# NSF Nuclear Physics Overview for NSAC

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- NSF Nuclear Physics Goals
- Budget
  - Process
  - FY18
  - FY17
- Announcements
  - Solicitations
  - Other funding opportunities
- Physics Division Personnel

# Goals of the Nuclear Physics Program

- *Identify research opportunities and the most compelling physics through the peer review process*
- *Support as much of the above as possible while managing a balanced portfolio*

Our goals and actions remain the same – regardless of the budget

# "Typical" Budget Process

- Agency budget request → OMB ~ end of summer
- "Pass Back": OMB provides numbers to agency ~ end of Nov
  - May also include additional instructions
- President's Budget Request set ~ end of cal year
  - Much activity → NSF Budget Book
- …


~ 60 days

- Congress passes appropriation ~ before beginning of FY
  - NSF: Amounts for 6 high-level accounts, occasionally with additional text
- President signs appropriation; budget → agency with OMB involvement
- NSF generates a new Budget Book ("current plan") and submits it to Congress via OMB
- Congress acts within 30 days: "current plan" → "operating plan"

FY17 Approp

# FY18 NSF Request $6,652.89 M

**National Science Foundation**
**FY 2018 Budget Request to Congress**
(Dollars in Millions)

| NSF by Account | FY 2016 Actual | FY 2017 Annualized CR | FY 2018 Request | FY 2018 Request change over Amount | FY 2018 Request change over Percent |
|---|---|---|---|---|---|
| Research & Related Activities | $5,998.09 | $6,022.18 | $5,361.65 | -$636.44 | -10.6% |
| Education & Human Resources | $884.10 | $878.33 | $760.55 | -$123.55 | -14.0% |
| Major Research Equipment & Facilities Construction | $241.50 | $199.93 | $182.80 | -$58.70 | -24.3% |
| Agency Operations & Award Management | $351.11 | $329.37 | $328.51 | -$22.60 | -6.4% |
| National Science Board | $4.31 | $4.36 | $4.37 | $0.06 | 1.5% |
| Office of Inspector General | $14.76 | $15.13 | $15.01 | $0.25 | 1.7% |
| Total, NSF | $7,493.86 | $7,449.30 | $6,652.89 | -$840.98 | -11.2% |

# FY18 PHY $253.30M

- Approximately 2% for Operations
  - Panels, IPA Appointments and Travel, M&S
- Approximately 30% for M&O for Facilities
  - IceCube, LHC, LIGO, NSCL
- Approximately 8% for Physics Frontiers Centers
  - Currently 10 (one of which is JINA-CEE)
  - Near end of tri-annual competition
- Approximately 3% for Education and Broadening Participation
  - REU Sites, LIGO Education Center, …
- Approximately 57% ($152.09 M) for six major areas of Physics (AMO, EPP, GP, NP, PA, PoLS, Plasma)
  - Experimental and Theoretical

# FY18 PHY $253.30M

**PHY Funding**

(Dollars in Millions)

| | FY 2016 Actual | FY 2017 (TBD) | FY 2018 Request | Change Over FY 2016 Actual Amount | Change Over FY 2016 Actual Percent |
|---|---|---|---|---|---|
| **Total** | **$276.91** | - | **$253.30** | **-$23.61** | **-8.5%** |
| **Research** | **174.12** | - | **152.09** | **-22.03** | **-12.7%** |
| CAREER | 8.12 | - | 7.30 | -0.82 | -10.1% |
| STC: Center for Bright Beams (CBB) | - | - | 5.00 | 5.00 | N/A |
| **Education** | **5.40** | - | **4.80** | **-0.60** | **-11.1%** |
| **Infrastructure** | **97.39** | - | **96.41** | **-0.98** | **-1.0%** |
| IceCube | 3.48 | - | 3.50 | 0.02 | 0.6% |
| Large Hadron Collider (LHC) | 20.00 | - | 16.00 | -4.00 | -20.0% |
| Laser Interferometer Gravitational Wave Observatory (LIGO) | 39.43 | - | 39.43 | - | - |
| Nat'l Superconducting Cyclotron Lab. (NSCL) | 24.00 | - | 23.00 | -1.00 | -4.2% |
| Midscale Research Infrastructure | 10.48 | - | 8.18 | -2.30 | -21.9% |
| Pre-construction planning: | - | - | 6.30 | 6.30 | N/A |
| High-Luminosity LHC Upgrade Planning | - | - | 6.30 | 6.30 | N/A |

