MICHIGAN STATE UNIVERSITY
College of Natural Science

College of Natural Science Annual Faculty Meeting

November 16, 2018

MSU's Empower Extraordinary Capital Campaign

- Multi-year project – Began in 2011, continues until Dec. 31, 2018.
- October 2014 – Launch of "public phase" of campaign.
- Overall MSU goal: $1.5B – Goal reached on Sept. 8, 2017; universitywide, the campaign has raised $1.75B to date.

NatSci Empower Extraordinary Progress

- NatSci goal: $74.05M; $71.14 raised to date (96.06% of goal)
- 2 new endowed faculty positions in FY 2017-18 for a total of 19 new endowed positions during the campaign.
- Brings us to 29 donor-funded endowed faculty positions, 22 MSU Foundation Professors and 84 endowments supporting students.
- Four campaign priorities/targets:
  - ✓ Engine of Opportunity – student support (77% of goal)
  - ✓ Creativity, Discovery, Learning – endowed positions (62% of goal)
  - ✓ Global Problem Solver – research (279% of goal)
  - ✓ Building a Vibrant Community – facilities (176% of goal)

MSU/NatSci Enrollment
Fall 2018

MSU overall – 50,351 students (39,423 undergrads)

NatSci Fall 2018 undergraduate majors 5,606

(plus 1,571 LBC coordinate majors)

NatSci Fall 2018 incoming freshmen 1,233

(plus 618 LBC freshmen)

NatSci Fall 2018 graduate students 925

(816 Ph.D. students, 109 M.S. students)

NatSci 2018-19 Budget

Total Recurring Budget: $70.98M – up 1.98%

$ 1.25M	Salary increases
$-1.39M	1% efficiency reduction+1% budget reduction
$ 1.52M	University allocation (new funding) ($757k GII salaries; $759 instructional reform)

Total Non-Recurring Budget: $8.5M – up 1.42%

$ 564k	Program allocations (spousal salaries, retention support)
$ 4.7M	Off-campus & online instruction (no change)
$ 3.3M	F&A (up $0.72M)

NatSci 2018-19 Budget (con.'t)

Recurring University Allocation – $1.52M

$ 757k	GII hires - salary
$ 759k	Instructional reform – PHY/Math

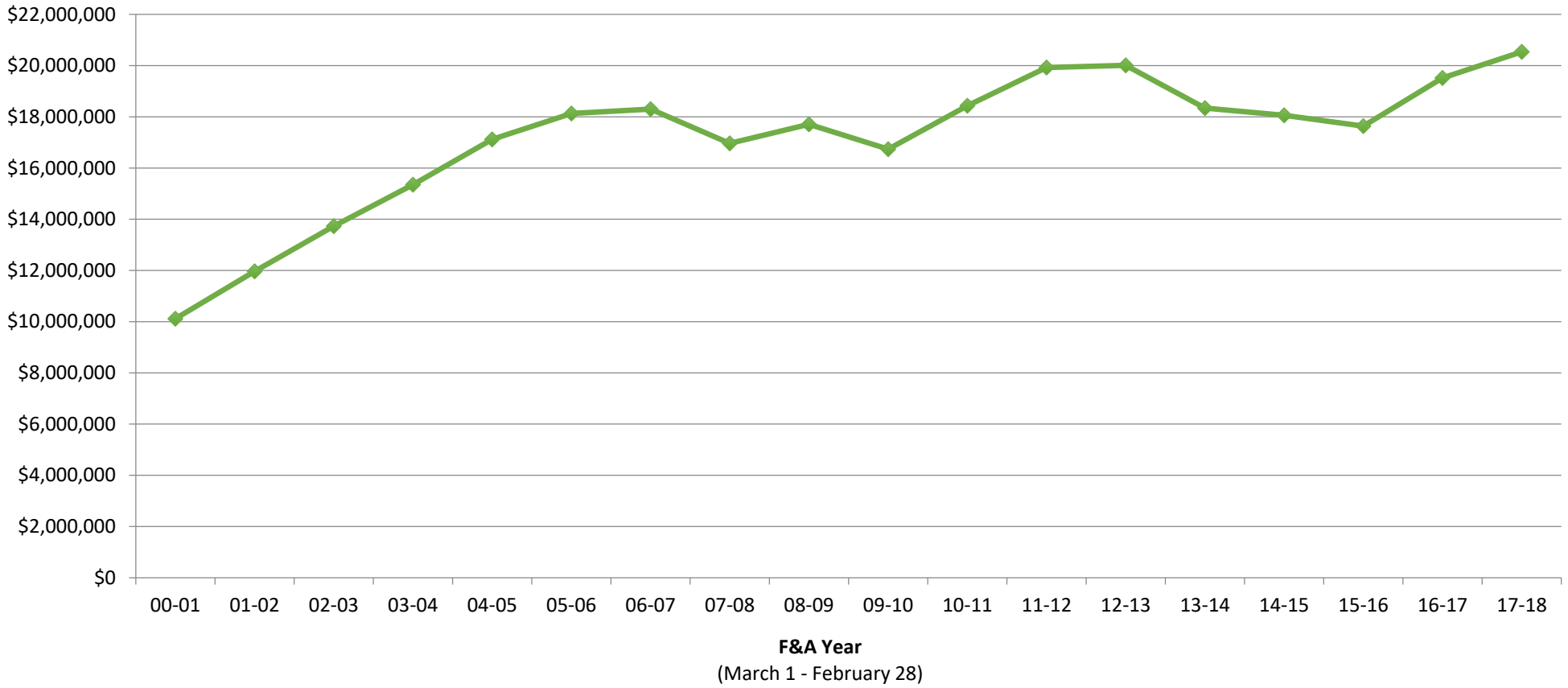
Additional University Support – $14.5M

$ 6.56M	Faculty start-up and retention
$ 4.0M	Research support (includes $3M Cryo-EM purchase)
$ 0.99M	Enrollment pressure, other instructional reform
$ 1.60M	Named/endowed professors
$ 1.38M	TLE and A+I

F&A Generated

00/01 through 17/18

(By NatSci Departments under all MAUs)



