ROSES-19 Status Update
Balance of R&A Elements

* FY19 percentage of $95M
Balance of R&A Elements

* FY19 percentage of $103M

~1/2 of APRA funding is invested in suborbital programs
Number of Proposals

GO/GI Programs: 2,364 proposals

R&A Programs: 1,085 proposals

Total: 3,449 proposals
Selection Rates

GO/GI Programs:
- Hubble GO – Cycle 27: 18%
- Chandra GO – Cycle 21: 32%
- NuSTAR GO – Cycle 5: 34%
- SOFIA – Cycle 8: 34%
- TESS GI – Cycle 2: 27%
- Swift GI – Cycle 16: 37%
- Fermi GI – Cycle 12: 36%
- NICER GO – Cycle 1: 39%
- ADAP (Data Analysis): 19%
- ATP (Theory): 21%
- FINESST (Grad Student Research): 11%
- APRA (Basic Research): 27%
- XRP (Exoplanets Research): 13%
- SmallSat Studies (AS3): 24%
- LISA Preparatory Science: 30%
- SAT (Technology): 40%
- Roman Technology Fellowships: 33%
- SOFIA Next Gen Instruments: 67%

R&A Programs:
- 20%

GO/GI Programs:
- 26%
PI Notification (Days after Proposal Submission)

GO/GI Programs:
- Average 108 days
- 80% of all PIs are notified < 87 days
- Slip by 9 months to allow faster notification

R&A Programs:
- Average 112 days
- Challenging selection
- Slip by 9 months to allow faster notification
New PIs (not funded by same Program within 5 Years)

GO/GI Programs:
- Hubble GO – Cycle 27: 30%
- Chandra GO – Cycle 21: 17%
- NuSTAR GO – Cycle 5: 39%
- SOFIA – Cycle 8: N/A
- TESS GI – Cycle 2: 78%
- Swift GI – Cycle 16: 12%
- Fermi GI – Cycle 12: 14%
- NICER GO – Cycle 1: N/A
- ADAP (Data Analysis): 71%
- ATP (Theory): 46%
- FINESST (Grad Student Research): N/A
- APRA (Basic Research): 88%
- XRP (Exoplanets Research): 89%
- SmallSat Studies (AS3): N/A
- LISA Preparatory Science: N/A
- SAT (Technology): 58%
- Roman Technology Fellowships: N/A
- SOFIA Next Gen Instruments: N/A
- Segmented Telescope Design: N/A

R&A Programs:
- ~50% of our PIs are new PIs
- GO/GI Programs: 32% new PIs
- R&A Programs: 70% new PIs
Inferred PI Gender Diversity (Submitted) – male/female

GO/GI Programs:
- 72% male PIs
- 28% female PIs

R&A Programs:
- 75% male PIs
- 25% female PIs
## Panel Gender Diversity – male/female

<table>
<thead>
<tr>
<th>Program</th>
<th>Male (%)</th>
<th>Female (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GO/GI Programs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hubble GO – Cycle 27</td>
<td>51%</td>
<td>49%</td>
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<tr>
<td>Chandra GO – Cycle 21</td>
<td>61%</td>
<td>39%</td>
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<tr>
<td>NuSTAR GO – Cycle 5</td>
<td>64%</td>
<td>36%</td>
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<td>SOFIA – Cycle 8</td>
<td>71%</td>
<td>29%</td>
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<tr>
<td>TESS GI – Cycle 2</td>
<td>64%</td>
<td>36%</td>
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<tr>
<td>Swift GI – Cycle 16</td>
<td>47%</td>
<td>53%</td>
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<td>Fermi GI – Cycle 12</td>
<td>80%</td>
<td>20%</td>
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<td>NICER GO – Cycle 1</td>
<td>85%</td>
<td>15%</td>
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<tr>
<td>ADAP (Data Analysis)</td>
<td>46%</td>
<td>54%</td>
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<tr>
<td>ATP (Theory)</td>
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<tr>
<td>FINESST (Grad Student Research)</td>
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<td>37%</td>
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<td>APRA (Basic Research)</td>
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<td>79%</td>
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<td>SOFIA Next Gen Instruments</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>Segmented Telescope Design</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

**GO/GI Programs:**
- 64% male panel
- 36% female panel

**R&A Programs:**
- 74% male panel
- 26% female panel
Inferred PI Gender Diversity (Selected) – male/female

GO/GI Programs:
- 73% male PIs
- 27% female PIs

Selections are consistent with submissions

R&A Programs:
- 77% male PIs
- 23% female PIs
Falling R&A Selection Rates

R&A selection rates are falling because:

+47% more proposals over 10 years
+39% more costs per proposal over 10 years
+34% R&A funding growth over 10 years

What can we do?

