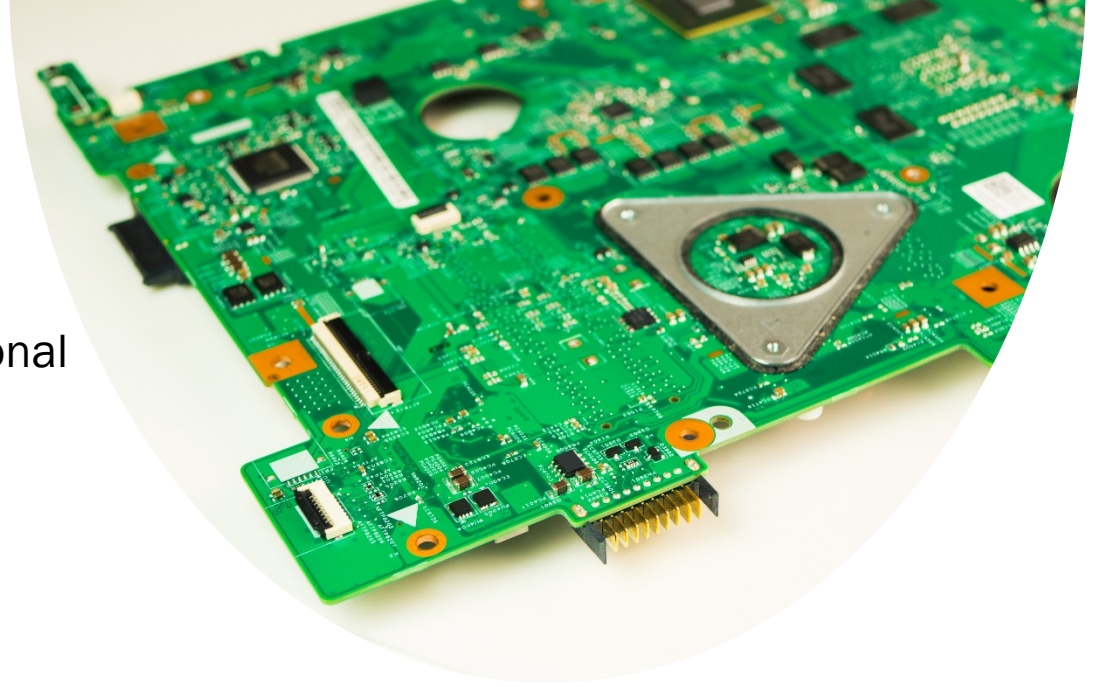
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# Applied Research Lab

*A Department of Defense  
University Affiliated Research Center (UARC)*

- Developing innovative solutions to address challenging national security problems in sea, land, air, space, and cyber
- Maintaining essential core capabilities
  - Communications and Information
  - Materials & Manufacturing
  - Navigation
  - Undersea Systems
  - Fluid Dynamics
  - Acoustics
- Transitioning advanced technology to operational programs in support of national security priorities
- Contributing to Penn State's education, research, and service mission
  - Employing more than 200 students annually

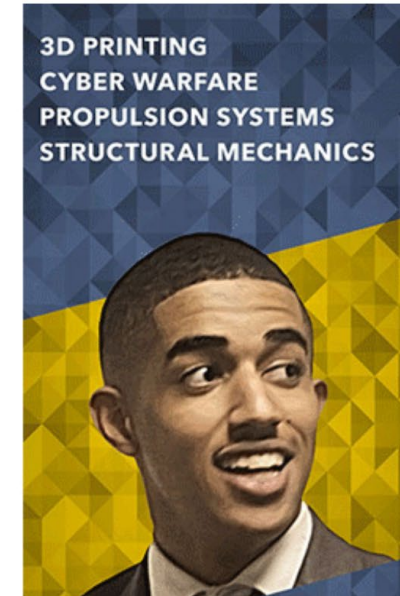


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# Impact of Research on Students

- Impact on Job Opportunities
  - Internships, senior projects, summer hires in critical areas of our economy
  - 2014-2019: nearly 8,000 students completed an undergraduate research experience
  - 12 active NIH Training Grants totaling \$3.4M annually
  - Graduate School piloting *Accelerate to Industry*, a program providing career readiness opportunities for students