Department Leadership Changes

- **Stephen Zepf,** chair, Department of Physics and Astronomy

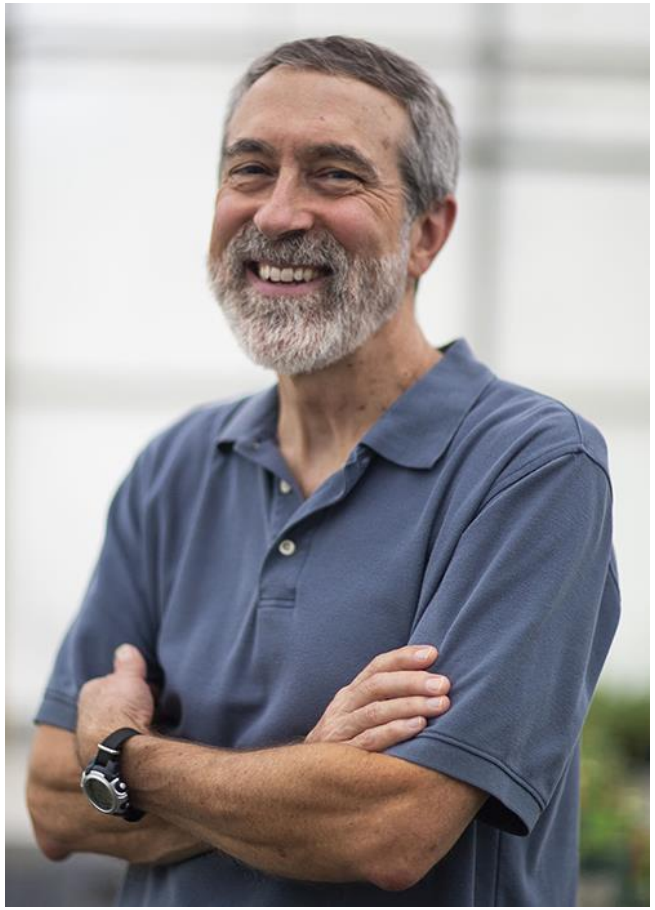
Program Leadership Changes

- **Frederi Viens,** interim director, Actuarial Science Program

Program Leadership Changes

- **Brad Day,** director, Molecular Plant Sciences Program

Kellogg Biological Station Leadership Changes



- **Jeffrey Conner,** interim director, Kellogg Biological Station

Dean's Office Leadership Changes

- **Phil Duxbury** became NatSci dean on Aug. 16.
- **Cheryl Sisk** returns to associate dean for faculty development on Aug. 16.

New NatSci Faculty Members

Biochemistry and Molecular Biology

- **Polly Hsu**, assistant professor, GII (plant genomics)
- **Robert Quinn**, assistant professor, GII (mass spectrometry)
- **Peter Lindquist**, assistant professor, GII (Plant Resilience Institute)

Computational Mathematics, Science and Engineering (CMSE)

- **Adam Alessio**, professor, GII (biomedical imaging with a tie to inverse problems) 70% BME, 30% CMSE
- **Daniel Chitwood**, assistant professor, GII (Plant phenomics and computational biology)

New NatSci Faculty Members (con.'t)

Earth and Environmental Sciences

- **Songqiao "Shawn" Wei**, Endowed Assistant Professor of Geological Sciences
- **Dalton Hardisty**, Endowed Assistant Professor of Global Change Processes
- **Jeffrey Freymueller**, professor, Thomas A. Vogel Chair for the Geology of the Solid Earth

New NatSci Faculty Members (con.'t)

Mathematics

- **Haiyan Liu,** professor, actuarial science
- **Ekaterina (Effie) Rapinchuk**, assistant professor

Physics and Astronomy

- **Tyler Cocker**, assistant professor (experimental condensed matter physics)
- **Darren Grant**, professor, ICECUBE/GII (astrophysics)
- **Claudio Kopper**, associate professor, ICECUBE/GII (astrophysics)

New NatSci Faculty Members (con.'t)

Plant Biology

- **Chad Niederhuth**, assistant professor, GII (plant genomics)
- **Berkley Walker**, assistant professor, PRL (plant responses to climate change).

Statistics and Probability

- **Shrijita Bhattacharya**, assistant professor (large scale data/computational statistics) 70% STT/30% CMSE
- **Chi-Li (Charlie) Sung**, assistant professor (large scale data/computational statistics)
- **Haolei Weng**, assistant professor (data science)

MSU Global Impact Initiative (GII)

The GII continues to have a significant impact on the development of MSU and the college:

- **Total MSU GII hires to date: 83** (25 senior; 53 junior)
  Pending MSU hires: 6
- **Total Nat Sci hires to date: 28** (5 senior; 23 junior) – 33.7% of total MSU hires
- **Approved NatSci searches for 2018-19: 5**
  1 junior, 4 open; STT, Mass Spec (BMB/GII), ultrafast (CEM/GII), 2-Cryo-EM (BMB/GII)

Early CAREER Award Winners

Laura Chomiuk – Physics and Astronomy, 2018 (NSF)
Susannah Dorfman – Earth and Environmental Sciences, 2018 (NSF)
Danny Ducat – Biochemistry and Molecular Biology/PRL, 2018 (NSF)
Kristen Hendricks – Mathematics, 2018 (NSF)
N. Cecelia Martinez-Gomez – Microbiology and Molecular Genetics, 2018 (NSF)
Kristin Parent – Biochemistry and Molecular Biology, 2018 (NSF)
Ashley Shade – Plant Biology, 2018 (NSF)
Michaela TerAvest – Biochemistry and Molecular Genetics, 2018 (NSF)

Early CAREER Award Winners

Still active:

Heiko Hergert – Physics and Astronomy, 2017 (DOE)
Jaideep Singh – Physics and Astronomy/FRIB, 2017 (DOE)
Huey-Wen Lin – Physics and Astronomy, 2017 (NSF)
Amy Ralston – Biochemistry and Molecular Biology, 2016 (Presidential)
Lars Brudvig – Plant Biology, 2016 (NSF)
Sean Couch – Physics and Astronomy, 2016 (DOE)
Christopher Wrede – Physics and Astronomy, 2016 (DOE)
Yingda Cheng – Mathematics, 2015 (NSF)
Aaron Levin – Mathematics, 2014 (NSF)

