

Conversations with Joint Policy Board for Mathematics



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Division of Mathematical
Sciences
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JPBM SUGGESTED TOPICS

- **Career pathways outside of academia**
- **Early Career opportunities**
- **Math Science Institutes**
- **Attracting more American students to degree programs**
- **Engagement of mathematicians/statisticians with other directorate funded research areas**

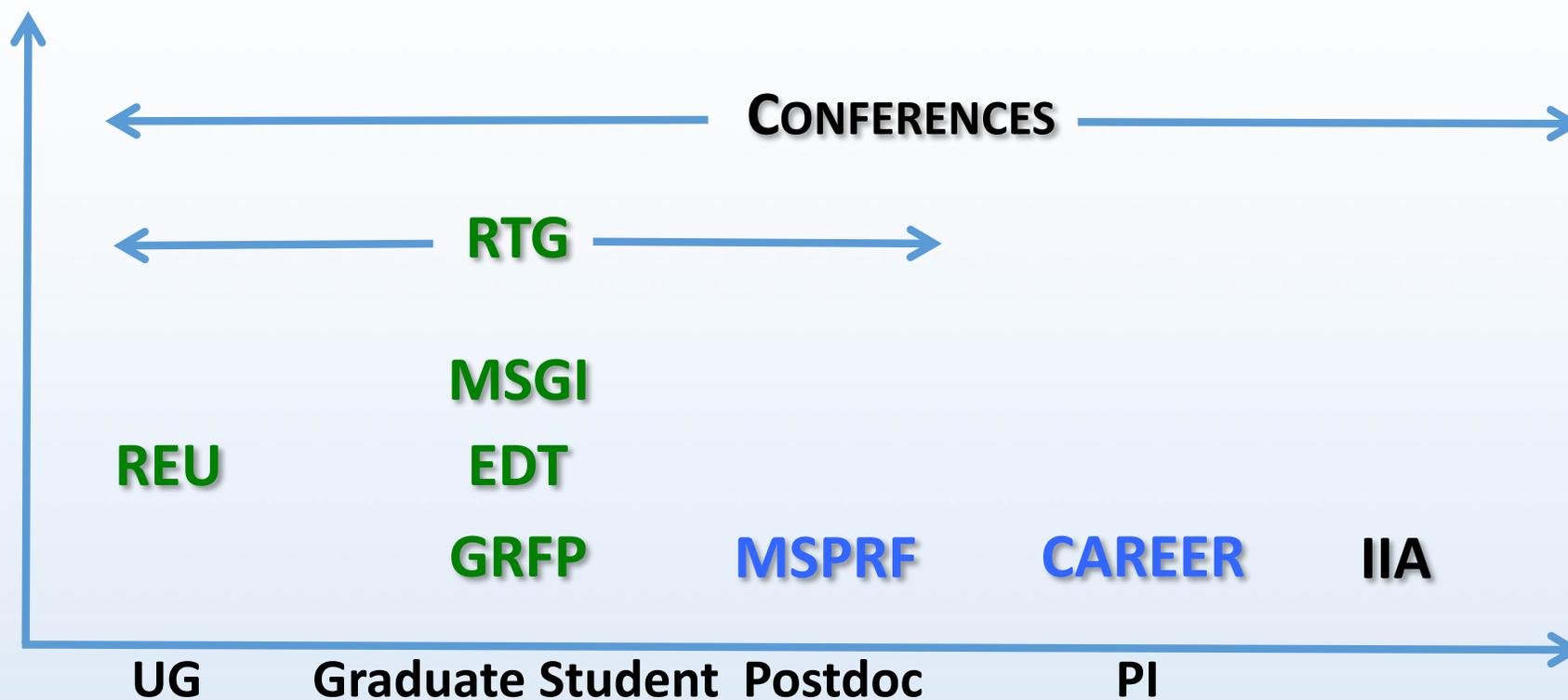


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1. **Attracting more American students to degree programs**
2. **Career pathways outside of academia**
3. **Early Career opportunities**
4. **Engagement of mathematicians/statisticians with other directorate funded research areas**
5. **Math Science Institutes**