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# Impact of Research on Students – cont'd

- Impact on Ability to Recruit
  - Corporate gifts support undergraduate projects, strengthen recruitment efforts, and make lasting industry connections
  - Merck, Lockheed Martin, PPG, Volvo, CSL Behring, and Wabtec all engage undergraduates in the research they sponsor
  - Companies locate at Innovation Park to have proximity to students for recruiting



Office of Undergraduate Research and Fellowships  
<https://urfm.psu.edu/>



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# Impact of Research on Students – cont'd

- Impact on Knowledge
  - Faculty incorporate research-based knowledge into curriculum



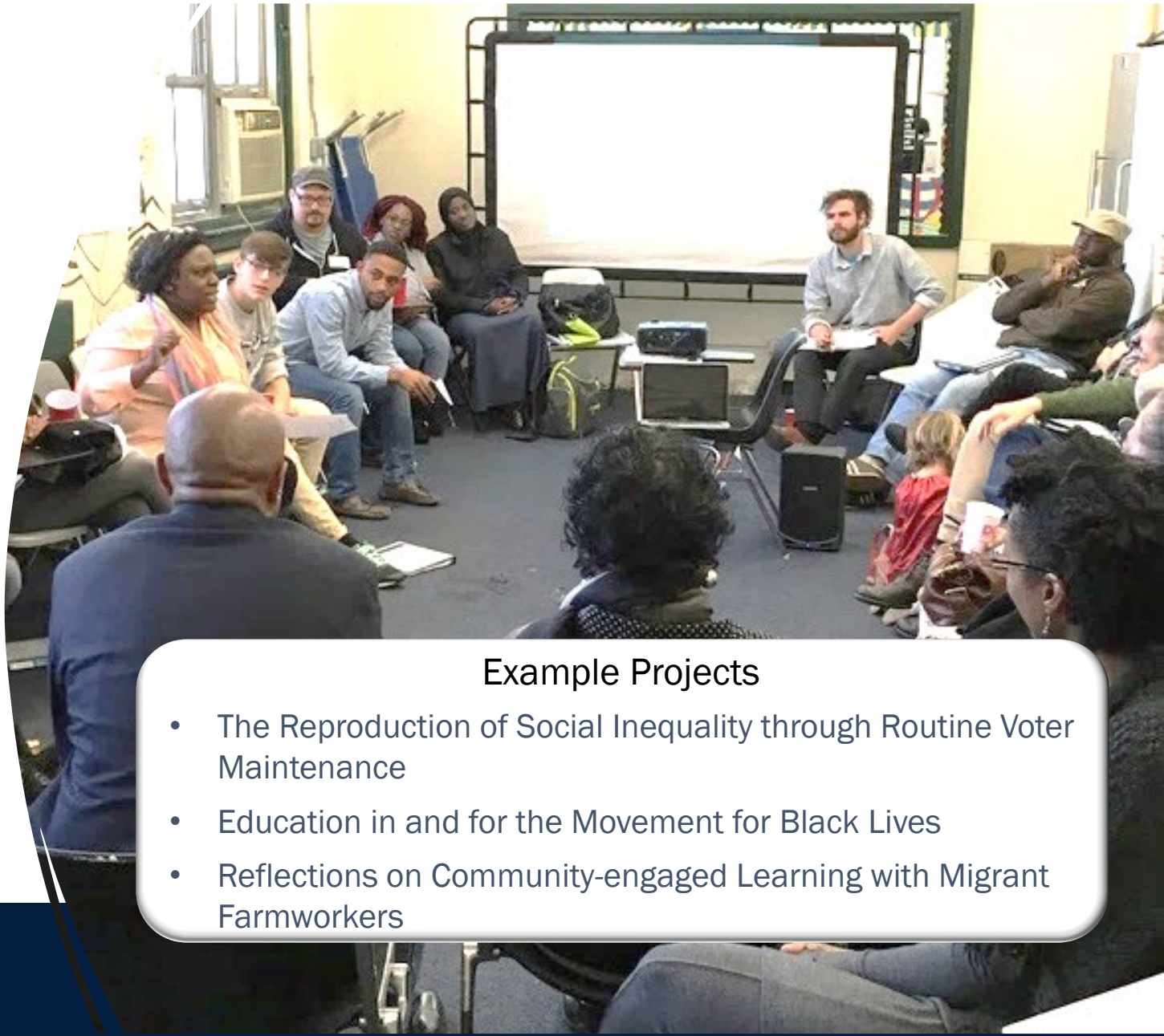
Spring 2019: Ceramics students processed red clay from Centre County to send to artist Andy Goldsworthy to dye flags for an installation at Rockefeller Center in New York City





