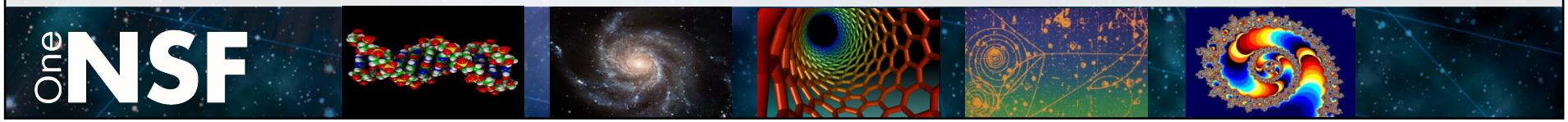
Diversity at the Forefront of Science: One View from NSF

F. Fleming Crim
Assistant Director for
Mathematical and Physical Sciences

April 2013



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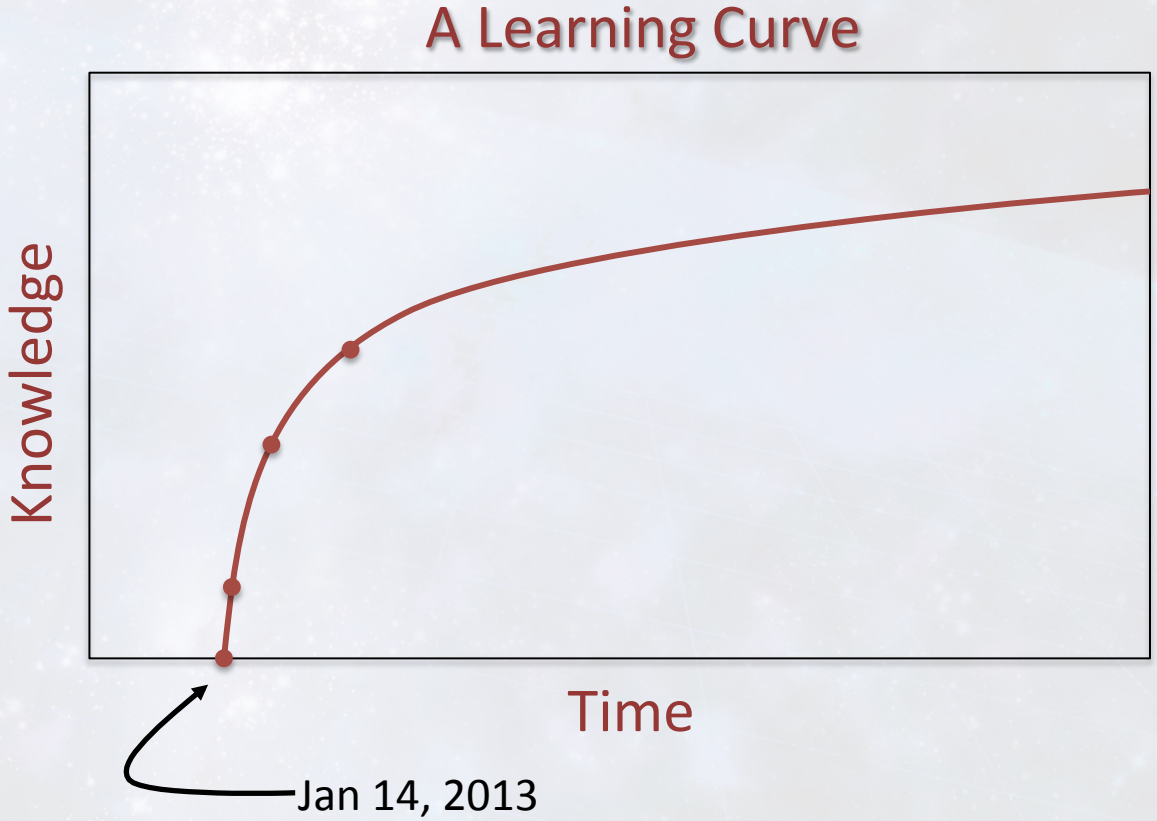
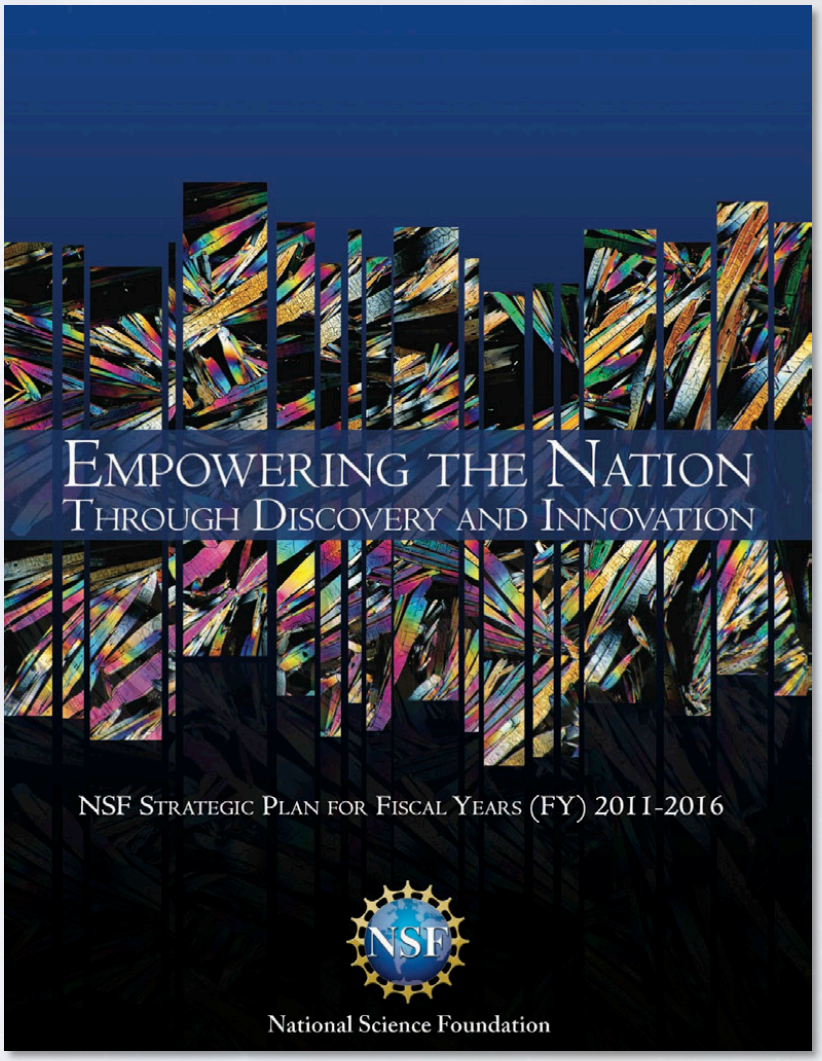


NSF Vision and Goals

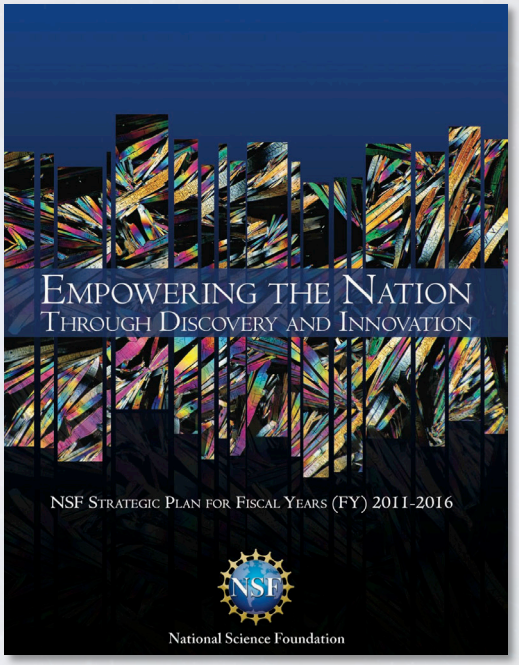


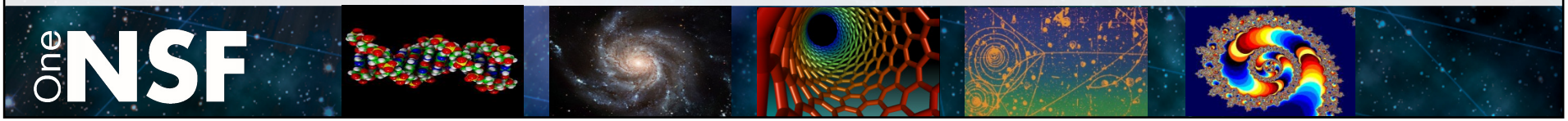
Directorate for Mathematical and Physical Sciences

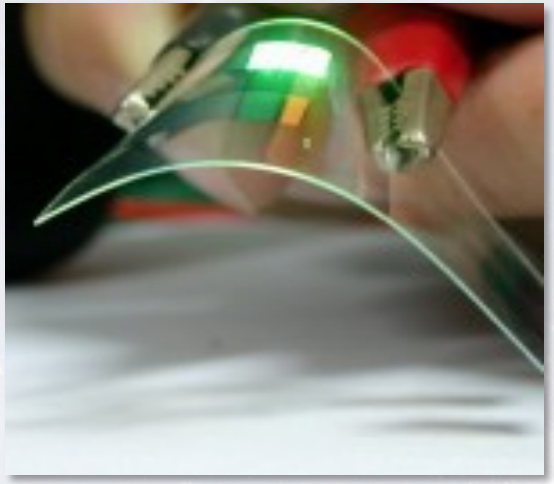
NSF Strategic Goals

- Transform the Scientific Frontiers
- Innovate for Society
- Perform as a Model Organization

- Advancing Discovery
  - Building Blocks for Innovation
    - Forefront Facilities
      - Educating the Next Generation

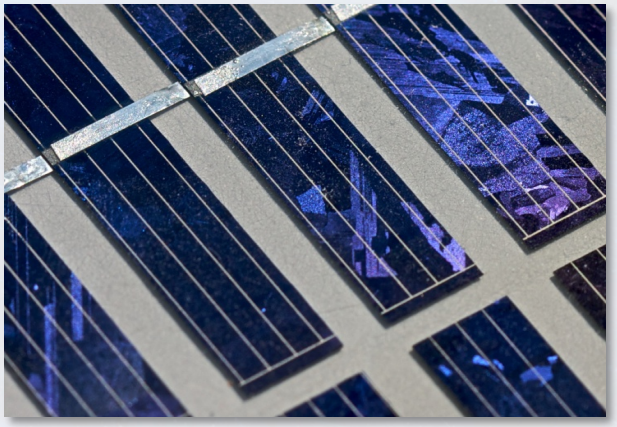




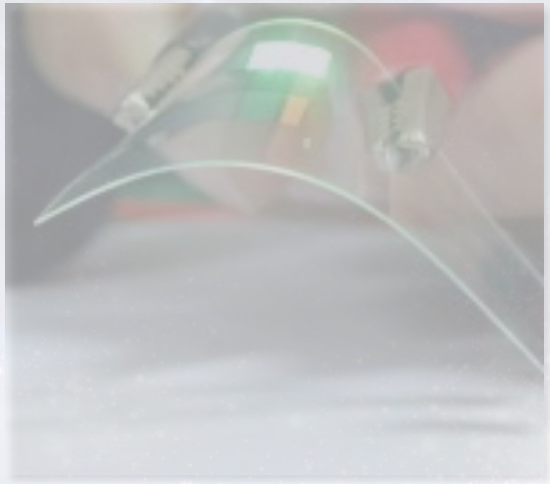


Polymers

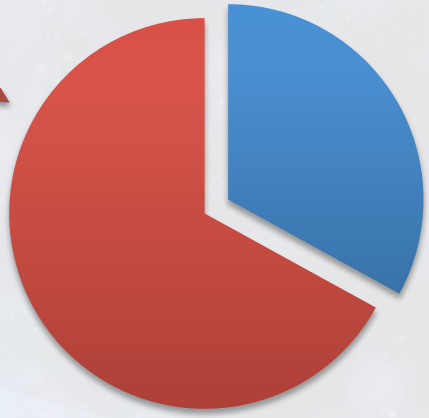
Electronics



Solar Cells

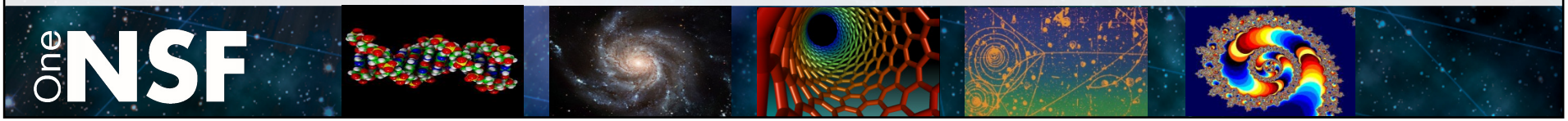


50 – 75 % of economic growth from fruits of basic research



$1 basic research

$40 – $140 GDP



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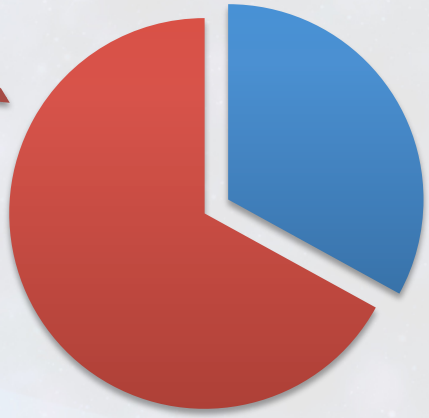