Awards made in FY17: yr1 = $XXX yr2 = $(XXX)*0.90 yr3 = $(XXX)*0.90

# Budget Trends – NSF Nuclear Physics

Includes co-funding and other leveraged funds

~ 25% = Research
~ 75% = Operations

| FY | Nucleon & Hadron QCD (k$) | Nuclear Astroph, Reactions, Structure (k$) | Prec Meas'ts & Fund. Symm. (k$) | Total Exp't Nuclear Physics (k$) | Nuclear Theory (k$) | Nuclear Program Total (k$) | NSCL (k$) | JINA & JINA -CEE (k$) | MRI (K$) | Mid-Scale (K$) | Total Nuclear Physics (k$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2011 | | | | 19,164 | 3,719 | 22,883 | 21,500 | 2,150 | 729 | | 47,262 |
| 2012 | 7,969 | 4,185 | 6,343 | 18,497 | 3,829 | 22,326 | 21,500 | 2,150 | 2,744 | | 48,720 |
| 2013 | 6,183 | 4,693 | 5,653 | 16,509 | 3,474 | 20,008 | 21,500 | 2,150 | 2,996 | 490 | 47,144 |
| 2014 | 5,826 | 5,189 | 5,999 | 17,014 | 3,514 | 20,528 | 22,500 | 2,280 | 1,038 | 1,188 | 47,533 |
| 2015 | 6,769 | 4,702 | 7,304 | 18,774 | 4,183 | 22,957 | 23,000 | 2,280 | 1,801 | 1,367 | 51,406 |
| 2016 | 7,141 | 5,046 | 7,391 | 19,579 | 4,223 | 23,802 | 24,000 | 2,280 | 1,869 | 3,238 | 55,189 |
| 2017 | | | | 17,800 + | | | 24,000 | 2,280 | | 2,990 | |

FY15 Fundamental Symmetries: + $1.32M for $0\nu\beta\beta$

MRI: competes each year; one-time acquisition/development funds

Mid-scale: ad hoc competition; design and construction funds (nEDM & MUSE)

# Solicitation for NSF Physics Division Investigator-Initiated Research Projects 17-561

All proposals submitted to the Division of Physics programs must go through this solicitation.

- **Deadlines:**
  - October 25, 2017 for Particle Astrophysics, Elementary Particle Phy
  - ***November 8, 2017 for Experimental Nuclear Physics & Theoretical Nuclear Physics***
- Text on Midscale Instrumentation and Long Duration Efforts
- Follow Proposal & Award Policies & Procedures Guide (PAPPG) https://www.nsf.gov/pubs/policydocs/pappg17_1/index.jsp
  - Follow the Proposal Preparation checklist
- Collaborators and Other Affiliations Template (as of 24-apr-2017)
- Follow instructions that are specific to this solicitation
  - PIs who have or anticipate having concurrent support … (Merit Review Criterion)
  - For large collaborations …

# NSF Physics Division:
# Investigator-Initiated Research Projects (17-561)

- Proposals to the Nuclear Physics Program for schools, workshops and conferences, must be submitted through this solicitation.
  - Priority will be given to schools.
  - Broad scope that serves a wide nuclear physics community
  - Involvement of under-represented groups
  - Contact us!

- However: Research at Undergraduate Institutions (RUI) proposals should be submitted through the RUI solicitation (14-579) by the deadlines in this PHY solicitation according to the closest disciplinary match.