Foundation/Agency Awards

Beckman Young Investigator (BYI) Award:
Michaela TerAvest, Biochemistry and Molecular Biology

Simons Fellowship in Mathematics:
Yingda Cheng, Mathematics

Alfred P. Sloan Research Fellowship:
Thomas Walpuski, Mathematics

DARPA Directors Fellowship:
***Matthew Hirn**, Mathematics/CMSE*

Professional Society Awards

American Academy of Microbiology Fellows:

George Garrity, Microbiology and Molecular Genetics; **Beronda Montgomery**, Biochemistry and Molecular Biology

Ecological Society of America (ESA) Early Career Fellow:

Marjorie Weber, Plant Biology

Eugene P. Odum Award for Excellence in Ecology Education (ESA):

Diane Ebert-May, Plant Biology

International Academy of Quantum Molecular Science:

Piotr Piecuch, Chemistry

Endowed NatSci Faculty

Thomas A. Vogel Endowed Chair for Geology of the Solid Earth
Jeff Freymueller, Earth and Environmental Sciences

Endowed Assistant Professor of Global Change Processes
Dalton Hardisty, Earth and Environmental Sciences

Endowed Assistant Professor of Geological Sciences
Songqiao "Shawn" Wei, Earth and Environmental Sciences

James K. Billman Jr., M.D. Endowed Research Professor
Kristin Parent, Biochemistry and Molecular Biology

MSU Foundation Professors

MSU Foundation Professors:

R. James Kirkpatrick, Chemistry/Earth and Environmental Sciences

Yimin Xiao, Statistics and Probability

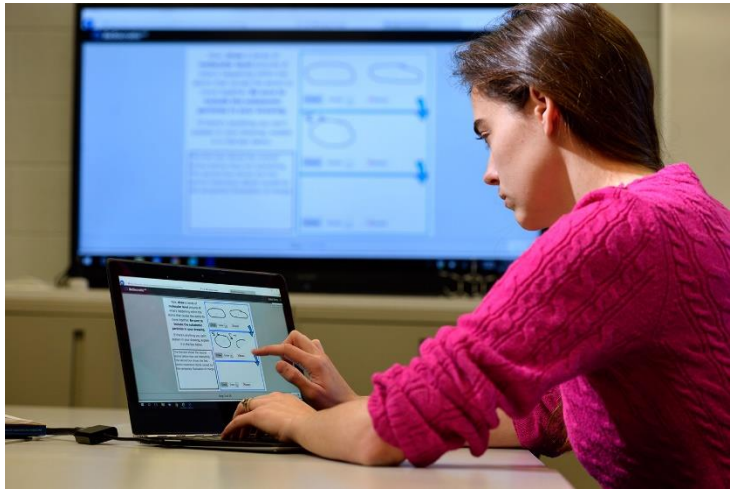
2018 William J. Beal Outstanding Faculty Award