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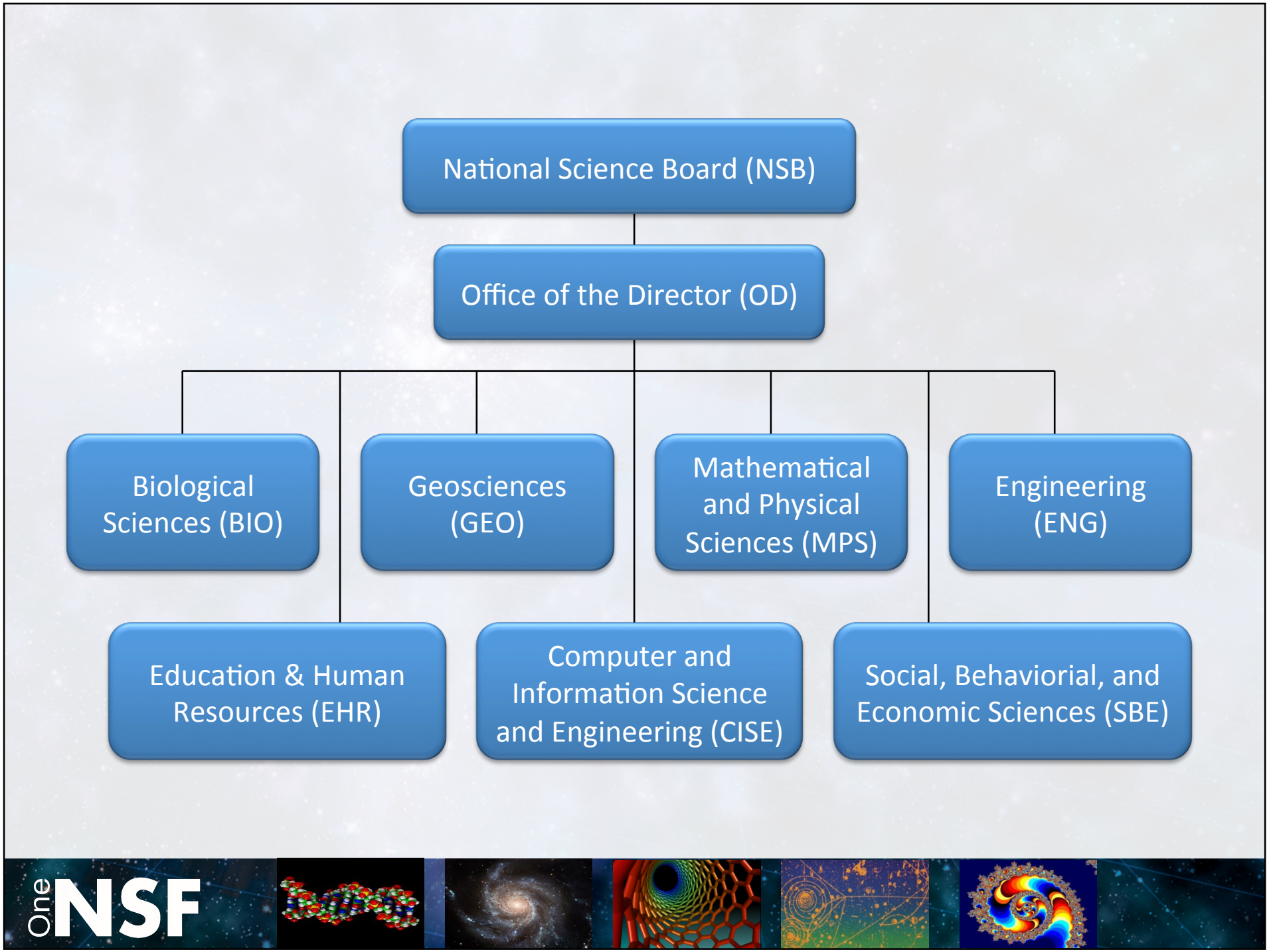
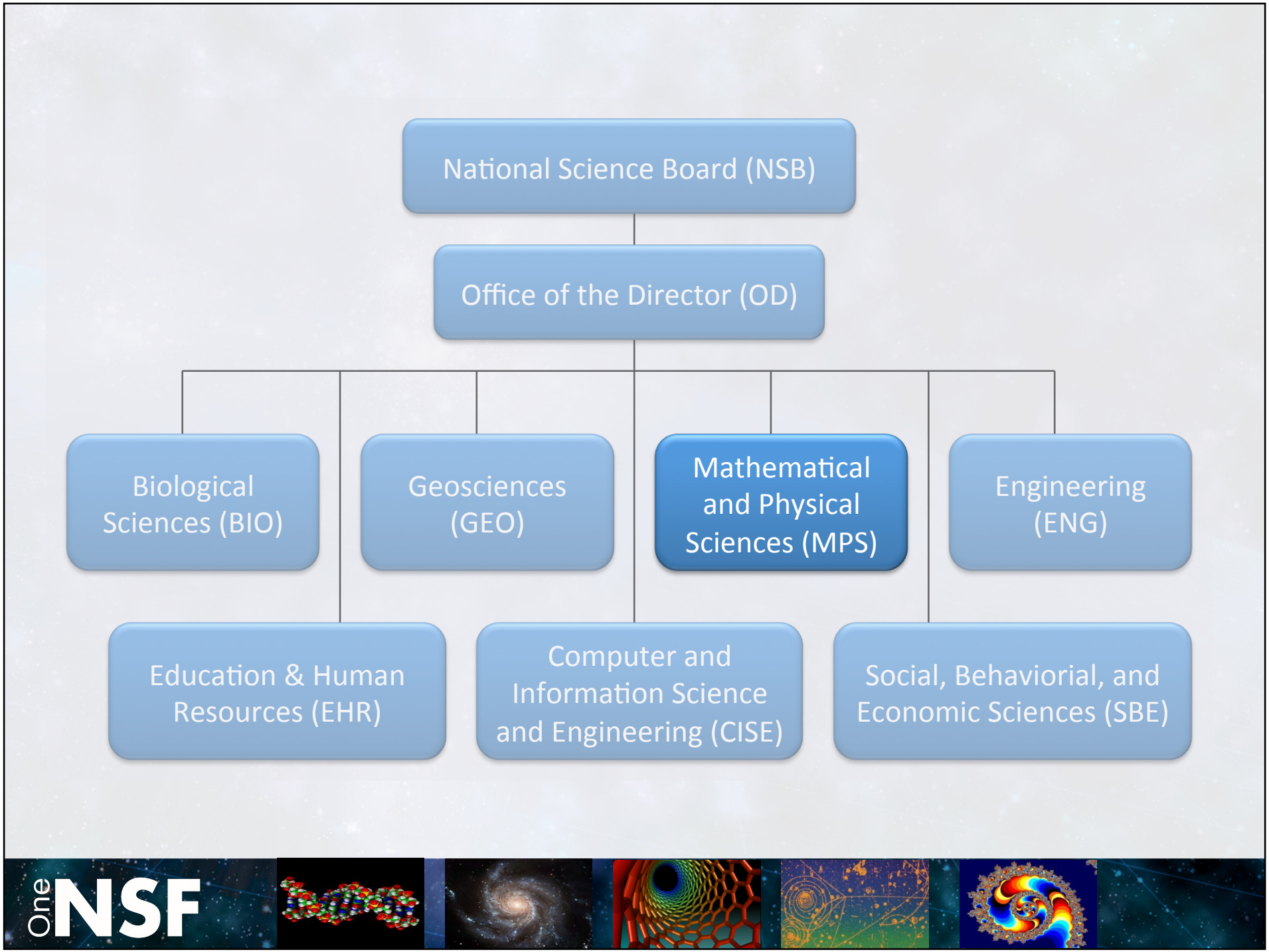