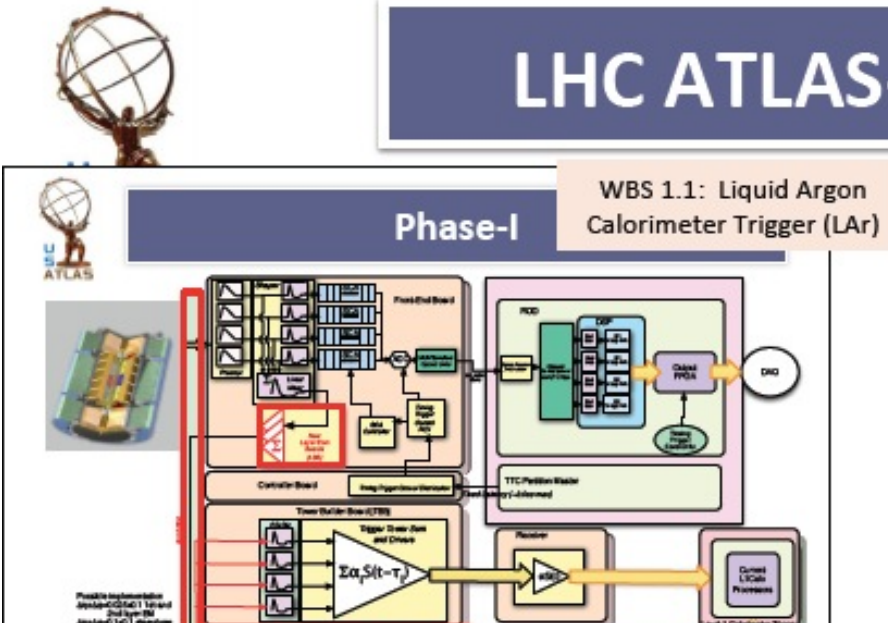
# Midscale Instrumentation

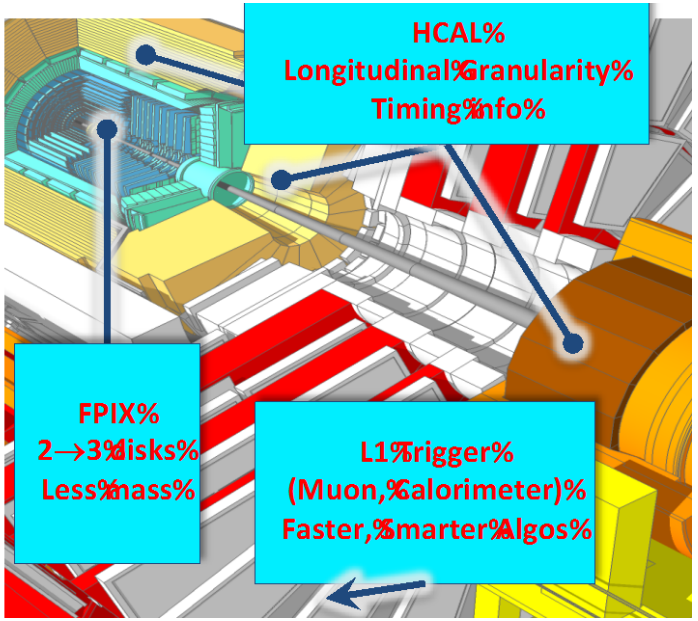
- Design and Construction *or* Acquisition of Instrumentation
  - R & early D, operations funded by research programs
- ~ $4M < TPC < ~ $15M; over multiple years
- Selection based on
  - merit review
  - exceptional opportunity
  - research community priorities.
- Currently 6 Midscale projects
- For more info, see PHY Solicitation 17-561