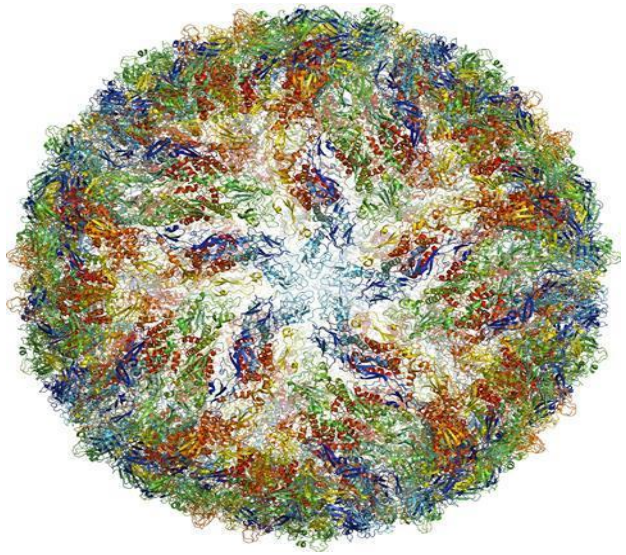
Gary J. Blanchard, Chemistry

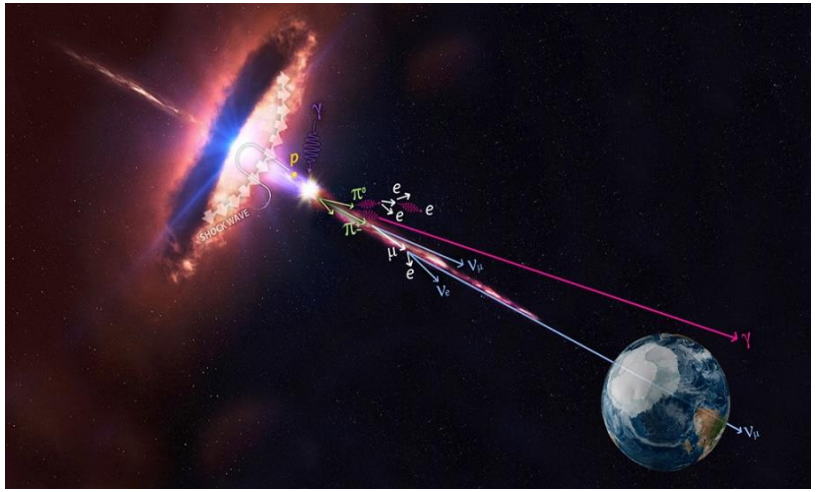
Alexandra Gade, Physics and Astronomy

James K. McCusker, Chemistry

Key Initiatives



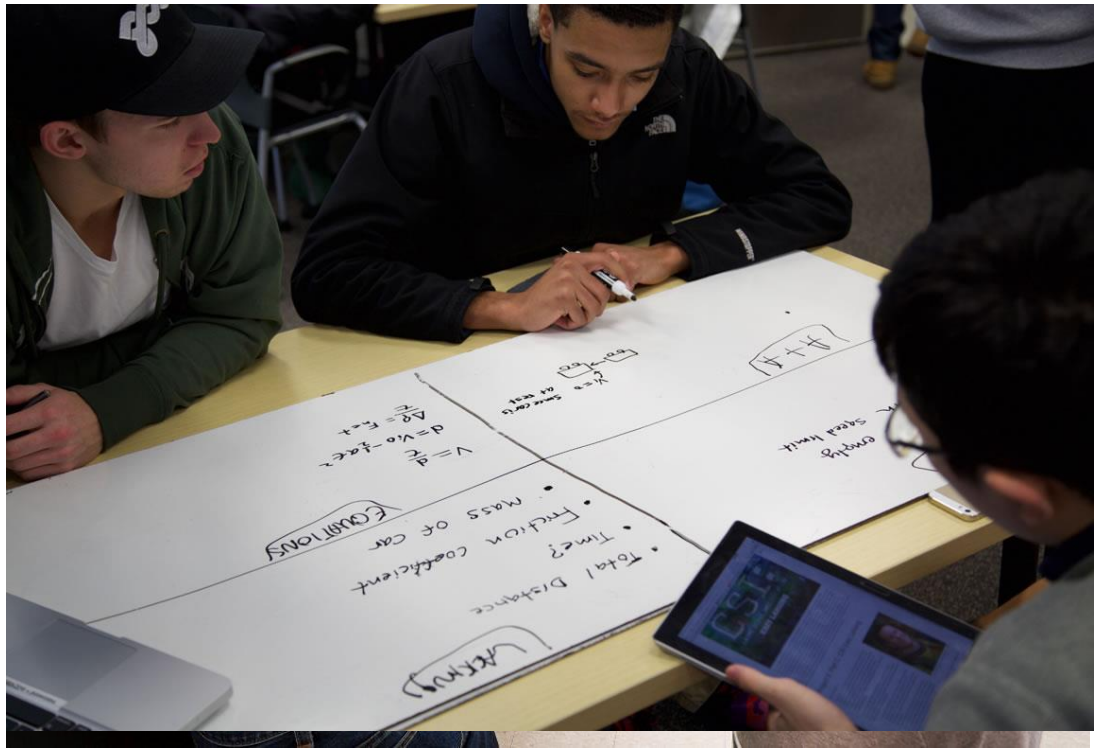




Transforming Undergraduate STEM Education

Long-term goals:

- Transform the STEM gateway curriculum around disciplinary core ideas, science practices and cross-cutting concepts.
- Expand transformation to upper level courses.
- Improve student learning, retention and success.



Transforming Undergraduate STEM Education (con't.)

Efforts to improve STEM Gateway Education:

- Math and statistics
- Chemistry
- Biology
- Physics

STEM Teaching and Learning Facility

- Ground officially broke for the $72.5 million, 117,000 sq. ft. building on August 31, 2018.
- First classroom building supported by State of Michigan in ~50 years.
- The facility is scheduled to open Fall 2020.

STEM Teaching and Learning Facility (con.'t)

Introductory Biology

- *C*ourse-based *U*ndergraduate *R*esearch *E*xperiences (CUREs)

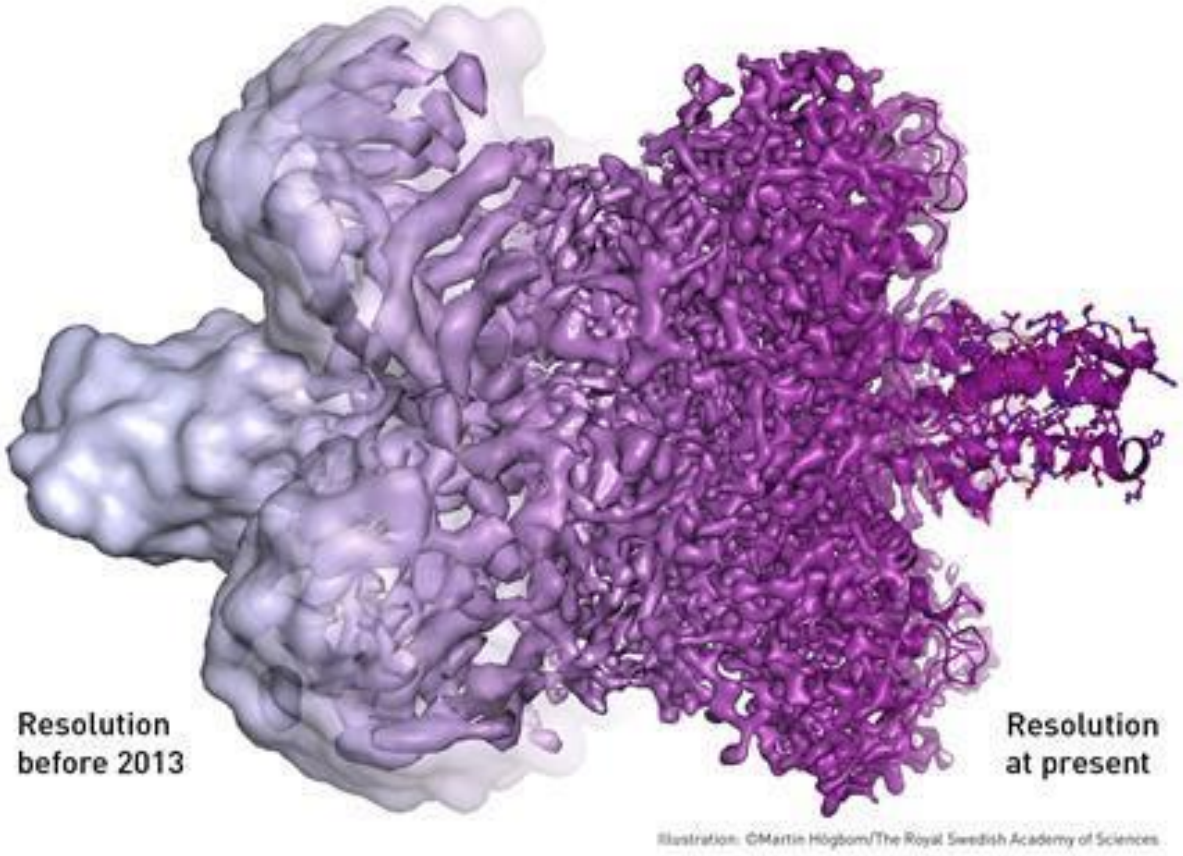
Introductory Chemistry

- Cooperative Chemistry- General and Organic

Introductory Physics

- Studio Physics

Cryogenic-electron microscopy (Cryo-EM)