National Science Board (NSB)
Office of the Director (OD)
Biological Sciences (BIO)
Geosciences (GEO)
Mathematical and Physical Sciences (MPS)
Engineering (ENG)
Education & Human Resources (EHR)
Computer and Information Science and Engineering (CISE)
Social, Behaviorial, and Economic Sciences (SBE)
One NSF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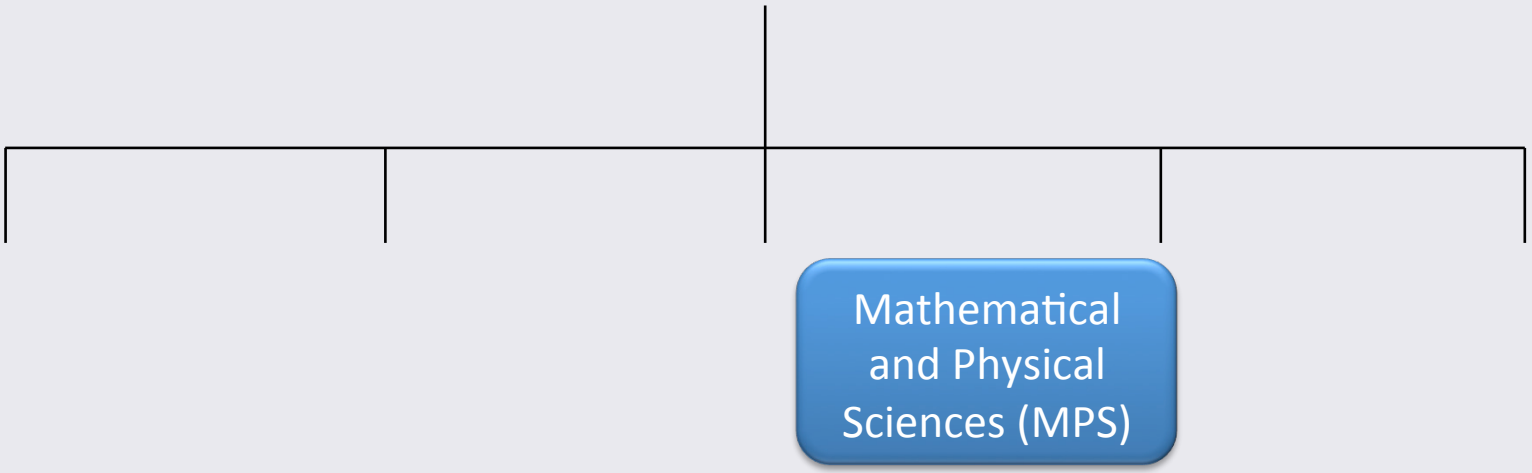
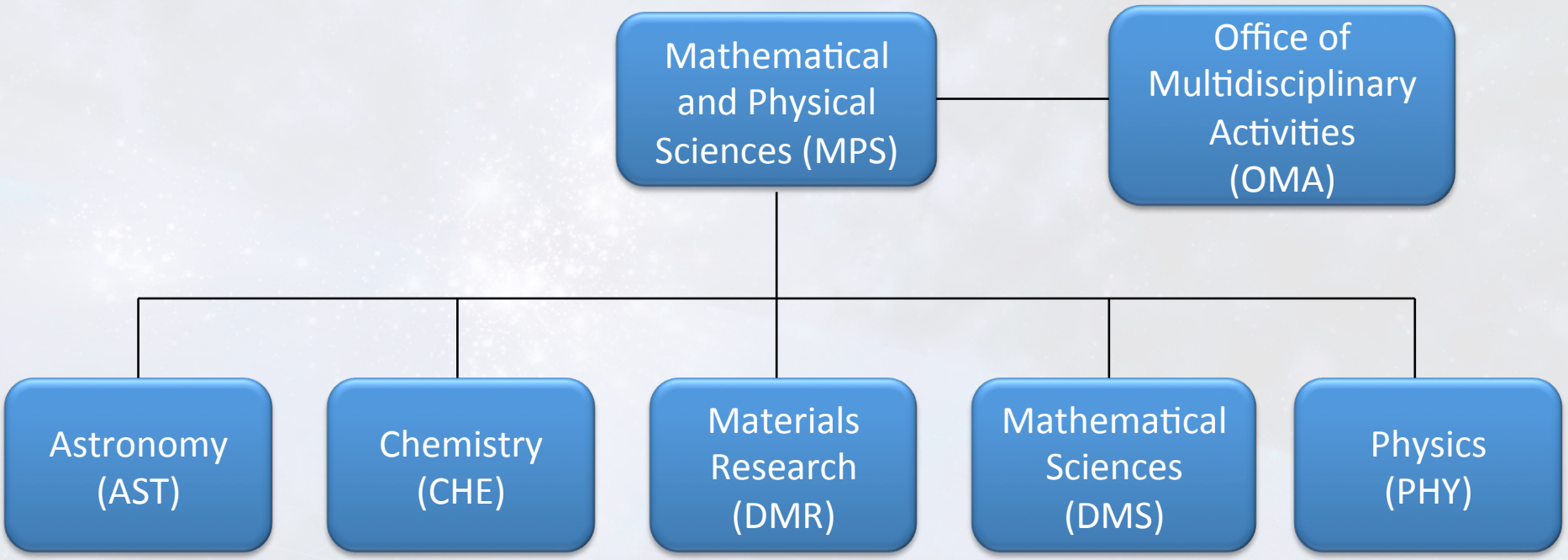
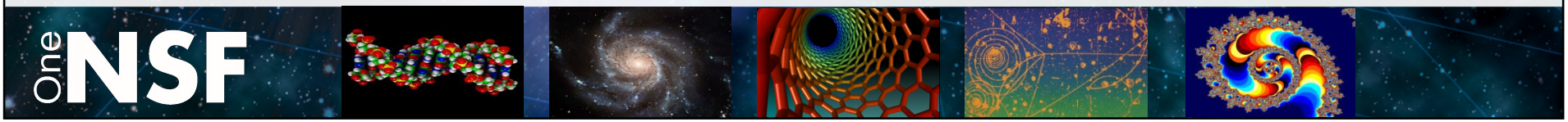
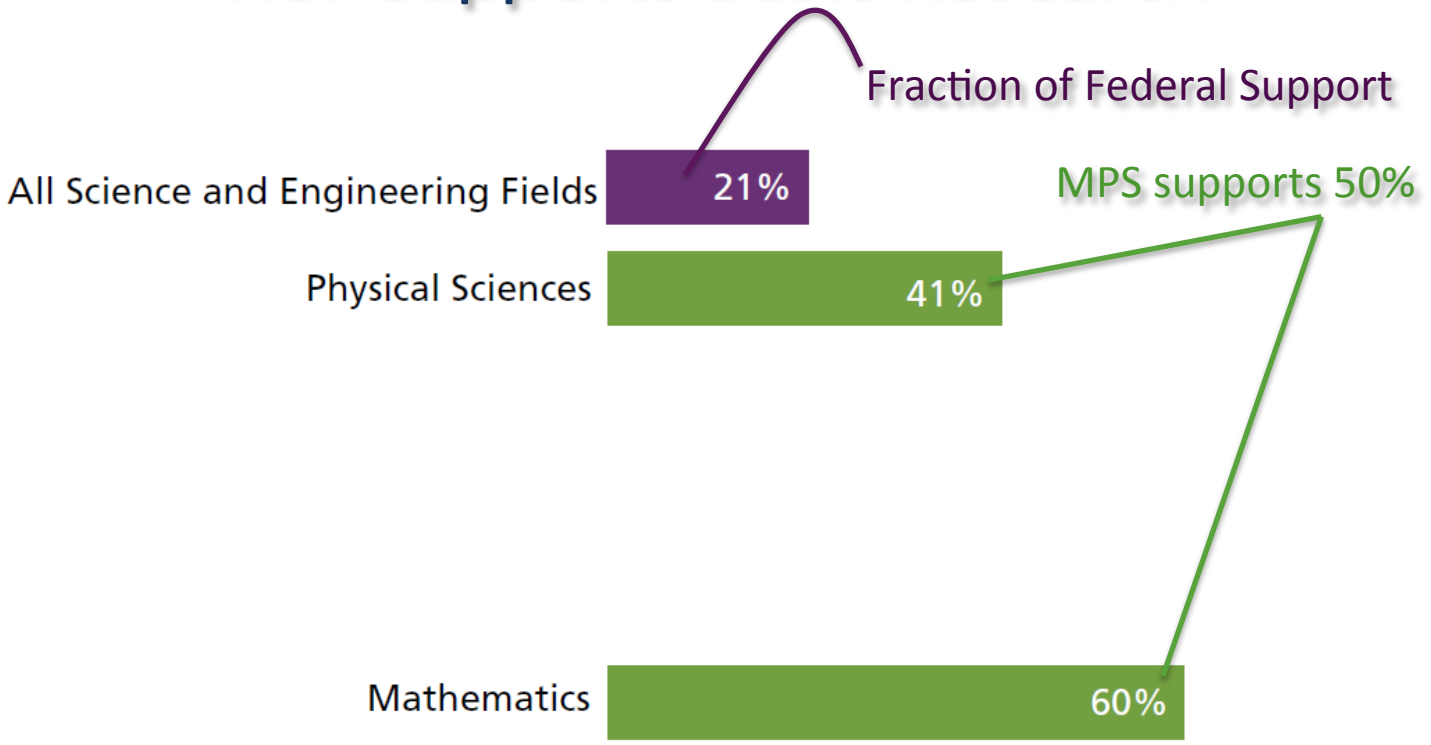

Mathematical and Physical Sciences (MPS)


Mathematical and Physical Sciences (MPS)
Office of Multidisciplinary Activities (OMA)
Astronomy (AST)
Chemistry (CHE)
Materials Research (DMR)
Mathematical Sciences (DMS)
Physics (PHY)


One NSF

NSF Supports Basic Research



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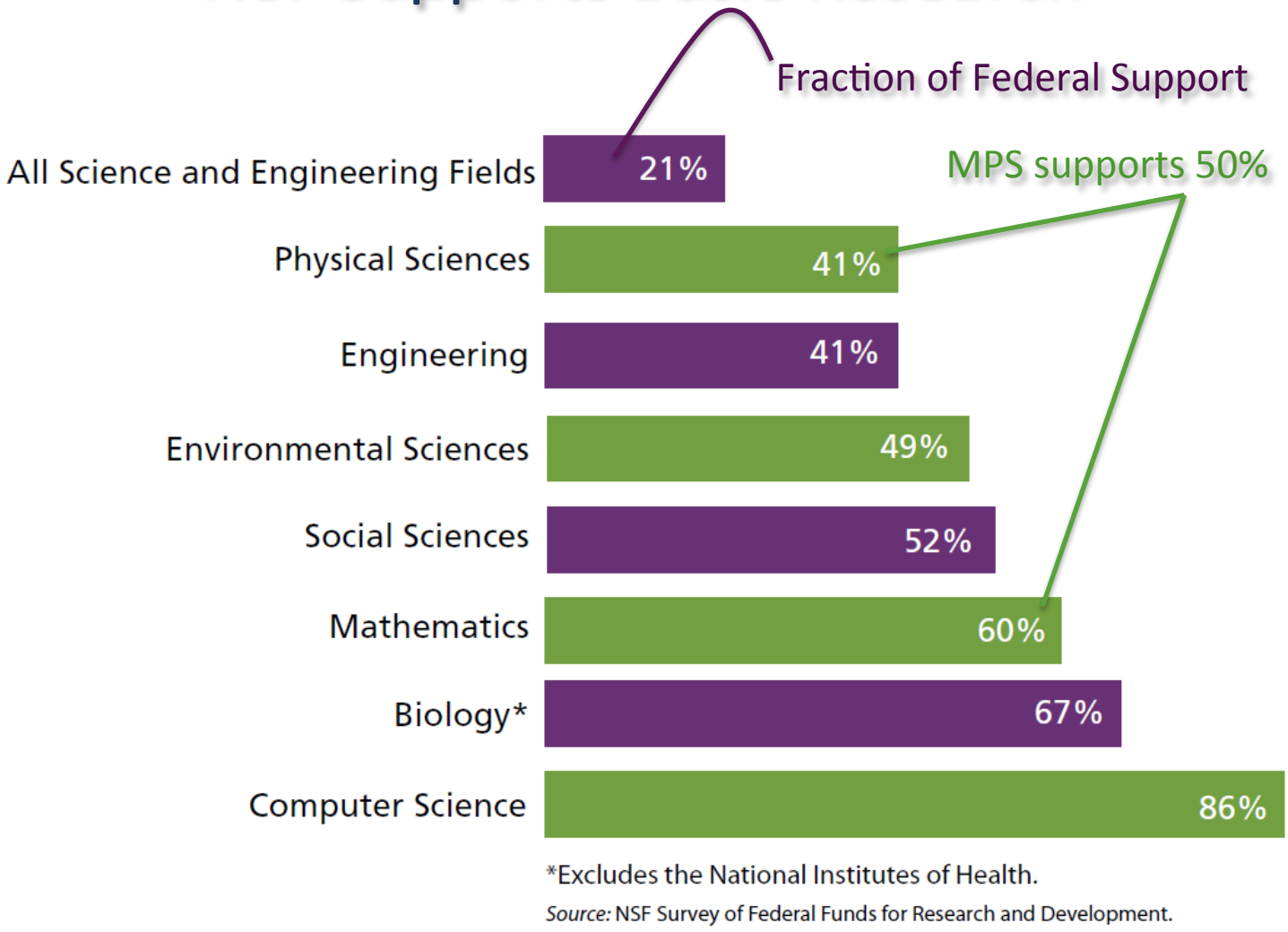
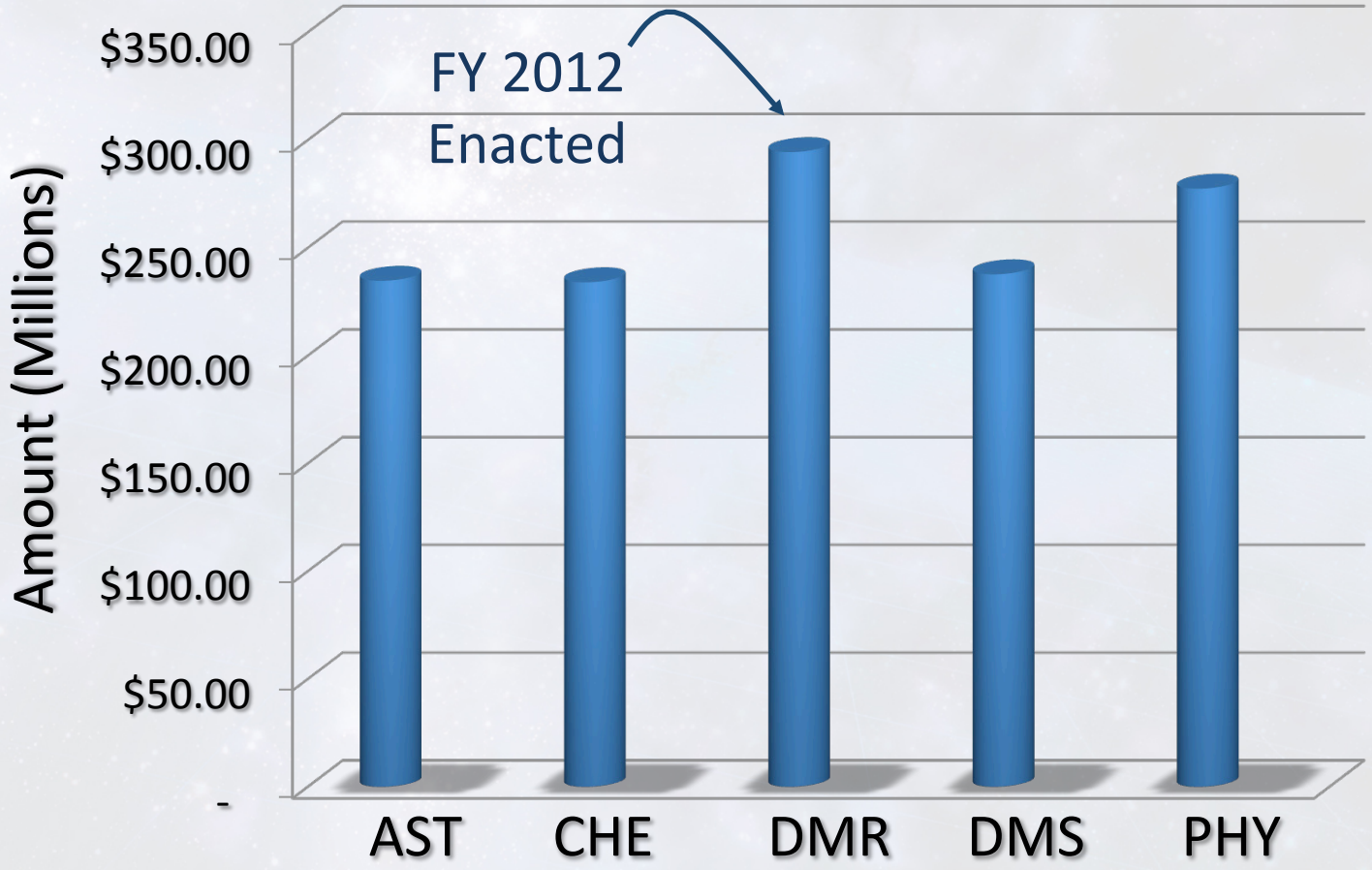