DMS PROGRAMS ADDRESS A WIDE RANGE OF STAGES IN THE PIPELINE



MATHEMATICAL SCIENCES GRADUATE INTERNSHIP

- Provide an opportunity for mathematical sciences doctoral students to participate in internships at national laboratories, industry and other approved facilities
- Aimed at students who are interested in understanding the application of advanced mathematical and statistical techniques to "real world" problems, regardless of whether the student plans to pursue an academic or nonacademic career
- 40 graduate students from 38 universities worked in 10 National Labs in the Summer of 2017



SIAM News Article
(12/01/2017)



Managed by Oak Ridge Institute for Science and Education

Division of Mathematical Sciences

EARLY CAREER OPPORTUNITIES

- Mathematical Sciences Postdoctoral Research Fellowship (MSPRF) and Research Training Groups (RTGs) are important components of our Workforce Program
- DMS made 75 CAREER awards in FY16-17 (6th most at NSF)
- Program Officers are highly cognizant of importance of supporting young investigators
- DMS reviews portfolios to ensure we maintain a good balance



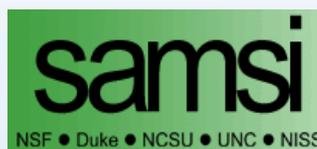
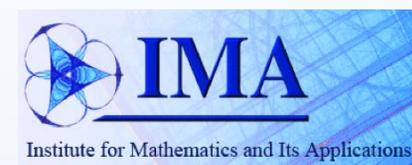
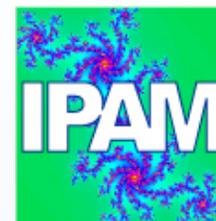
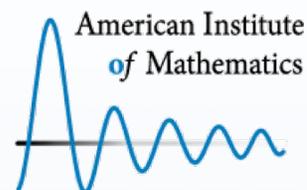
ENGAGEMENT IN RESEARCH FUNDED BY OTHER DIRECTORATES

- Mathematical Sciences Innovation Incubator addresses this
 - https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505044
- From the web page:
 - “The National Science Foundation (NSF) Division of Mathematical Sciences (DMS) aims to enhance the synergistic relationships between the mathematical sciences and other NSF-supported disciplines”
- Some example areas: security and resilience of critical infrastructure, emerging technologies, innovative energy technology, and foundational biological and health research.



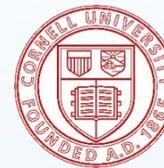
INSTITUTES RECOMPETE

- Mathematical Sciences Research Institutes solicitation (NSF 17-553) issued in FY 2017
- Webinar held Feb 20, 2018 with over 70 participants registered
- Proposals due **March 14, 2019**