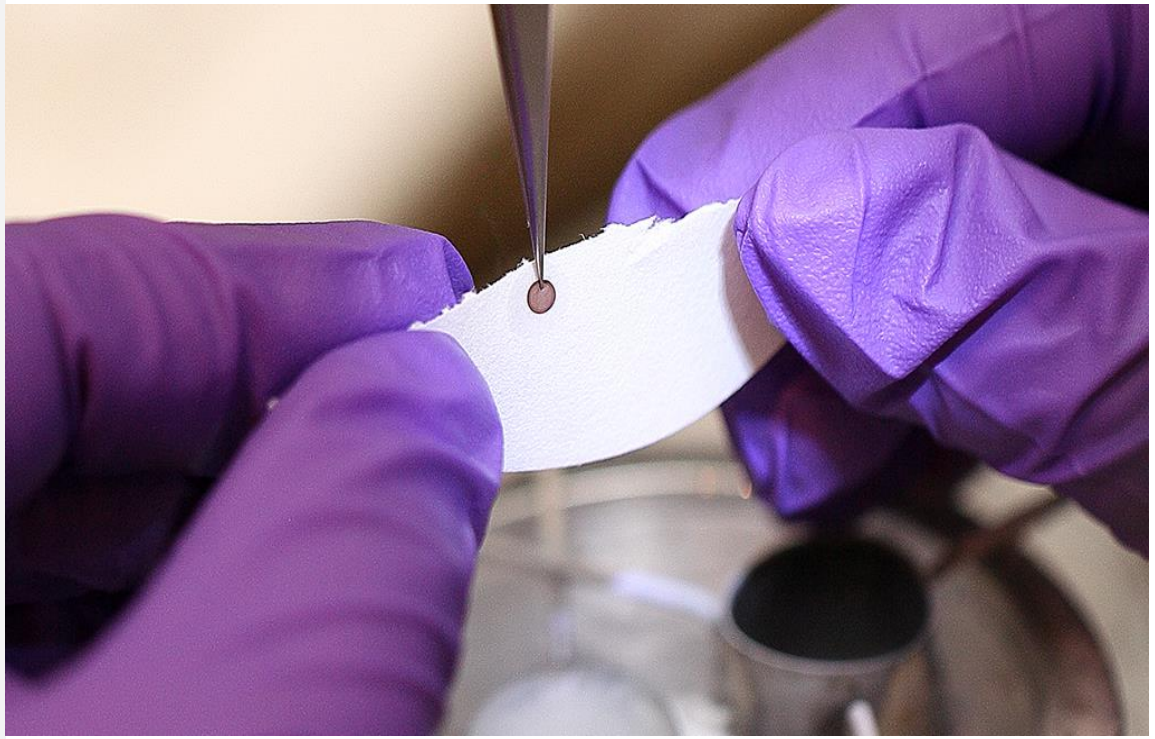


Cryogenic-electron Microscopy (con.'t)

Cryo-EM is gaining worldwide recognition that has revolutionized structural biology.

Benefits:

- Does not require crystallization
- Examine samples in a native, frozen hydrated state
- Achieve atomic resolution
- Ability to solve different conformational states from samples