*Excludes the National Institutes of Health.

Source: NSF Survey of Federal Funds for Research and Development.

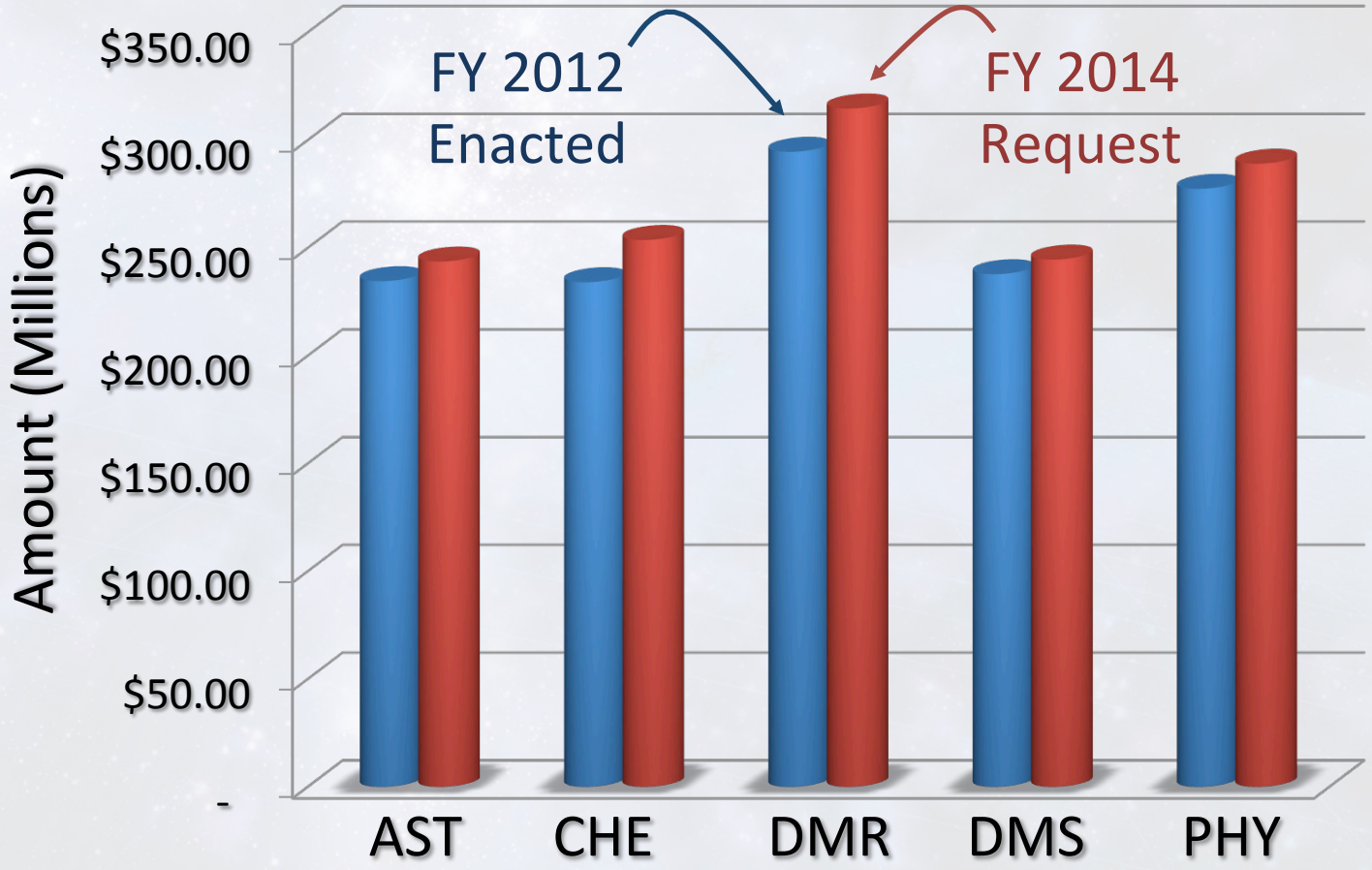
MPS FY 2014 Budget Request

$ 1309 M



MPS FY 2014 Budget Request

$ 1309 M → $ 1386 M 5.9% ↑



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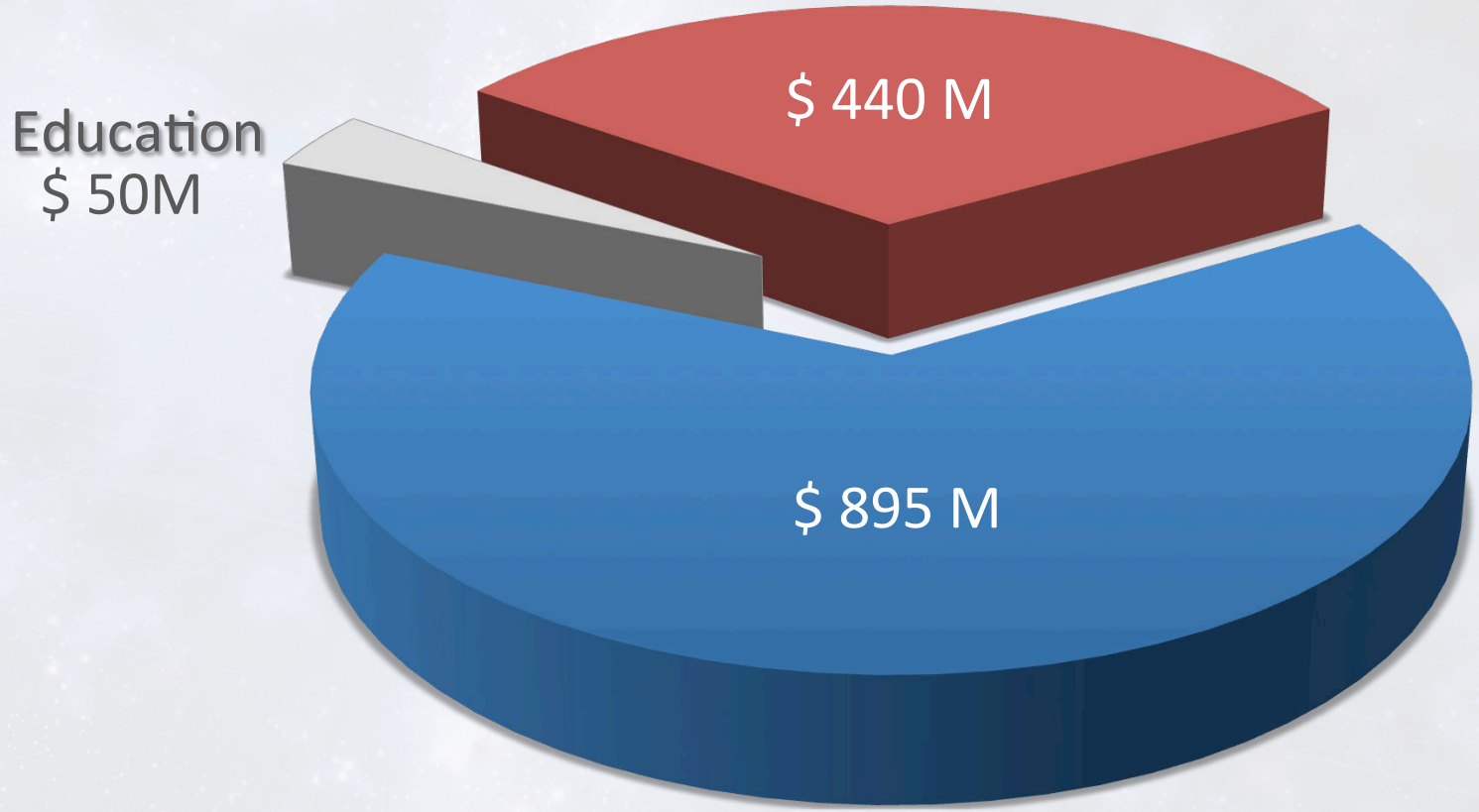


The Excitement of Advancing Discovery

…extending our view of galaxy formation nearly to the Big Bang…

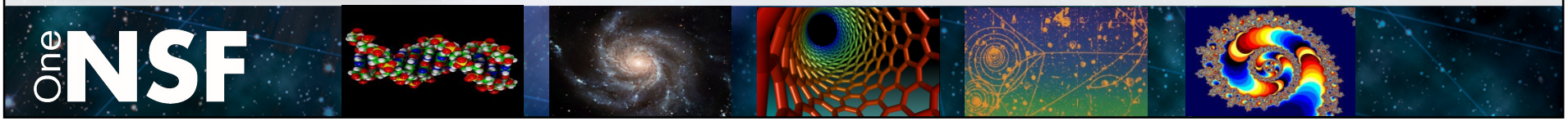
National Medal of Science
Sandra Faber (AST)

MPS supported 8 of 12 recipients of the National Medal of Science

Bard
Faber
Gates
Golomb
Goodenough
Hawthorne
Hood
Mazur

National Medal of Science
Barry Mazur (DMS)

…differential topology, number theory, and arithmetic algebraic geometry…



The Excitement of Advancing Discovery

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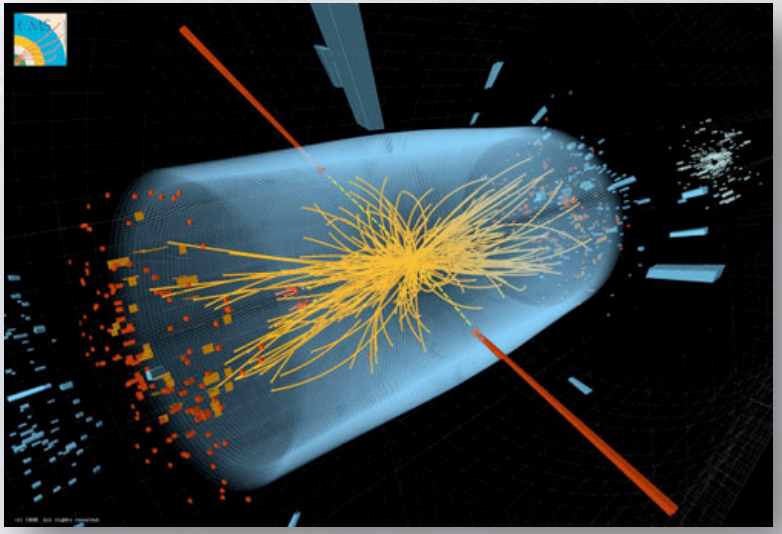
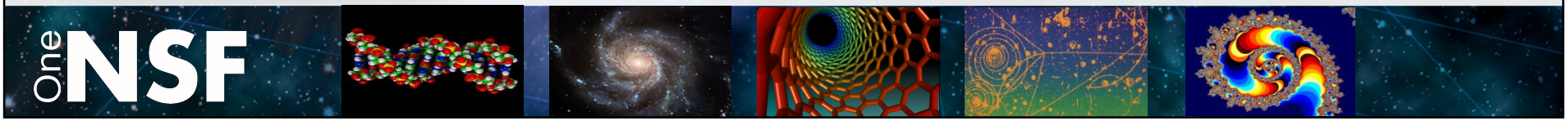
National Medal of Science
Barry Mazur (DMS)