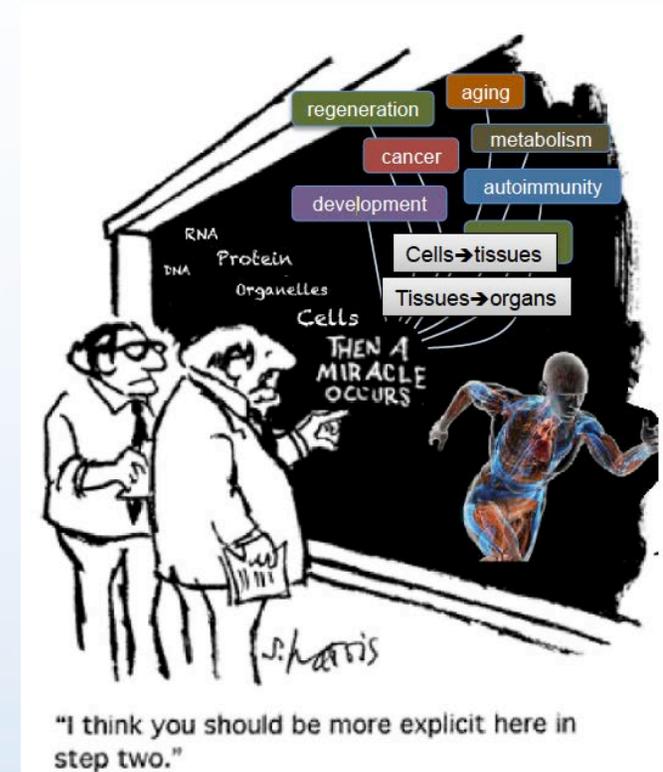
TRIPODS - TRANSDISCIPLINARY RESEARCH IN PRINCIPLES OF DATA SCIENCE

- Joint DMS & Division of Computing and Communications Foundations
- Bring together the statistics, mathematics, and theoretical computer science communities to develop the theoretical foundations of data science through integrated research and training activities
- 12 phase I awards. Each \$500K per year for three years.
- Phase II in FY 2020, anticipated to call for larger Institutes for up to 5 years of funding



NSF-SIMONS RESEARCH CENTERS FOR MATHEMATICS OF COMPLEX BIOLOGICAL SYSTEMS

- NSF and Simons Foundation Partnership
- 3 NSF Divisions: Mathematical Sciences, Integrative Organismal Systems, Molecular and Cellular Biosciences
- Support mathematical approaches aimed at understanding:
 - the complex causal relationships leading to emergent properties of molecular, cellular and organismal systems, or
 - to the emergent properties resulting from the complex integration across these levels of organization at different time scales
- Close, sustained collaborations between biologists and mathematical scientists that leverage their complementary expertise



CENTERS & INSTITUTES

- DMS is working to develop a strategic vision for managing the entire portfolio of centers and institutes
- We recently met with the current Math Institutes Directors where this topic was discussed
- Need to maintain a balance of different types of programs and activities as well as be aware of the importance of continuity
- Still in the early stages – input is welcome



OTHER IMPORTANT AREAS



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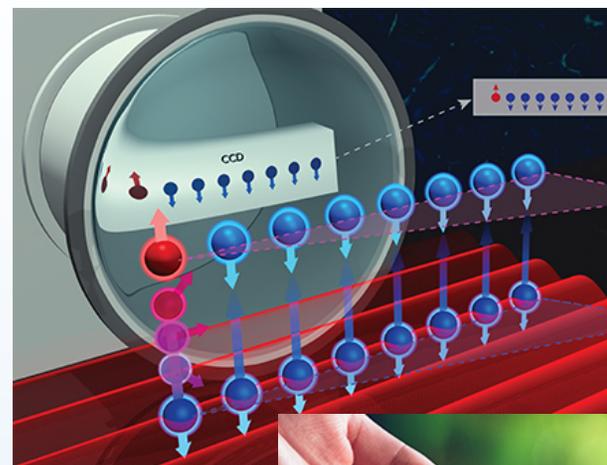
TEN BIG IDEAS FOR FUTURE NSF INVESTMENT RESEARCH

- Harnessing Data for 21st Century Science and Engineering
- Understanding the Rules of Life: Predicting Phenotype
- The Quantum Leap: Leading the Next Quantum Revolution
- Windows on the Universe: The Era of Multi-messenger Astrophysics
- Navigating the New Arctic
- The Future of Work at the Human-Technology Frontier



CONNECTIONS TO BIG IDEAS

- Mathematical aspects of advancing fundamental understanding of quantum phenomena, materials, systems, and information processing methods (DCL NSF 18-035)
- Define the key challenges and research imperatives to understand the organizational principles and rules of living systems. Seeking Conference, EAGER, and RAISE proposals (DCL NSF 18-031)



Quantum Leap

Rules of Life



SUMMARY

- We have several programs aimed at increasing numbers of American students and broadening participation
- DMS recognizes importance of supporting early career investigators
- DMS supportive of working with other disciplinary areas and encourages proposals with multidisciplinary research
- We are working on developing strategic vision for Centers and Institutes
- 10 Big Ideas important to future of DMS



THANK YOU!



Division of Mathematical Sciences