# Midscale: Upgrades to LHC Experiments

## Elementary Particle Physics

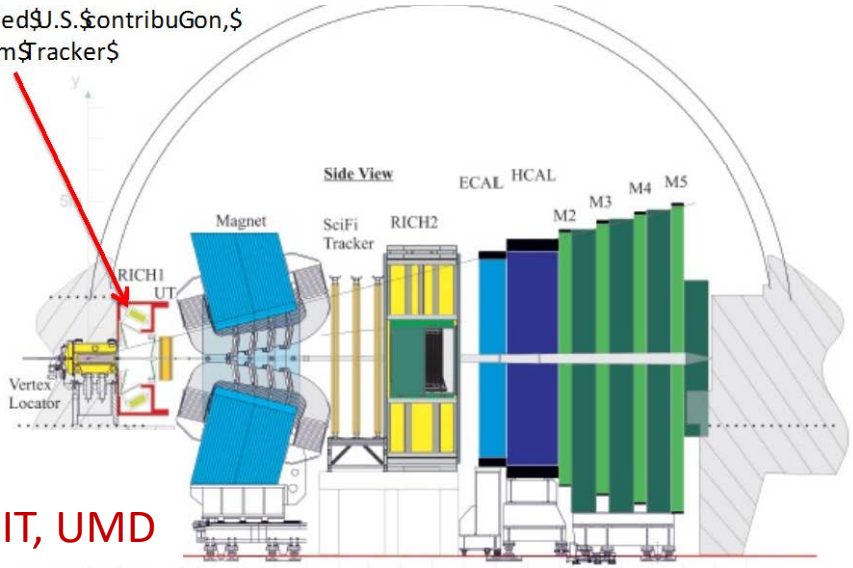
ATLAS
Lead: SUNY-Stony Brook




CMS
Lead:
U. Nebraska
/Catholic

NSF funded U.S. contribution,
Upstream Tracker



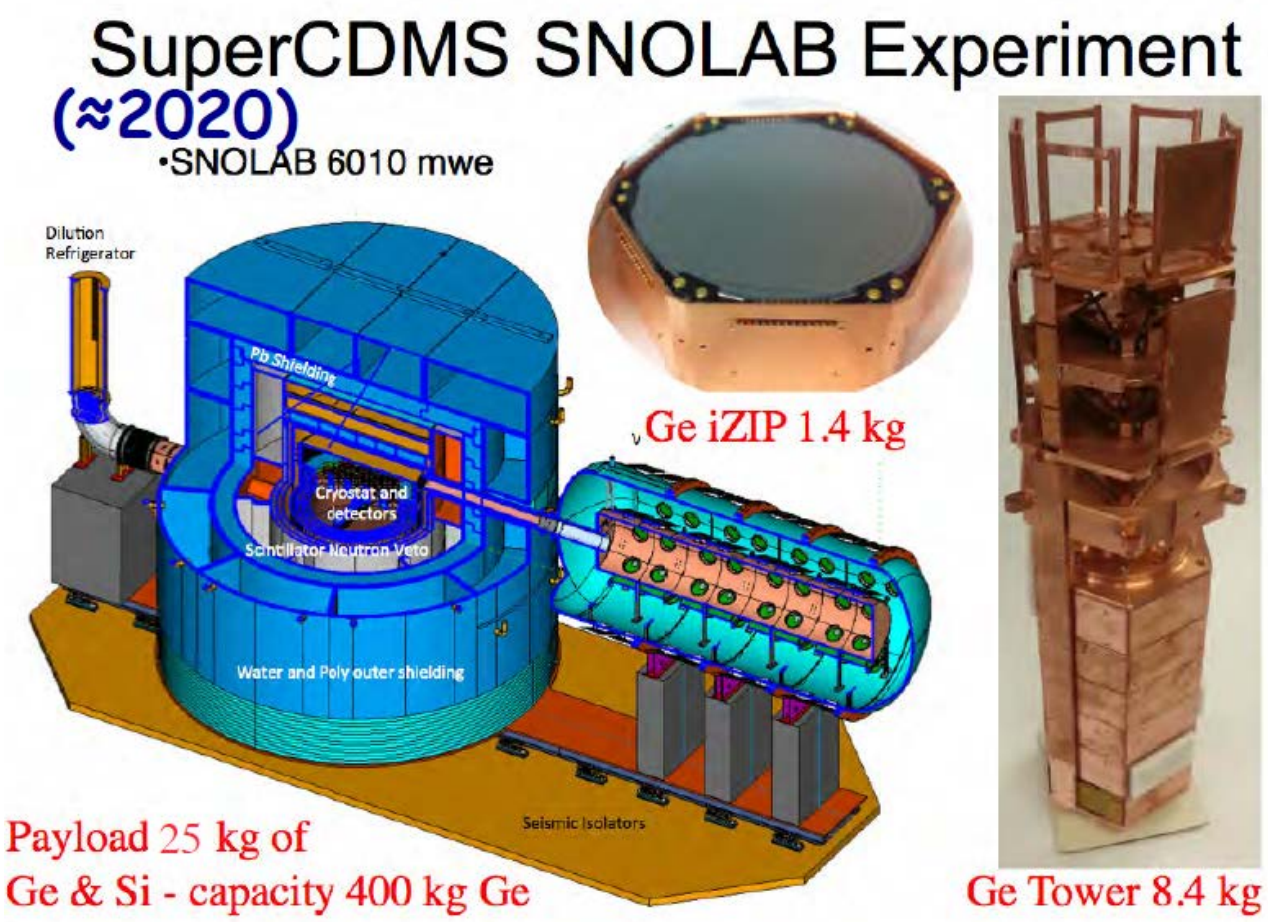

LHCb
Leads: Syracuse, Cincinati, MIT, UMD

# Midscale: Super Cryogenic Dark Matter Search

## Underground Astroparticle Physics

SuperCDMS (Soudan, MN)
Lead: UC-Berkeley

- Mission: to cover the low WIMP mass region: 0.5 – 10 GeV/$c^2$
- Being baselined for CD2/3 in Dec 2017