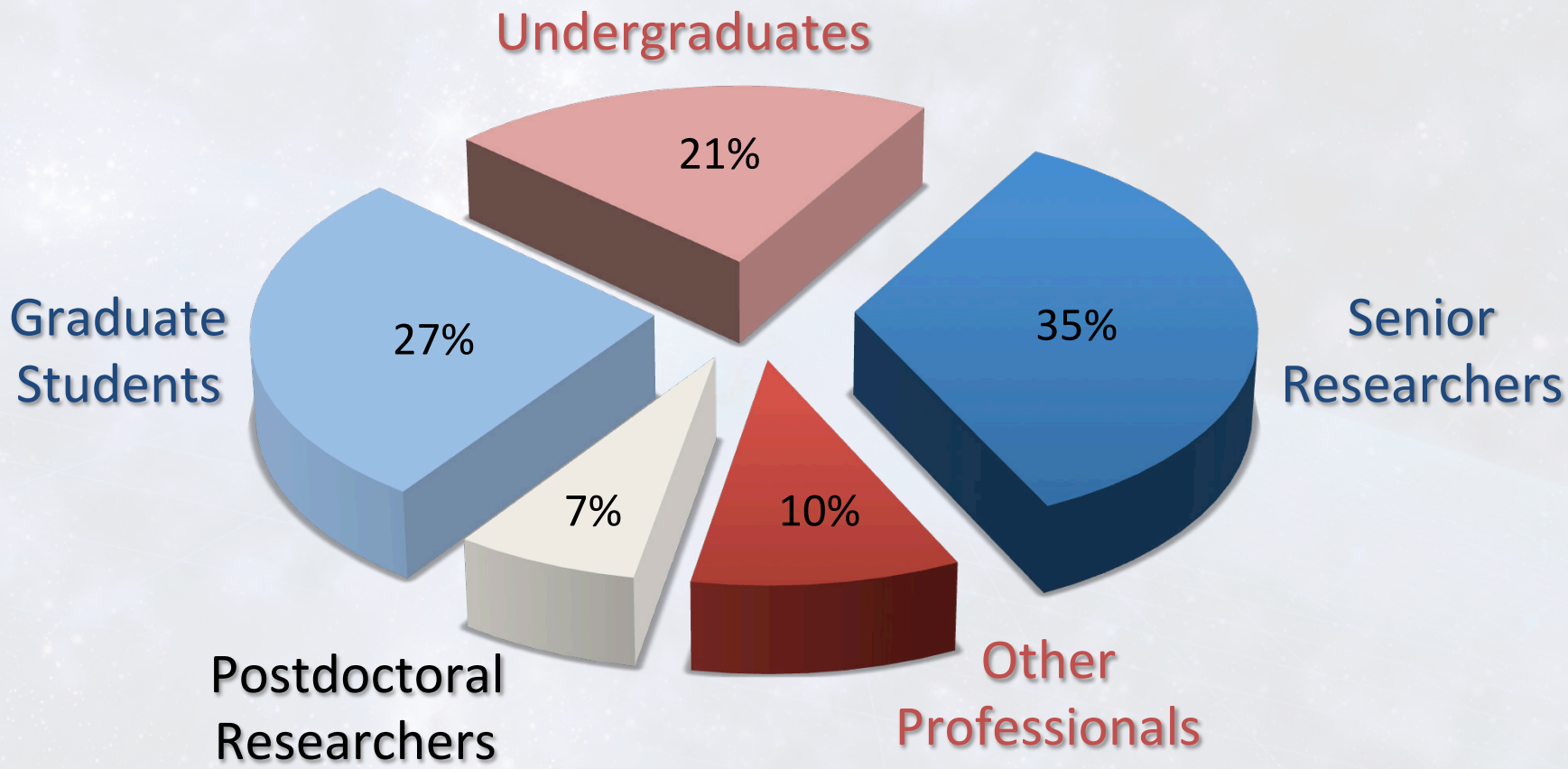


The Higgs Particle in the CMS detector at the LHC

…differential topology, number theory, and arithmetic algebraic geometry…



33,000 People in MPS Activities*



*Estimated for FY 2014

- Demographics
- Renew the workforce
- Invigorate science

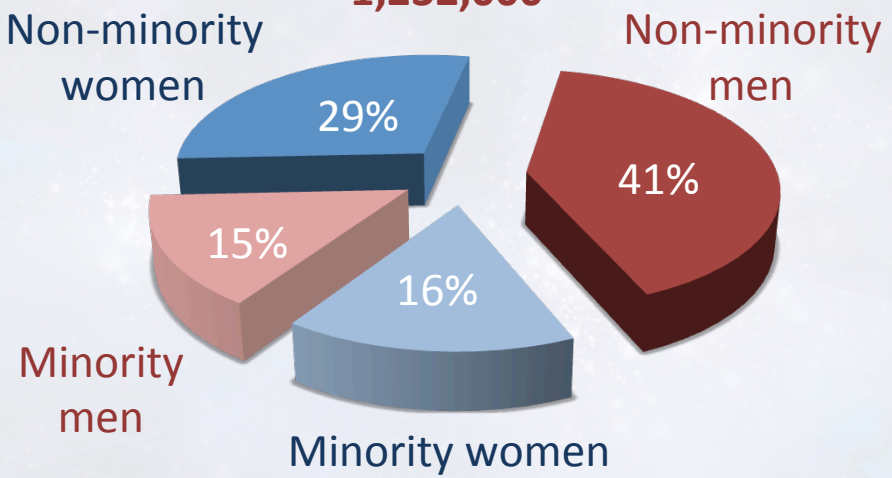
- Demographics
  - Attract the best to science
  - The US will be "majority minority" by 2042*
- Renew the workforce
  - The biological imperative
- Invigorate science
  - Culture and style matter