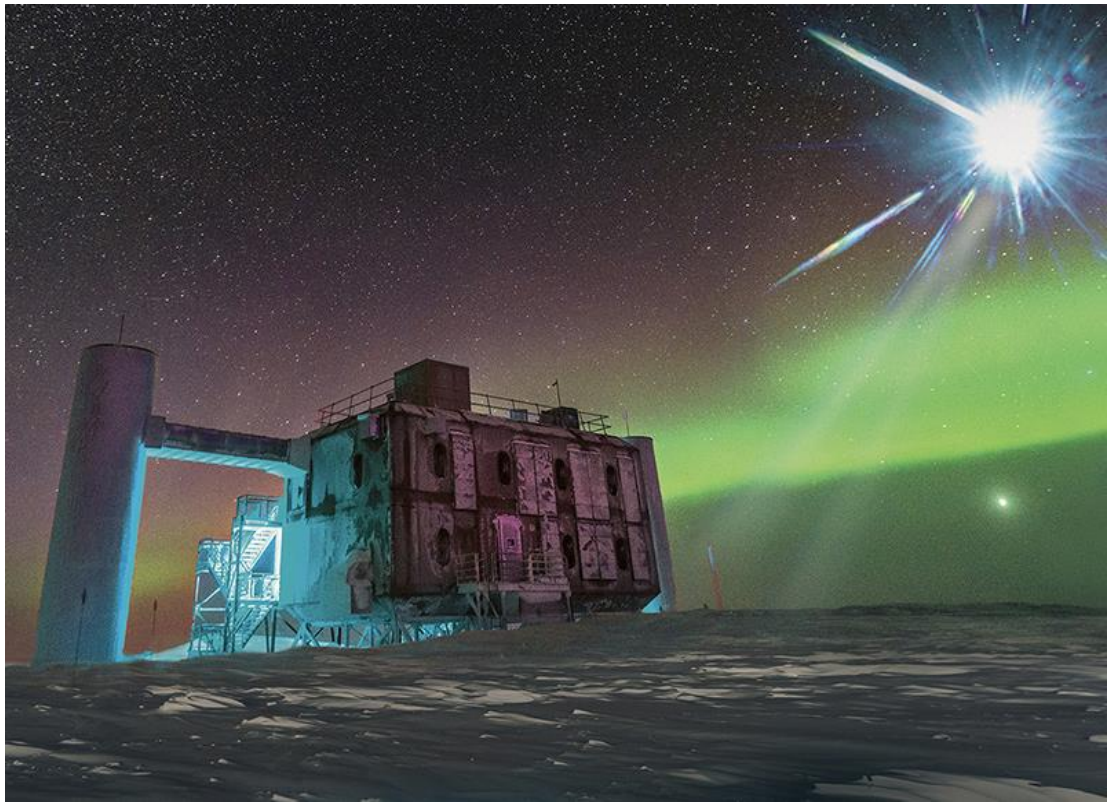


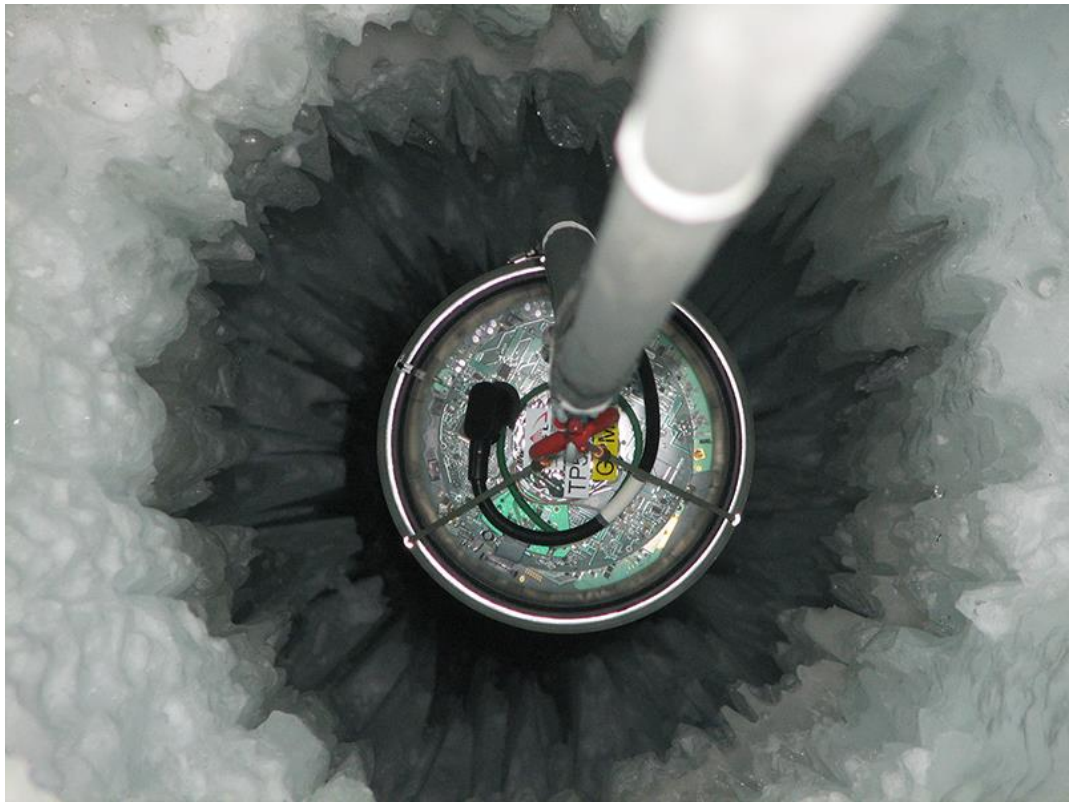
Cryogenic-electron microscopy (con.'t)

- MSU is purchasing a modern, automated and high-throughput Talos Arctica instrument.
- Estimated completion date: February 2019.
- In the process of hiring two tenure track faculty and a staff scientist.

Photo: Kristin Parent standing next to the just-delivered Cryo-EM microscope.