- We discussed ideas at the R&A Offsite on Feb 18 how we can increase the R&A selection rates.
- We will discuss with NSF at the next APD/AST meeting (June) which ideas the NSF has tried and worked/didn’t work to learn from their experiments.
Nancy Grace Roman Technology Fellowships
Nancy Grace Roman Technology Fellowships

2018:
Regina Caputo, NASA GSFC (cosmic rays/gamma-ray)
Sarah Heine, MIT (optics and gratings for polarimeters)
Gregory Mace, UT Austin (optics and spectroscopy)

2017:
Manel Errando, Washington University, St. Louis
Adam McCaughan, NIST/Boulder
Varun Verma, NIST/Boulder

2016:
Abigail Vieregg, University of Chicago
Omid Noroozian, NRAO

2015:
Erika Hamden, California Institute of Technology
Daniel Cunnane, NASA Jet Propulsion Lab
Eric Schindhelm, Southwest Research Institute

2014:
John Conklin, University of Florida
Brian Fleming, University of Colorado
Tyler Groff, Princeton University

2013:
Not solicited

2012:
Cullen Blake, University of Pennsylvania
Kevin France, University of Colorado

2011:
Judd Bowman, Arizona State University
Michael McElwain, NASA GSFC
Randall McEntaffer, University of Iowa
Suborbital Investigations
Suborbital Funding

Funding in Million Dollars

FY12 FY13 FY14 FY15 FY16 FY17 FY18 FY19 FY20 FY21 FY22 FY23

Future selections

$7M

50% of APRA

CubeSats

BlackCat SPRITE
BurstCube SPARCS
CUTF HoloSat
BFORE GRAIN
EXCLAIM STARFIRE
STO-2 SupBtbPol
BETTII PIPER
STO SPIDER
BLAST REBE
IMAGER REDDIE
ASTHROS FORTIS
FIREBall ACCESS
SuperBt DEUCE
SU/CHESS CIBER-1-2
PICTURE-B-C XL-Calibur
WIRK-X XQC
GlowTag DXL
Micro-X ProtoEXIST
XACT CGRGS
OX P X-Calibur
CODI DoGONE
ASCOT AMEGO
GRAPE INFOCUS
EXOS CDFE
UMD Prop GALPROP
PUEO CREST
ExoVol HELIX
EURO CALET US
CAPS ANITA
SuperTIGER CREAM

Particle Astrophysics

X-rays γ-rays

Sub-mm Far-IR

Vis UV
## APRA-18 Suborbital Selections

### Balloon Program

<table>
<thead>
<tr>
<th>Title</th>
<th>PI Last Name</th>
<th>Institution</th>
<th>Category</th>
<th>Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>XL-Calibur</td>
<td>Krawczynski, Henric</td>
<td>Washington University</td>
<td>Balloon</td>
<td>HEA</td>
</tr>
<tr>
<td>ASTHROS</td>
<td>Pineda, Jorge</td>
<td>Jet Propulsion Laboratory</td>
<td>Balloon</td>
<td>IR/sub-mm</td>
</tr>
<tr>
<td>FIREBall-2</td>
<td>Martin, Christopher</td>
<td>California Institute of Technology</td>
<td>Balloon</td>
<td>UV/Vis</td>
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<tr>
<td>PUEO</td>
<td>Vieregg, Abigail</td>
<td>University of Chicago</td>
<td>Balloon</td>
<td>PA</td>
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<tr>
<td>SuperTIGER-2</td>
<td>Rauch, Brian</td>
<td>Washington University, St Louis</td>
<td>Balloon</td>
<td>PA</td>
</tr>
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</table>

### Sounding Rocket

<table>
<thead>
<tr>
<th>Title</th>
<th>PI Last Name</th>
<th>Institution</th>
<th>Category</th>
<th>Portfolio</th>
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</thead>
<tbody>
<tr>
<td>OGRE</td>
<td>McEntaffer, Randy</td>
<td>Pennsylvania State University</td>
<td>Sounding Rocket</td>
<td>HEA</td>
</tr>
<tr>
<td>Detector for diffuse hot gas</td>
<td>McCammon, Dan</td>
<td>University of Wisconsin</td>
<td>Sounding Rocket</td>
<td>HEA</td>
</tr>
<tr>
<td>Micro-X</td>
<td>Figueroa, Enectali</td>
<td>Northwestern University</td>
<td>Sounding Rocket</td>
<td>HEA</td>
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<tr>
<td>SISTINE + FLUID</td>
<td>France, Kevin</td>
<td>University of Colorado</td>
<td>Sounding Rocket</td>
<td>UV/Vis</td>
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</tbody>
</table>

### CubeSat / ISS Payload

<table>
<thead>
<tr>
<th>Title</th>
<th>PI Last Name</th>
<th>Institution</th>
<th>Category</th>
<th>Portfolio</th>
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</thead>
<tbody>
<tr>
<td>BlackCAT</td>
<td>Falcone, Abe</td>
<td>Pennsylvania State University</td>
<td>CubeSat</td>
<td>HEA</td>
</tr>
<tr>
<td>CALET</td>
<td>Guzik, T. Gregory</td>
<td>Louisiana State University</td>
<td>ISS Payload</td>
<td>PA</td>
</tr>
</tbody>
</table>
NASA’s Astrophysics Division is investing approximately $5M annually in a new CubeSat initiative.