* US Census estimate

Milestones - Ethnicity and Gender - 2010

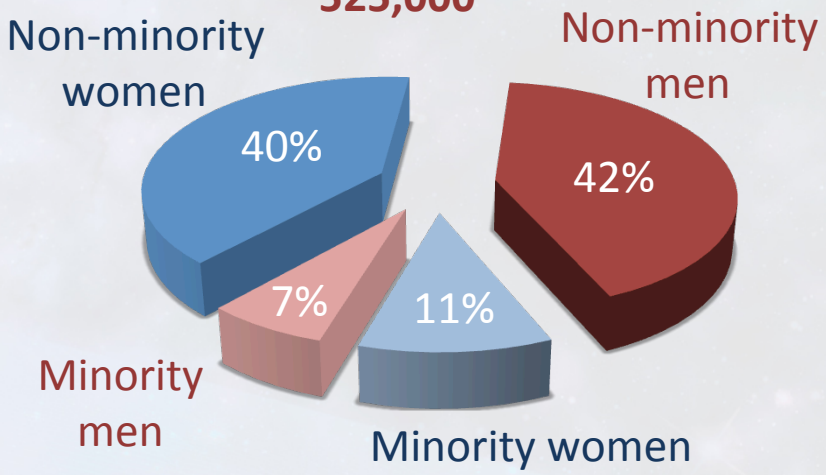
Freshmen – science, engineering

1,232,000



Bachelors – science, engineering

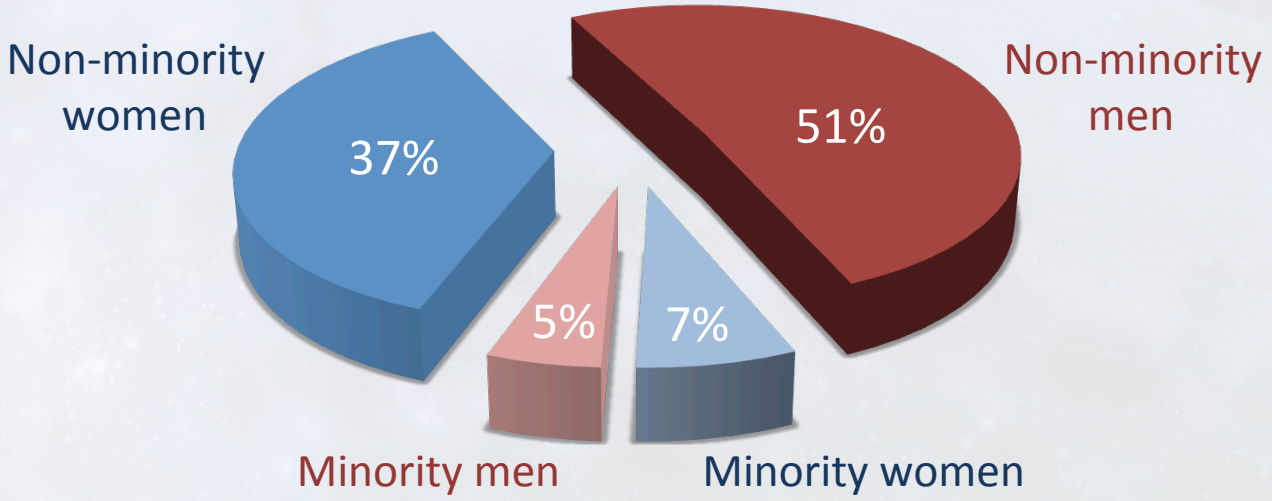
525,000

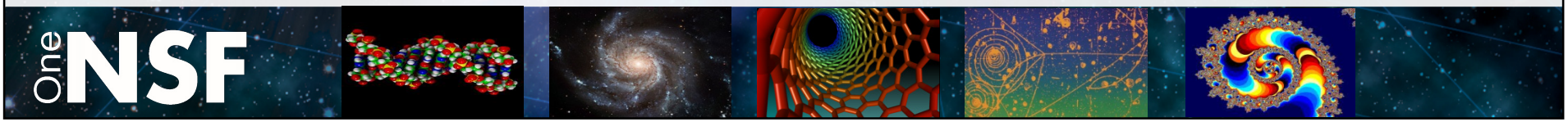


Advanced Degrees

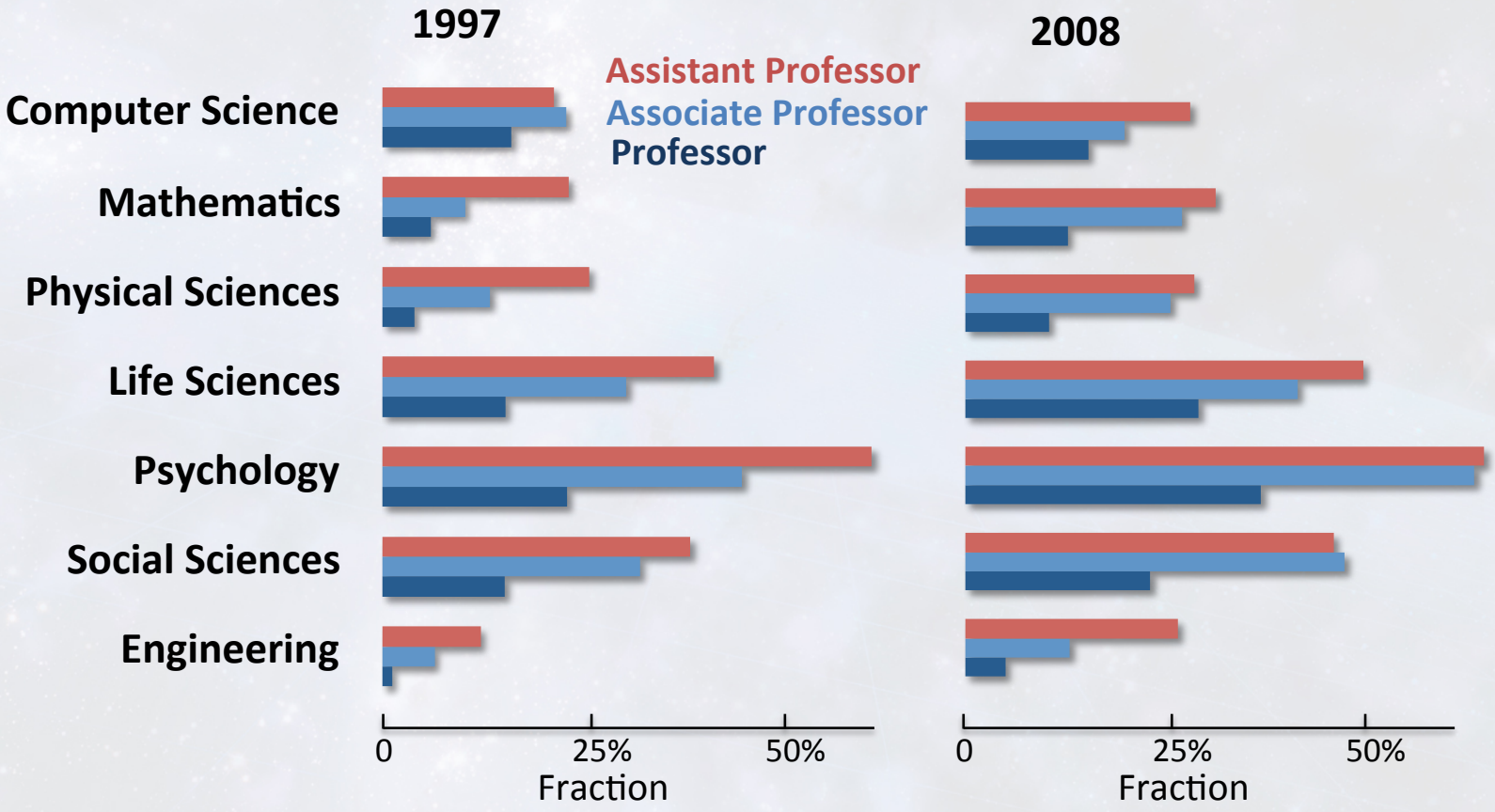
science, engineering

173,000

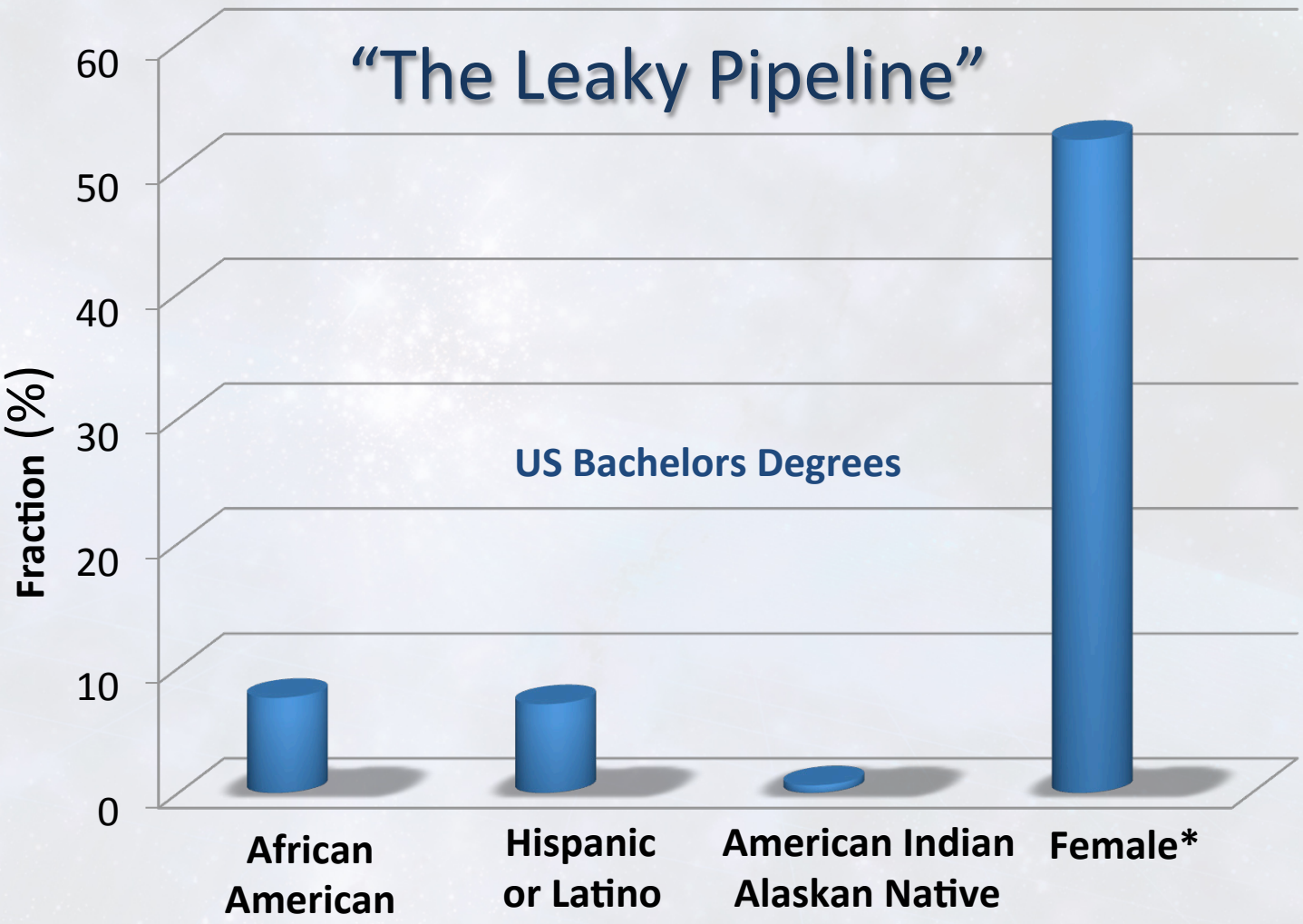




Female Fraction of Full-Time Science and Engineering Faculty at Four-year Institutions

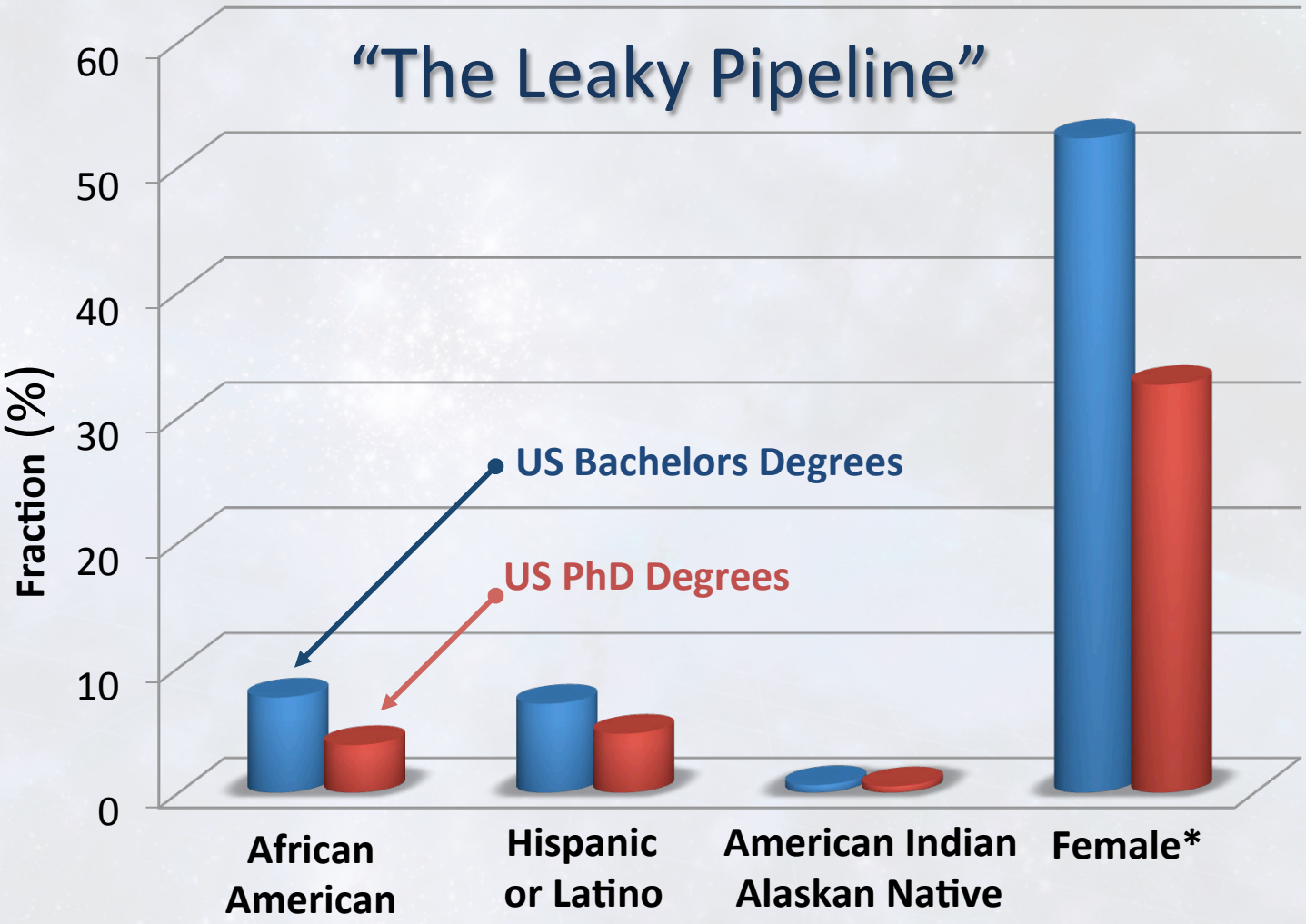


Source: National Science Foundation, Survey of Doctorate Recipients



National Center for Science and Engineering Statistics, 2010

*Physical Science Degrees

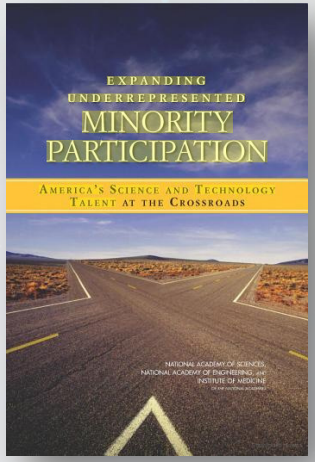


National Center for Science and Engineering Statistics, 2010

*Physical Science Degrees

The NSF Role

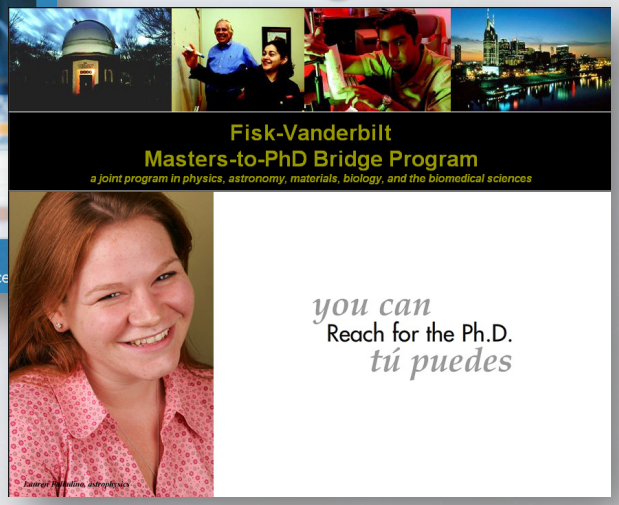
Facilitate and Foster Community Responses