# Midscale: nEDM

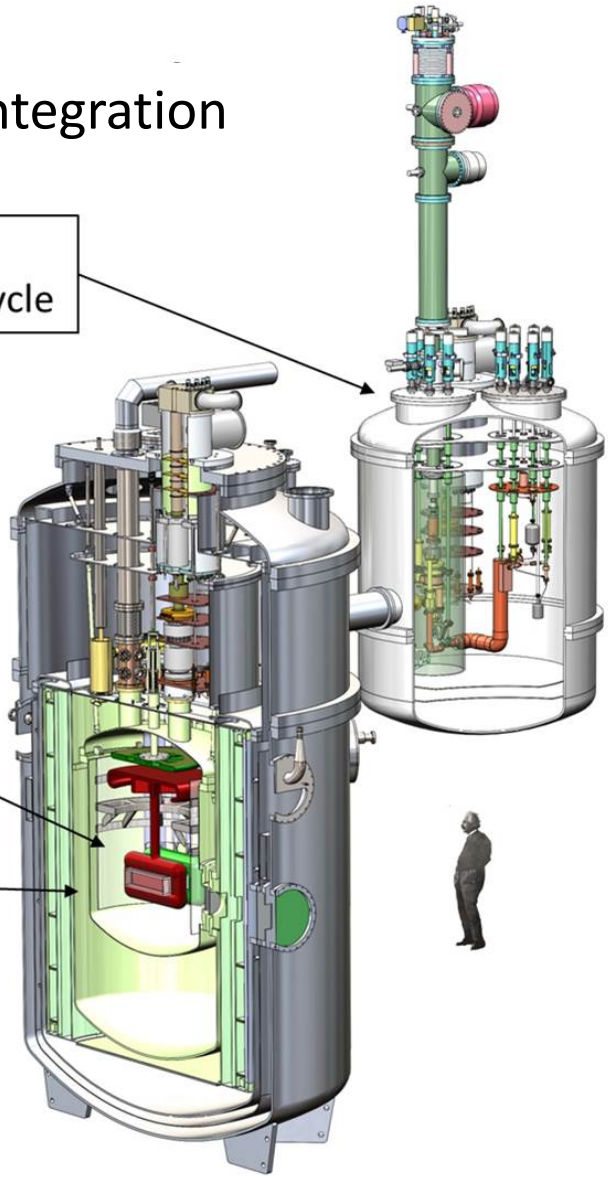
## Experimental Nuclear Physics

Critical Component Design → Large Subsystem Integration

- Prepare polarized 3He
- Isotopically purify 4He each measurement cycle

- Generate electric field
- Store 3He, neutrons
- Monitor 3He, neutron precession frequencies