# Impact of Research on Students – cont'd

- Impact on Knowledge
  - Consortium for Social Movements & Education Research and Practice
- Broad University involvement: 31 faculty from
  - College of Liberal Arts
  - College of Education
  - Penn State Outreach
  - Brandywine Campus
- 4 student organizations
  - Black Caucus
  - Social Movement Group
  - Black Graduate Student Association
  - Adult Education Student Association



## Example Projects

- The Reproduction of Social Inequality through Routine Voter Maintenance
- Education in and for the Movement for Black Lives
- Reflections on Community-engaged Learning with Migrant Farmworkers



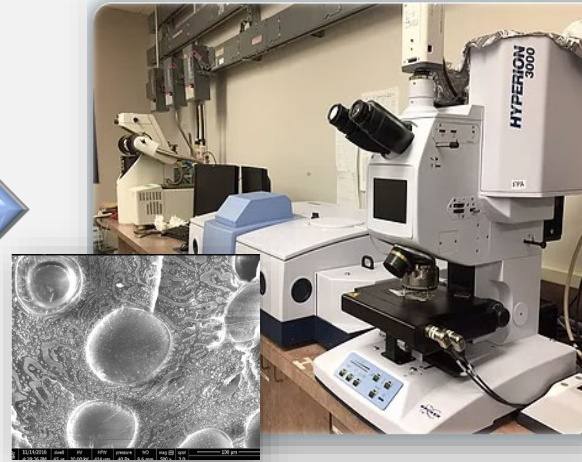
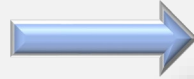
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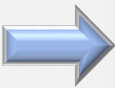
# Research at the Behrend College



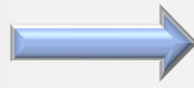
Collect plastics from Lake Erie



Characterize degradation in lab



Reprocess in Plastics Lab



New materials from lake plastic

## Lake Plastic Recovery, Recycling, and Polymer Research

- From 2015-2020: \$3.7 million in sponsored awards
  - NSF, ARPA-E, Industry
  - 9 active faculty researchers
  - 2 postdocs
  - 40+ undergraduate students
- In 2020, launched new major
  - Polymer Engineering and Science

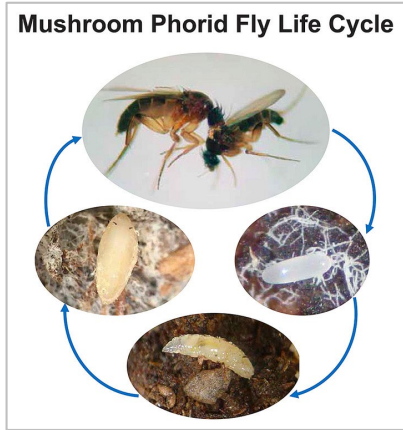


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# Research through Ag Extension



*Penn State entomologists and Penn State Ag Extension helped find solution to mushroom phorid fly infestation*

- Pennsylvania leads the nation in mushroom production
  - 67 mushroom farms produced more than 500 million pounds of mushrooms last year
- Chemical products would be effective in killing larvae, but adding them to compost could affect the mushrooms
- Applied EcoVia to window screens to target adult flies
  - Keeps product away from compost and crops
- By November 2020, we were seeing nearly complete elimination in phorid flies on our test farms



# Research + Students + Faculty + Facilities + Industry = Success



*“For CSL Behring, this represents an opportunity for us to support our talent pipeline that will bring some of Penn State’s brightest minds to our efforts in developing life-saving medicines.”*

*- Paul Perreault, CEO CSL Behring*

Watch the video

<https://www.youtube.com/watch?v=aaNhyhiZWTA>



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Thank You