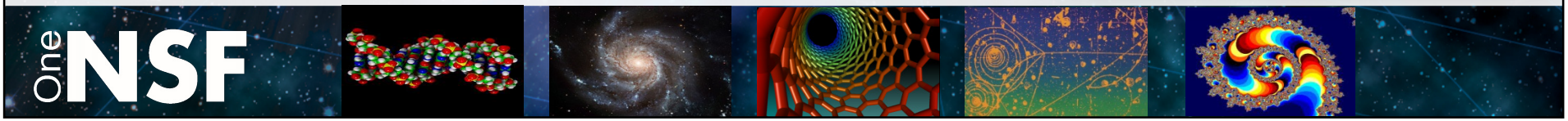


Workshops

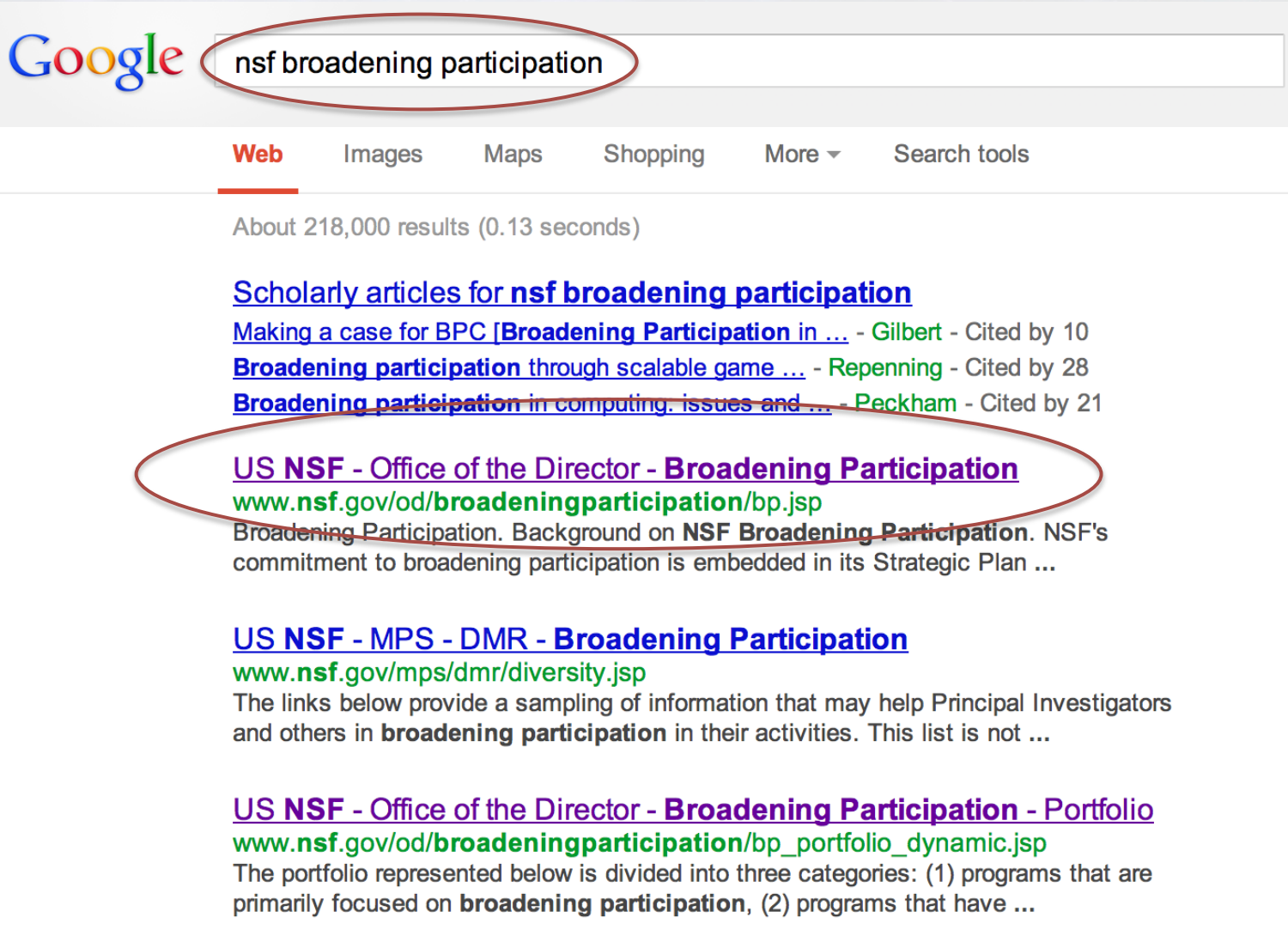
Policies

Programs





Finding the Policies and Programs



NSF Broadening Participation Portfolio

Background

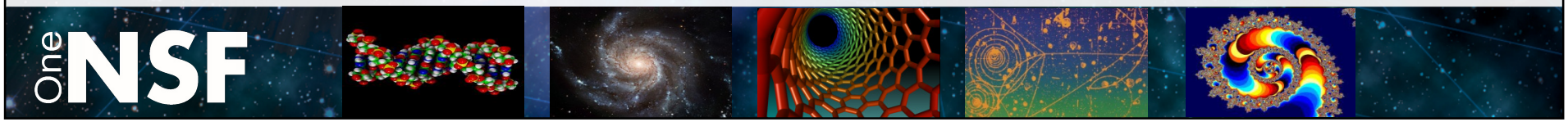
NSF has taken a variety of approaches to broaden participation across its many programs. While broadening participation is included in the NSF review criteria, some program announcements and solicitations go beyond the standard criteria. They range from encouraging language to specific requirements. Investments range from capacity building, research centers, partnerships, and alliances to the use of co-funding or supplements to existing awards in the core research programs.

The portfolio represented below is divided into three categories: (1) programs that are primarily focused on broadening participation, (2) programs that have broadening participation as one of several emphases, and (3) Dear Colleague Letters expressing interest in specific aspects of broadening participation.

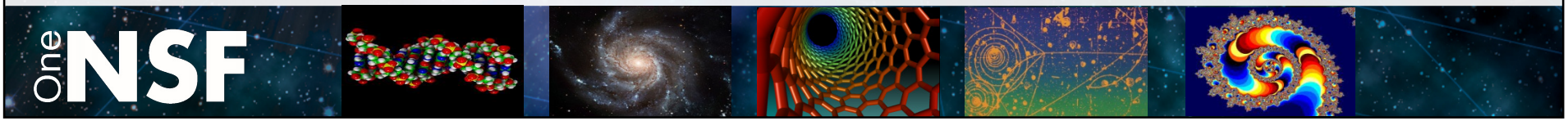
(1) Programs focused on broadening participation

(2) Programs with broadening participation as one part

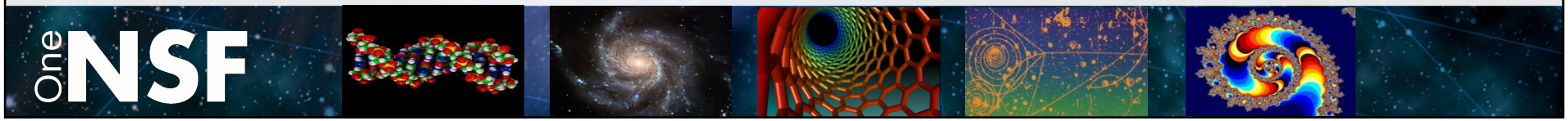
(3) Dear colleague letters expressing interest



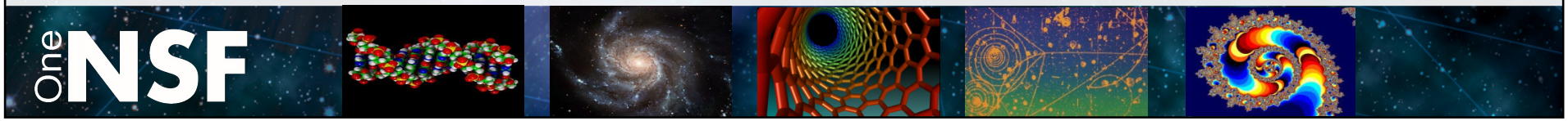
Broadening Participation Focused Programs				
1	ADVANCE: Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers	12-584	All	All
2	Alliances for Graduate Education and the Professoriate	12-554	EHR, MPS	HRD
3	Broadening Participation Research Initiation Grants in Engineering 2013	13-534	ENG	CBET, CMMI, ECCS, EEC, IIP
4	Centers of Research Excellence in Science and Technology (CREST) and HBCU Research Infrastructure for Science and Engineering (RISE)	13-533	EHR	HRD
5	EPSCoR Research Infrastructure Improvement Program Track-3: Building Diverse Communities	13-553	OIA	EPSC
6	EPSCoR Research Infrastructure Improvement Program: Inter-Campus and Intra-Campus Cyber Connectivity	10-598	All	All
7	Experimental Program to Stimulate Competitive Research: Workshop Opportunities (EPS-WO)	12-588	All	All
8	General & Age-Related Disabilities Engineering (GARDE)		ENG	CBET
9	Historically Black Colleges and Universities Undergraduate Program	13-516	EHR	HRD
10	Louis Stokes Alliances for Minority Participation (LSAMP)	12-564	EHR	HRD
11	NSF Scholarships in Science, Technology, Engineering, and Mathematics	12-529	EHR	DUE
12	Ocean Sciences Postdoctoral Research Fellowships	13-504	GEO	OCE
13	Ocean Sciences Research Initiation Grants	13-505	GEO	OCE
14	Opportunities for Enhancing Diversity in the Geosciences (OEDG)	10-599	GEO	AGS, EAR, OCE
15	Partnerships for Research and Education in Materials	11-562	MPS	DMR
16	Partnerships in Astronomy & Astrophysics Research and Education	08-562	MPS	AST
17	Postdoctoral Research Fellowships in Biology	12-497	BIO	
18	Research in Disabilities Education	12-542	EHR	DRL, HRD
19	Research on Gender in Science and Engineering	10-516	EHR	HRD
20	SBE Postdoctoral Research Fellowships	12-591	SBE	SMA



Broadening Participation Emphasis Programs				
1	Advancing Informal STEM Learning	12-560	EHR	DRL
2	American Competitiveness in Chemistry-Fellowship	10-535	MPS	CHE
3	Centers for Chemical Innovation	12-572	MPS	CHE
4	Computing Education for the 21st Century	12-609	CISE, EHR, OCI	CCF, CNS, IIS
5	EMERGING FRONTIERS IN RESEARCH AND INNOVATION 2013	12-583	BIO, ENG, MPS	MCB, EFRI, DMR, DMS
6	Engineering Research Centers	11-537	ENG	EEC
7	Graduate Research Fellowship Program	12-599	All	All
8	Innovative Technology Experiences for Students and Teachers	12-597	EHR	DRL
9	Integrative Graduate Education and Research Traineeship Program	11-533	All	All
10	Integrative Graduate Education and Research Traineeship Program-CIF21 Track	12-555	BIO, CISE, EHR, ENG, GEO, MPS, OCI, OIA, OISE, OPP, SBE	DGE
11	International Research Experiences for Students	12-551	All	All
12	Major Research Instrumentation Program:	13-517	All	All
13	Materials Research Centers and Teams	10-568	MPS	DMR
14	Math and Science Partnership	12-518	EHR	DUE
15	Mentoring Through Critical Transition Points in the Mathematical Sciences	11-542	MPS	DMS
16	NSF Earth Sciences Postdoctoral Fellowships	13-548	GEO	EAR
17	Postdoctoral Fellowships in Polar Regions Research	09-612	OPP	ANT, ARC
18	Research Experiences for Undergraduates	13-542	All	All
19	Research Training Groups in the Mathematical Sciences	11-540	MPS	DMS
20	Science and Technology Centers: Integrative Partnerships	11-522	All	All
21	Science of Learning Centers	07-7278	All	All