IceCube Neutrino Observatory

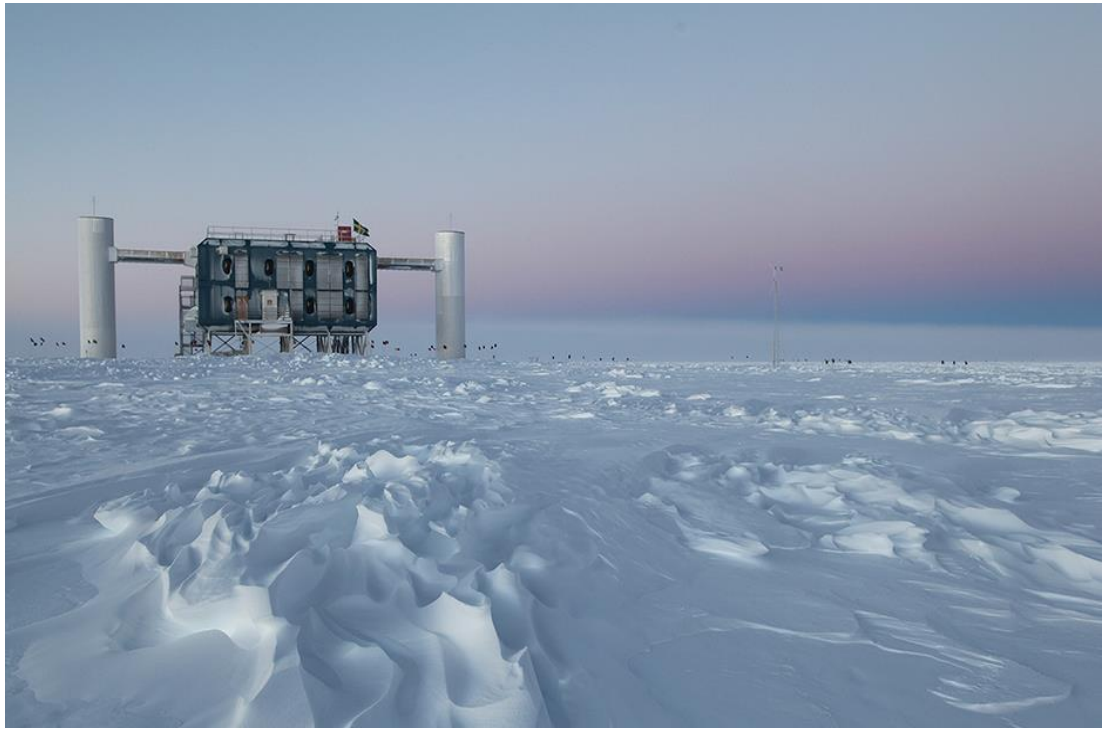


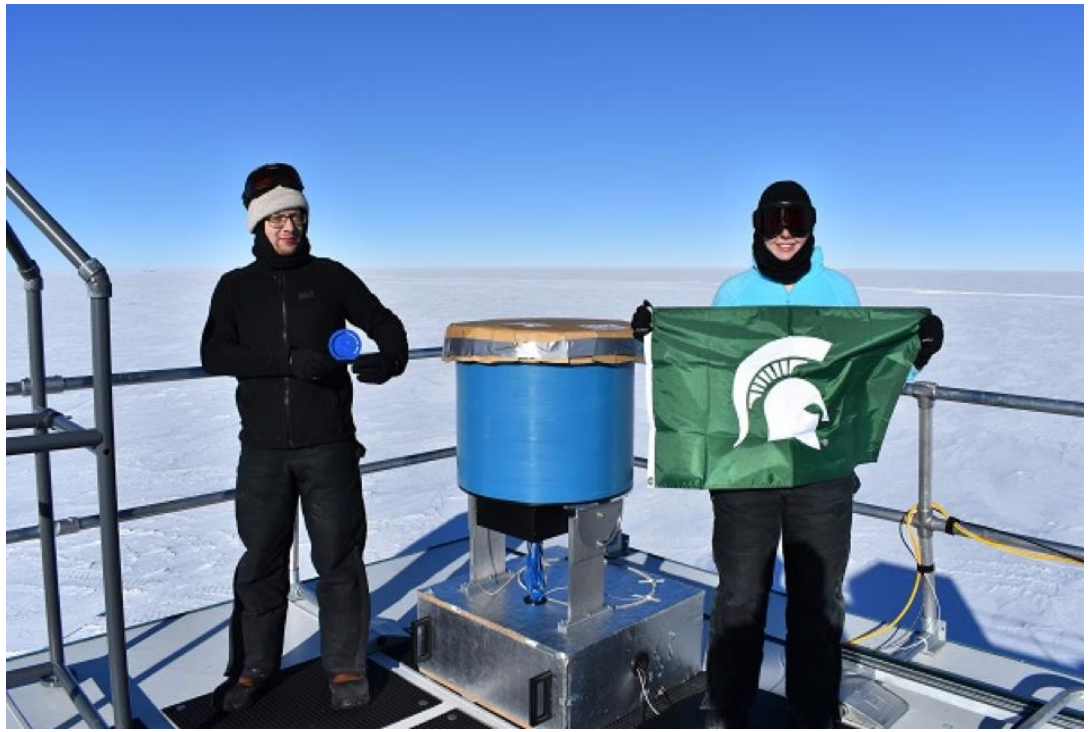


MSU IceCube Faculty Members

(L to R):
Tyce DeYoung
Darren Grant
Claudio Kopper

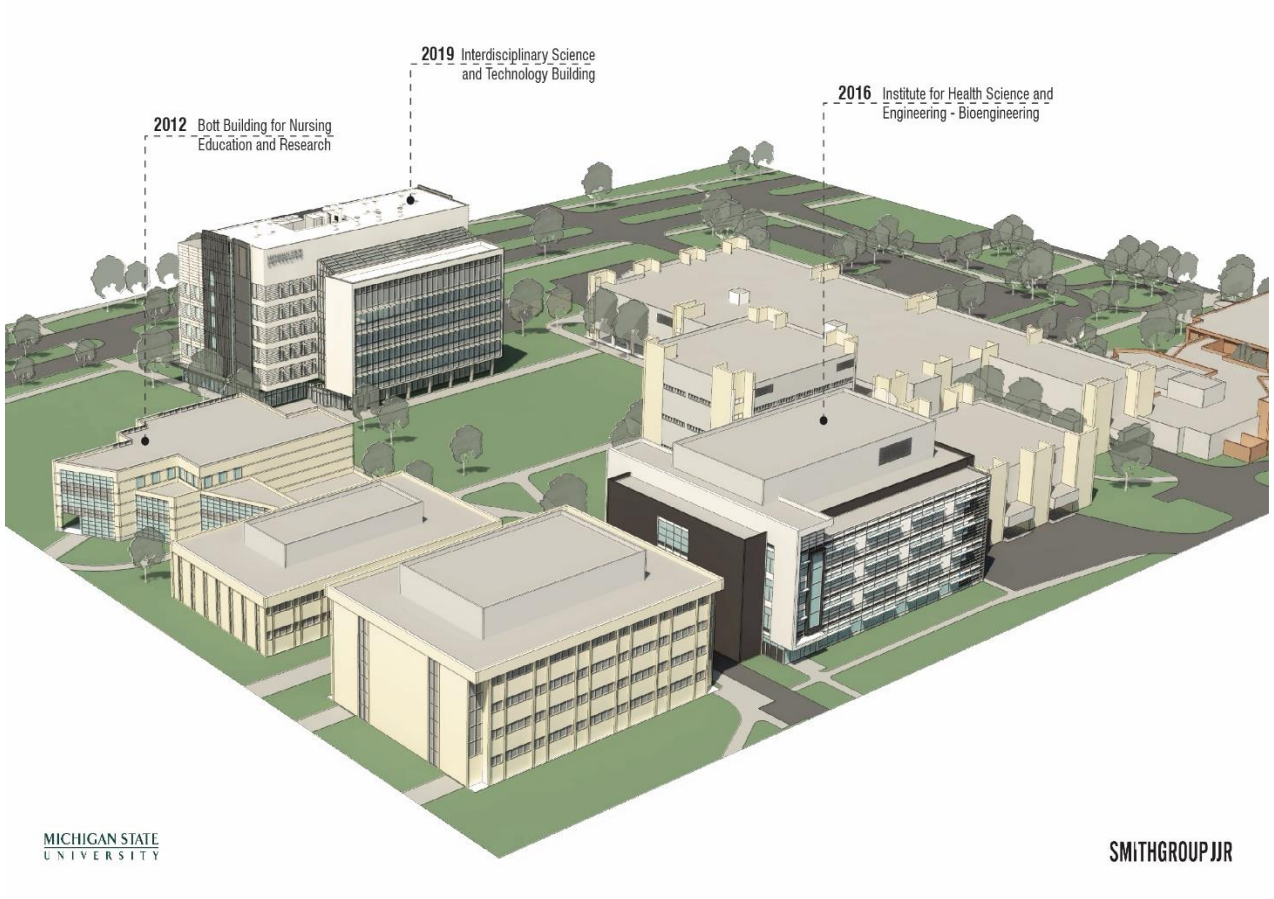
IceCube Neutrino Observatory (con.'t)