- Generate uniform B-field

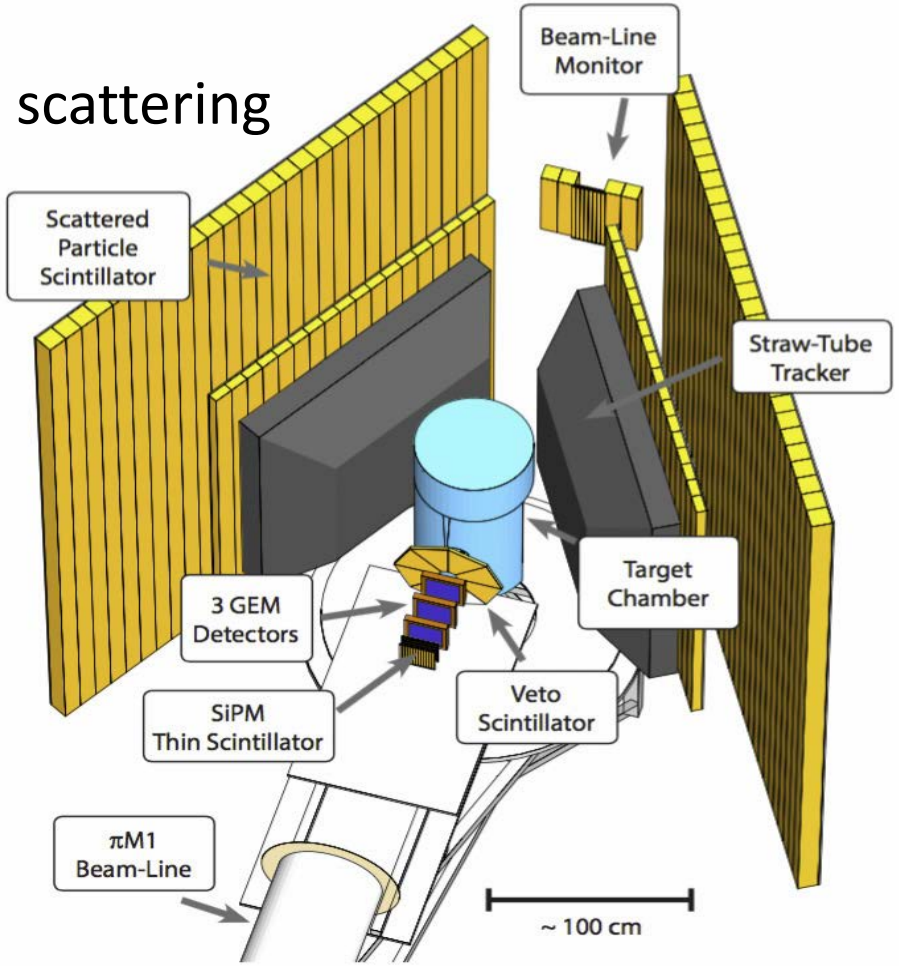


PIs: Brad Filippone (Caltech) and Doug Beck (UIUC)

# Midscale: MUSE

## Experimental Nuclear Physics

Precise comparison of e-p and μ-p scattering
Proton charge radius




PIs: R. Gilman (Rutgers), E. Downie (GWU), M. Kohl (Hampton), W. Lorenzon (U Mich), S. Strauch (USC)

# Career Program

- Solicitation: 17-537
- Must include excellent research proposal as well as excellent educational plan
- There are eligibility requirements: e.g., must be assistant professor, untenured
- 5 year awards, $400,000 minimum
- Proposal deadline: **July 21, 2017**
- PECASE nominees are chosen from CAREER winners
- Contact program officer for information/advice ahead of time (budget, scope)

FY17: 8 ENP proposals; 2 awarded

Jaideep Singh @ MSU & Liang Yang @ UIUC

# Writing proposals: Mentoring program

GOAL: make the proposal writing expertise of senior researchers available to junior investigators

How does it work?

- The Mentee requests a Mentor (email us at aopper@nsf.gov or ejgarcia@nsf.gov ).
- We will send a list of Mentor Volunteers to Mentee, who contacts Mentors without identifying them to NSF.
- The Mentor will read the Mentee's proposal and provide feedback once. Send the proposal early – Mentors are busy people!
- NSF accepts no responsibility on the interaction/outcome of the program!

Needed: Mentors!

email us at aopper@nsf.gov or ejgarcia@nsf.gov

# Major Research Instrumentation (MRI) NSF 15-504

FY17

- *Physics received 23 proposals,  10 in ENP*
  - *Review process complete*
  - *Funding recommendations soon*