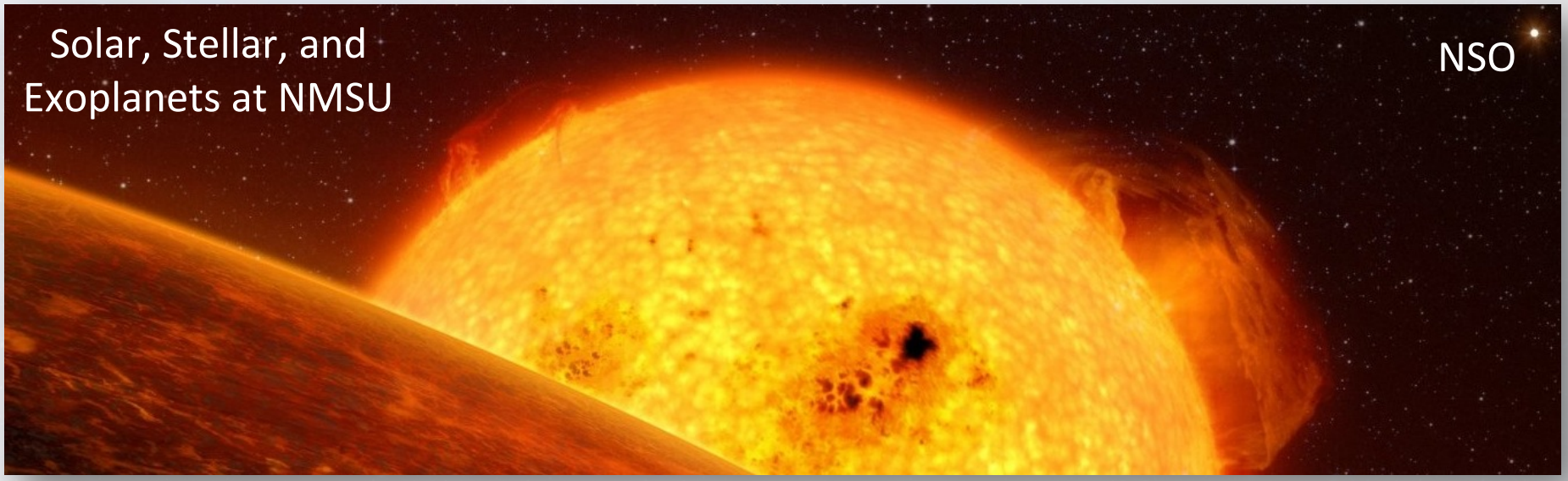


Dear Colleague Letters				
1	Research Assistantships for High School Students (RAHSS) - SBIR/STTR Phase II Supplements	DCL 06-003	ENG	IIP
2	Research Assistantships for High School Students (RAHSS) - BIO supplements	DCL 06-027	BIO	All
3	SBIR/STTR Supplemental Funding for Community College Research Teams	DCL 08-029	ENG, EHR	IIP, HRD, DUE
4	Supplemental Opportunity for SBIR/STTR Mentoring	DCL 09-004	ENG	IIP
5	Broadening Participation in Computing Alliance Program (BPC-A)	N/A	CISE	CNS
6	MPS Alliances for Graduate Education and the Professoriate - Graduate Research Supplements	DCL 12-021	MPS	AST, CHE, DMR, DMS, PHY
7	Stimulating Research Related to the Science of Broadening Participation	DCL 12-037	SBE	BCS, SES
8	Prepare, Engage, and Motivate a Diverse STEM Workforce	DCL 12-034	EHR	HRD
9	Balancing the Scale: NSF's Career-Life Balance (CLB) Initiative	N/A	All	All
10	Career-Life Balance (CLB) Initiative	DCL 12-065	All	All
11	Supplemental Opportunity for Small Business Innovation Research and Small Business Innovation Research/Small Business Technology Transfer for CREST/HBCU-RISE Collaborations	DCL 12-069	ENG, EHR	IIP, HRD
12	Research Experiences for Veterans/Teachers	DCL 12-073	ENG	All
13	Engineering Research Experiences for Veterans	DCL 12-074	ENG	CMMI, CBET, ECCS
14	Research Experience for Teachers (RET): Funding Opportunity in the Biological Sciences	DCL 12-075	BIO	All
15	Research Assistantships for High School Students (RAHSS): Funding to Broaden Participation in the Biological Sciences	DCL 12-078	BIO	All
16	Announcement of Efforts to Increase Hispanic Participation in STEM Fields	DCL 12-081	BIO, CISE, EHR, ENG	All
17	Alliances for Graduate Education and the Professoriate (AGEP) Program	DCL 12-088	MPS	DMR
18	Broadening Participation in Engineering (BPE)	N/A	ENG	All



Partnerships in Astronomy and Astrophysics Research and Education (PAARE)

Enhance **diversity** in astronomy and astrophysics **through long term collaborative research partnerships** among minority serving institutions and partners at research institutions



Partnerships in Astronomy and Astrophysics Research and Education (PAARE)

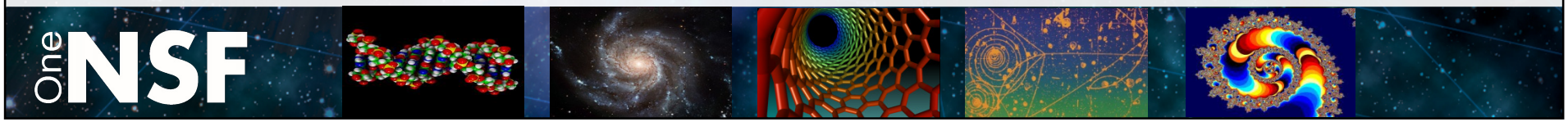
Enhance **diversity** in astronomy and astrophysics **through long term collaborative research partnerships** among minority serving institutions and partners at research institutions

AstroCom NYC

Improve access by urban minority students to research opportunities

GO-FAAR

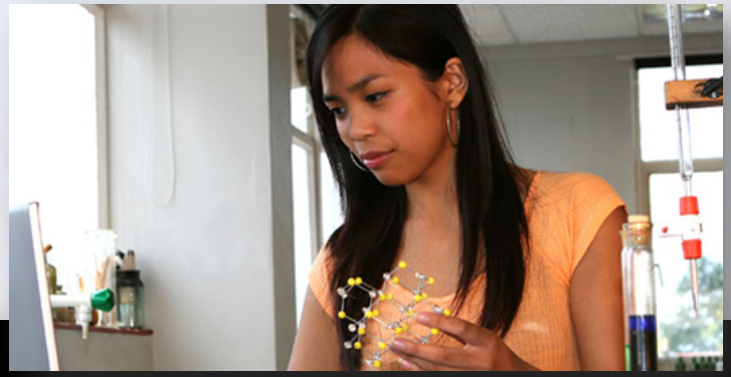
Fisk-Vanderbilt Masters-to-PhD Bridge Program
29 URM students - 97% retention



Alliances for Graduate Education and the Professoriate (AGEP)

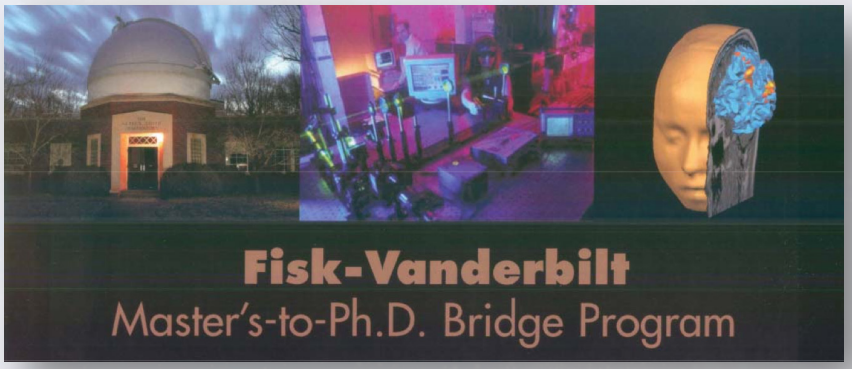
Supplements to existing MPS grants to support under-represented minority graduate students

Partnership of MPS with Directorate for Education and Human Resources (EHR)



AGEP Alliances for Graduate Education and the Professoriate

Transitions to Graduate Study



FISK-VANDERBILT

Master's-to-PhD Bridge Program

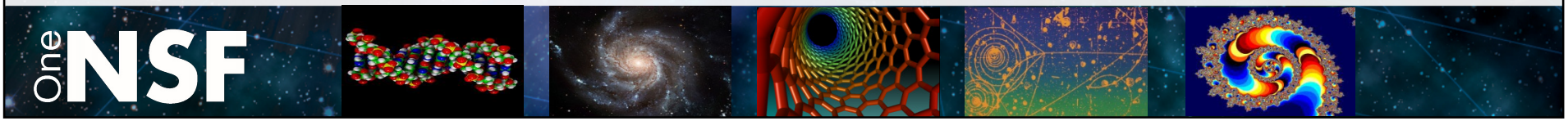
a joint program in astronomy, biology, chemistry, physics, and materials science

LOOKING FOR STUDENTS WITH:
Persistance, Passion, Self-motivation, Strong work ethics

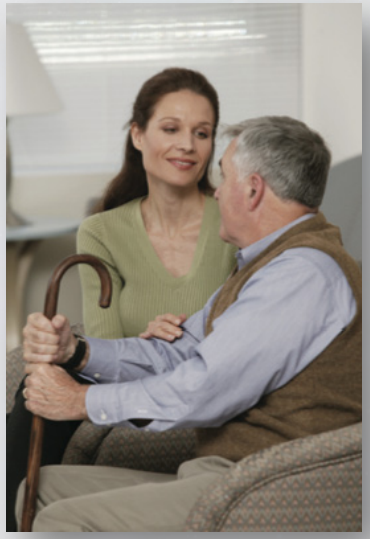
AREAS OF STUDY:
Astronomy, Biology, Chemistry, Physics, Materials Science

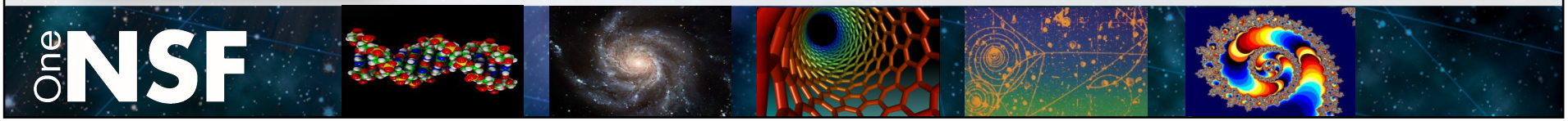
WE PROVIDE:
Tuition & fees, Medical Insurance, $1800 Monthly

YOU WILL FIND:
Support through school and thereafter, Student & alum network, Assistance with presentations/thesis & defense/job placement



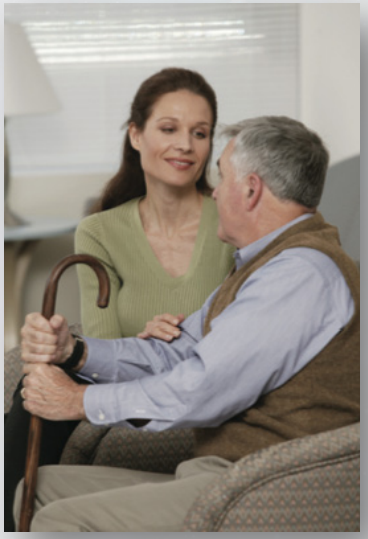
Career Life Balance



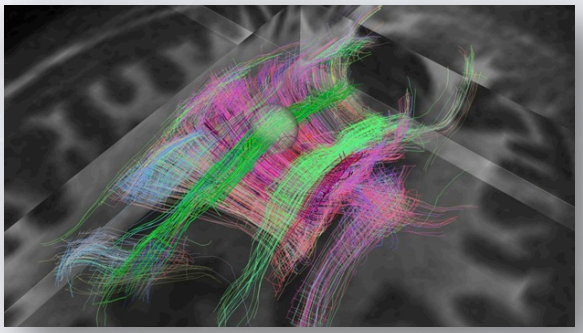


Career Life Balance

"Balancing the Scale"



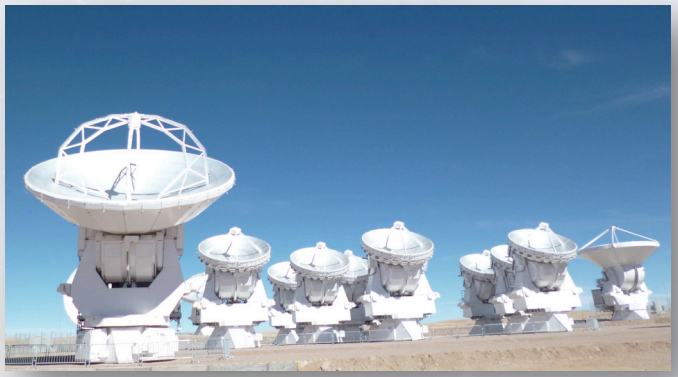
- Flexibility in timing grants
- No-cost extensions
- Supplements for personnel
- CAREER
- Plans for ADVANCE, Graduate Fellows, post-docs



Directorate for Mathematical and Physical Sciences (MPS)

- Advancing Discovery

- Building Blocks for Innovation
- Forefront Facilities



- Educating the Next Generation