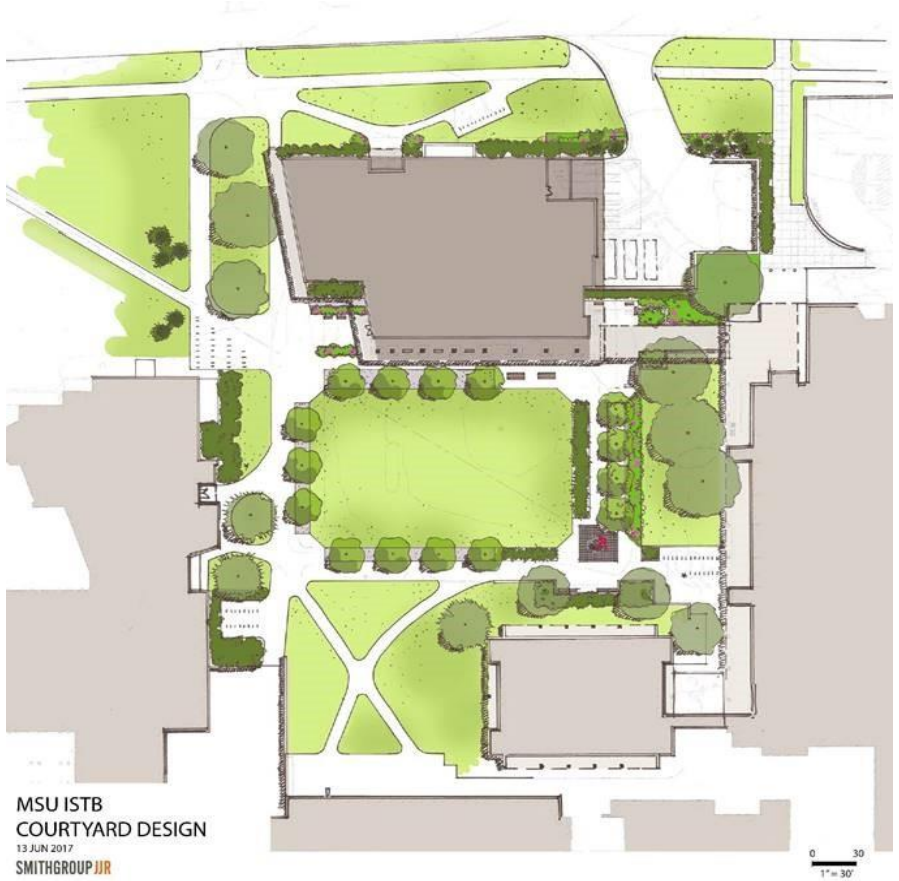




Interdisciplinary Science & Technology Building

Interdisciplinary Science & Technology Building





Key Grants



Research projects of note

- *Alkaline-Oxidative Pretreatment of Woody Biomass for Optimal Co-Product Production (DOE) Eric Hegg, $1.8M*
- *Taking Electric Fish Research to the EDGE with Gene Manipulation Technologies (NSF) Jason Gallant, $2.96M*
- *Research-PGR: A genome-level approach to balancing the vitamin content of maize* grain *(NSF), Dean Della Penna, Carol Buell, $4.4M*
- *Research-PGR: Elucidating Maize Gene Regulatory Networks to Accelerate Translational Genomics (NSF), Erich Grotewold, Andrea Doseff, $4.88M*
- *Investigations in Proton-Proton Collisions at the Large Hadron Collider, (NSF) Raymond Brock, Wade Fisher, Joey Huston, Reinhard Schwienhorst, $3.45M*

Research projects of note (con.'t)

- *Dimensions: Phylogenetic and Functional Diversity of Tripartite Plant-Fungal-Bacterial Symbioses (NSF), Gregory Bonito, Patrick Edger, Bjoern Hamberger, $1.99M*
- *INFEWS/T1: Developing Pathways Toward Sustainable Irrigation across the United States Using Process-based Systems Models (SIRUS), (NSF), David Hyndman, Annick Anctil, Bruno Basso, Anthony Kendall, Paolo Sabbatini, Jinhua Zhao, Adam Zwickle, $2.49M*
- *Resolving and understanding the genomic basis of heterogeneous complex traits and disease (NIH-R35/MIRA), Arjun Krishnan, $1.75M*

Teaching, training and success research

- *NRT-HDR: Intersecting computational and data science to address grand challenges in plant biology (NSF), Shinhan Shiu (PI), $2.99M*

Research Consortium Projects

- *Great Lakes Bioenergy Research Center (DOE), Eric Hegg (MSU Project Leader), $52.59M*
- *LTER: Mechanisms of resilience in agricultural landscapes (NSF), Stephen Hamilton (PI), Sarah Evans, Nicholas Haddad, Douglas Landis, Sandra Marquart-Pyatt, G Robertson, Scott Swinton, Bruno Basso, $4.5M.*
- *Photosynthetic Energy Capture, Conversion and Storage: From Fundamental Mechanisms to Modular Engineering (DOE), Christoph Benning (PRL Director), $3.17M*

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