FY18

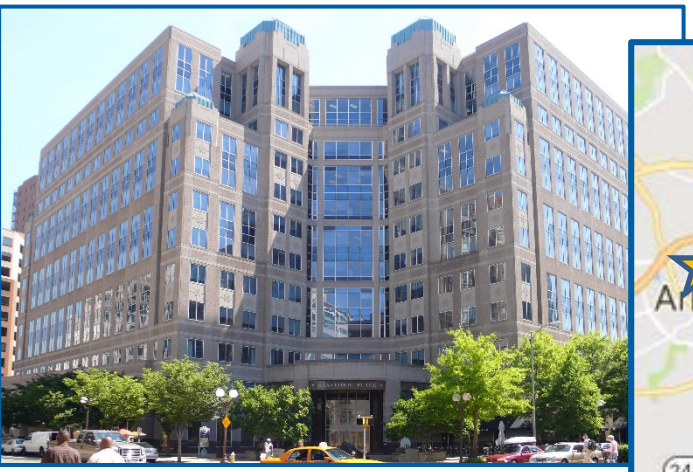
- Likely to be a new solicitation

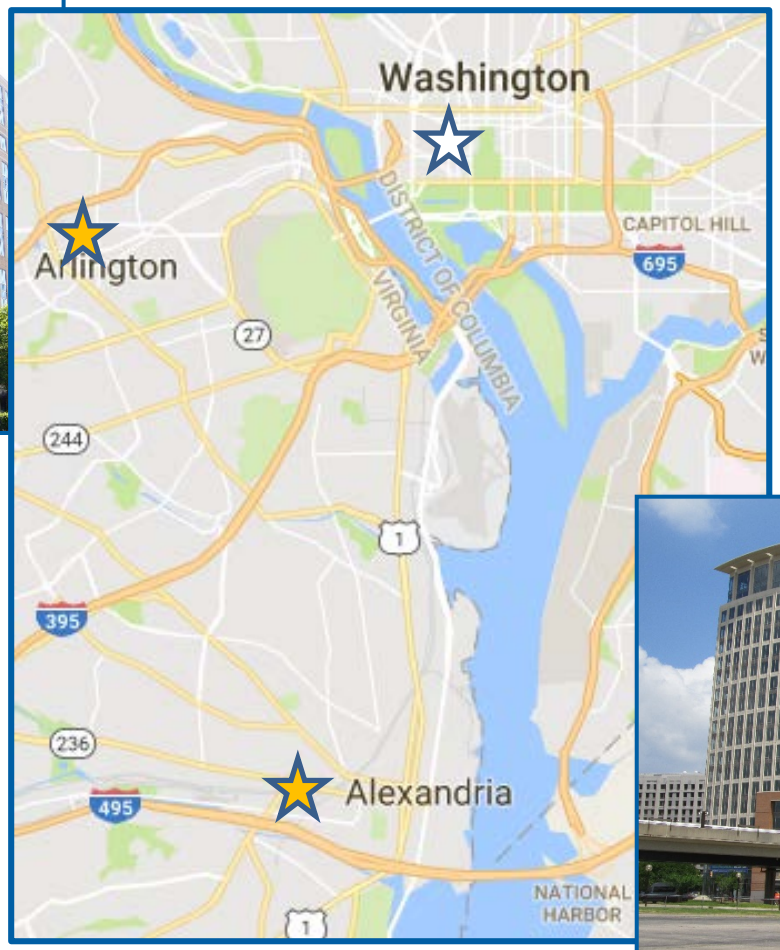
# AGEP GR *Supplements*

- Available to PIs at AGEP or AGEP Legacy Institutions
  https://www.nsf.gov/mps/broadening_participation/index.jsp
- Graduate Student Eligibility
  - Emphasis placed on under-represented groups
  - Not currently supported by federal government (NSF, DOE, NIH, …)
  - US Citizen, US National, or US Permanent Resident
- Stipend, tuition, benefits, and IDC (~$60k)
- Renewable up to two times

See us and DCL 16-125 for more information

# NSF is Moving!






# NSF is Moving!
# Late August / Early September

- Business operations may be suspended for periods
- CGIs (Continuing Grant Increments)
  - Submit annual progress reports early

# NSF/MPS/Physics Personnel

- France Córdova – Director
- James Ulvestad – Acting Assistant Director for MPS
- Denise Caldwell – Physics Division Director
- Brad Keister – Deputy Division Director
- Bogdan Mihaila – Nuclear Theory Program Director
- Edmundo Garcia – Expt'l Nuclear Physics Program Director
- Allena Opper – Expt'l Nuclear Physics Program Director

http://www.nsf.gov/pubs/2015/phy15001/phy15001.jsp?org=PHY

http://www.nsf.gov/careers/rotator/index.jsp

# For the latest updates, check out

http://www.nsf.gov/div/index.jsp?div=PHY

Contact us:

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