**HaloSat**, our first CubeSat, has been in orbit since July 2018. Producing excellent data. Re-entry expected in late 2020.
First Astrophysics CubeSat, HaloSat: Results on Southern Galactic Halo

Emission Measure (10^{-3} \text{ cm}^{-6} \text{ pc})

Temperature (kT in keV)

Large variation in EM – factors of 10x
New Finding: Galactic halo is concentrated towards core, lumpy
Five CubeSat in Development

• **CUTE**, PI: Kevin France, CU
  • **Science Objectives:** The Colorado Ultraviolet Transit Experiment (CUTE) will take medium resolution UV spectra of 14 hot Jupiters during transit, in order to measure atmosphere being ablated away.
  • **Technologies:** BCT S/C, COTS telescope and camera.
  • **Launch:** March 21 on LS-9

• **SPARC5**, PI: Eygenya Shkolnik, ASU
  • **Science Objectives:** Determine rate, strength and 2-band color of bright UV flares from 25 M dwarfs, effect on habitability?
  • **Technologies:** BCT S/C, δ–doped CCD, UV dichroic.
  • **Launch:** September 2021

• **SPRITE**, PI: Brian Fleming, CU
  • **Science Objectives:** Determine ionization rate of IGM from galaxies and AGN, trace feedback within galaxies driven by star-forming regions, using low-resolution imaging UV spectrograph.
  • **Technologies:** in house S/C, UV coatings, next-gen MCP.
  • **Launch:** Fall 2022

• **BlackCat**, PI: Abe Falcone, Penn St.
  • **Science Objectives:** GRB/Transient detection in 0.2-20keV with coded mask.
  • **Technologies:** CMOS X-ray CCD
  • **Launch:** FY2024
ROSES-20
ROSES-2020 Astrophysics Elements

**Supporting Research and Technology**
- Astrophysics Research & Analysis (APRA)
- Strategic Astrophysics Technology (SAT)
- Roman Technology Fellowships (RTF)
- Astrophysics Theory Program (ATP) (biennial, not this year)
- Theoretical and Computational Astrophysics Networks (TCAN) (triennial, this year)
- Exoplanet Research Program (XRP) (cross-div)
- Topical Workshops, Symposia, and Conferences (TWSC)

**Data Analysis**
- Astrophysics Data Analysis (ADAP)
- GO/GI programs for:
  - Fermi
  - Swift
  - NuSTAR
  - TESS
  - NICER

**Mission Science and Instrumentation**
- Sounding rocket, balloon, cubesat, and ISS payloads solicited through APRA
- XRISM Guest Scientists (one time)
- Astrophysics Explorers U.S. Participating Investigators (triennial, this year)
- Pioneers

**Separately Solicited**
- GO/GI/Archive/Theory programs for:
  - Chandra
  - Hubble
  - SOFIA
  - Webb
- NASA Hubble Fellowship Program
- NASA Postdoctoral Program
- FINESST Graduate Student Research Awards

**New in ROSES-2020:**
- APD participates in cross-divisional TWSC
- XRISM Guest Scientist
- Astrophysics Explorers U.S. Participation Investigators (APEX USPI) (not R&A)
- Pioneers (see presentation by Michael Garcia)
- Data Management Plan will be evaluated as part of the intrinsic merit of proposals
- Announcement that ROSES-2021 will enable open software/code/source/models
- High Risk / High Impact: special review process will be implemented
- Proposals will be evaluated dual-anonymously
“APAC also requests a report on the success metrics, quantified to track outcomes resulting in the division-wide efforts to lower participation barriers for early- and mid-career investigators across a span of institutions and NASA Centers. APAC requests that APD track the impact of these programs on the diversity of Astrophysics missions, programs, and proposals submitted to the APD.”
Removing Barriers for Early/Mid-Career Investigators

To help remove barriers, we have implemented the following steps:

• We doubled the FINESST funding allocation in FY20
• We developed slides for peer reviews that discuss cognitive biases and how to mitigate them
• Code of Conduct poster boards for panels and panel chairs are presented at all peer reviews
• NASA’s Office of Diversity and Equal Opportunity has developed a short video that is sent to reviewers before the review and is shown at all peer reviews
• We encourage panels to learn about unconscious bias before arriving at the review
• Program Officers need to report on the diversity of the proposing community, the review panels and selection recommendations to the R&A selecting official before selection are made
• Proposals will be evaluated dual-anonymously to reduce bias (see separate slides)
• As a learning organization, we want to take every opportunity to apply best practices
Panel Diversity for Upcoming Astrophysics Review

Inferred Gender Diversity

- Female: 38%
- Male: 63%

Career Stage Diversity

- Early Career (<5 years): 25%
- Mid/Late Career: 75%

Career Background Diversity

- Engineers: 29%
- Scientists: 71%

Institution Type Diversity

- NASA Center: 17%
- University: 4%
- Private Sector: 13%
- Non-Profit: 67%

Geographic Diversity of Reviewer Institutions
APAC Recommendation: PI Diversity Tracked

“APAC also requests a report on the success metrics, quantified to track outcomes resulting in the division-wide efforts to lower participation barriers for early- and mid-career investigators across a span of institutions and NASA Centers. APAC requests that APD track the impact of these programs on the diversity of Astrophysics missions, programs, and proposals submitted to the APD.”

NASA Response: We welcome APAC recommendation how we could further remove barriers for early- and mid-career investigators
Dual Anonymous Peer Reviews (DAPR)
## Dual Anonymous Peer Reviews

<table>
<thead>
<tr>
<th>Format</th>
<th>Program</th>
<th>Anticipated Proposal Due Date</th>
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</thead>
<tbody>
<tr>
<td>Dual-Anonymous (GO pilot)</td>
<td>NuSTAR Cycle 6</td>
<td>1/24/2020</td>
</tr>
<tr>
<td>Traditional</td>
<td>Fermi Cycle 13</td>
<td>2/19/2020</td>
</tr>
<tr>
<td>Dual-Anonymous</td>
<td>Hubble Cycle 28</td>
<td>3/4/2020</td>
</tr>
<tr>
<td>Traditional</td>
<td>Chandra Cycle 22</td>
<td>~ 3/2020</td>
</tr>
<tr>
<td>Dual-Anonymous</td>
<td>Webb Cycle 1</td>
<td>5/1/2020</td>
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<tr>
<td>Dual-Anonymous (R&amp;A pilot)</td>
<td>ADAP</td>
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<td>Dual-Anonymous</td>
<td>Swift Cycle 17</td>
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<td>Dual-Anonymous</td>
<td>NICER Cycle 3</td>
<td>~ 11/2020</td>
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<td>TESS Cycle 4</td>
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<td>NuSTAR Cycle 7</td>
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<tr>
<td>Dual-Anonymous</td>
<td>Chandra Cycle 23</td>
<td>~ 3/2021</td>
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</table>
APAC Dual Anonymous Peer Review Recommendation 1

“The committee recommends providing many opportunities for proposers to be trained in the submission of an anonymous proposal that meets the guidelines. Town Halls at AAS meetings as well as webinars would be an important component of this training.”

APAC Dual Anonymous Peer Review Recommendation 2

“The committee also supports a “Dear Colleague” letter from Dr. Hertz to the community to explain the changes, the roadmap for implementation, and the training opportunities for the proposers.”
### NASA Response

**NASA concurs.** Below is a timeline of community announcements, training opportunities, and Town Halls.

<table>
<thead>
<tr>
<th>Date</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 27, 2019</td>
<td>Dear Colleague Letter issued by Paul Hertz</td>
</tr>
<tr>
<td>January 5, 2020</td>
<td>NASA Town Hall @ AAS</td>
</tr>
<tr>
<td>February 27, 2020</td>
<td>Astrophysics GO/GI virtual community Town Hall. Slides at <a href="https://science.nasa.gov/researchers/dual-anonymous-peer-review">https://science.nasa.gov/researchers/dual-anonymous-peer-review</a></td>
</tr>
<tr>
<td>March 3, 2020</td>
<td>SMD-wide virtual community Town Hall with Dr. Thomas Zurbuchen (for ROSES-20 pilot: ADAP, Earth USPI, Habitable Worlds, Heliophysics GI-Open). Slides at <a href="https://science.nasa.gov/researchers/dual-anonymous-peer-review">https://science.nasa.gov/researchers/dual-anonymous-peer-review</a></td>
</tr>
<tr>
<td>April 2, 2020</td>
<td>ADAP proposers’ webinar on dual-anonymous peer review</td>
</tr>
<tr>
<td>June 2, 2020 (tentative date)</td>
<td>Dual-anonymous peer review Special Session @ AAS</td>
</tr>
<tr>
<td>September, 2020</td>
<td>Dual-anonymous peer review Special Session @ AAS HEAD meeting</td>
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Questions?