National Aeronautics and Space Administration

Cosmic Origins Program Analysis Group (COPAG) Report to Astrophysics Advisory Committee (APAC) October 17-18 2022

Dr. Rachael Beaton
Lead, COPAG Stars Science Interest Group
Lead, COPAG Retention Study

1. COPAG EC Overview
    + Charge
    + Membership & Staffing; SIG/STIG Structure

2. COPAG Activities
    + Community Engagement: Monthly Activities, AAS

3. Cosmic Origins Analysis Activities: Supporting Informed Leadership in a Rapidly Changing World and Scientific Landscape
    + Study: retention and recruitment of technical expertise

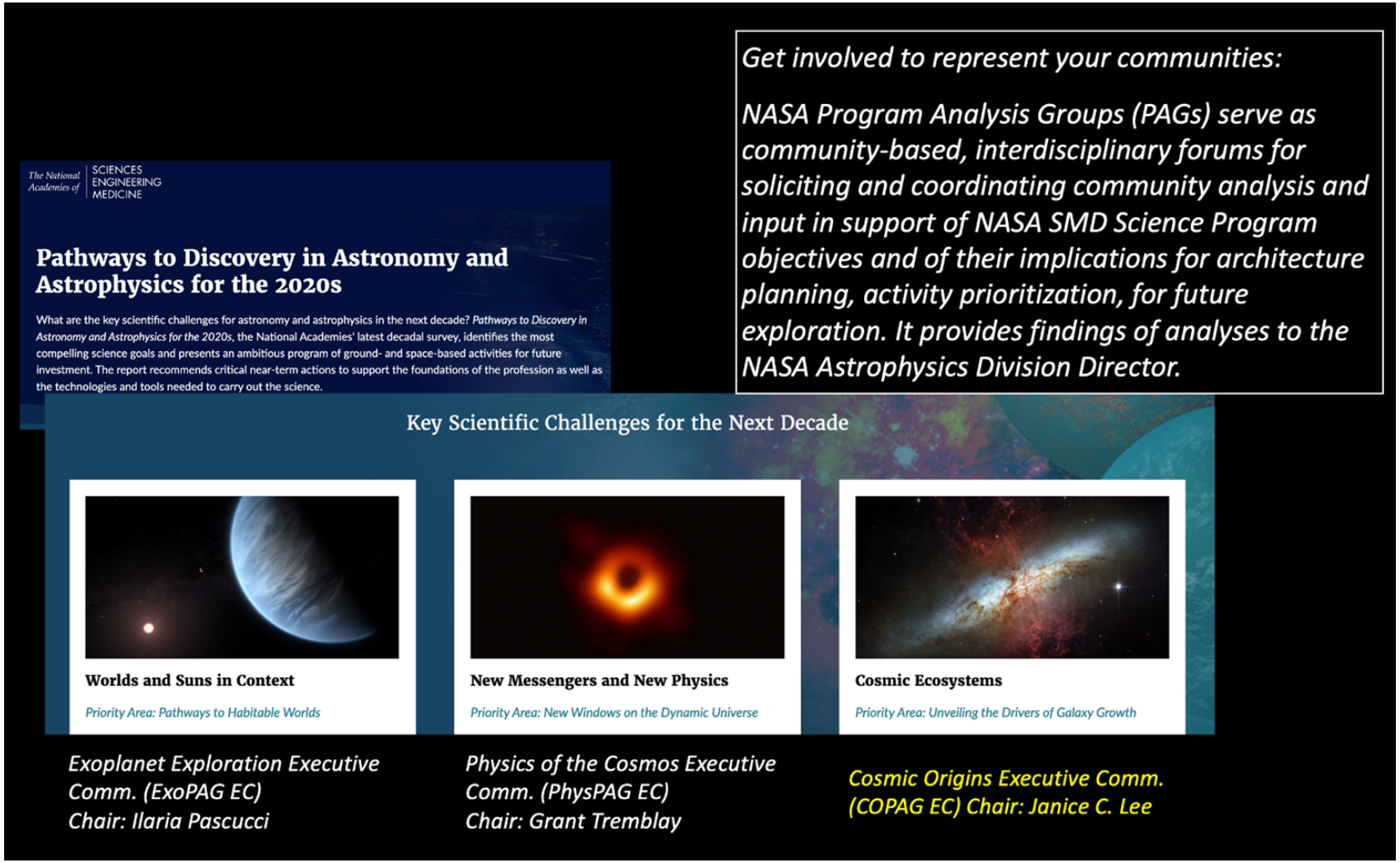
COSMIC ORIGINS EXECUTIVE COMMITTEE: Review of charge and organization

COPAG EC lead analysis and coordinate PAG activities; members should span breadth of COR science, technology

Executive Secretary: Stephanie Clark

COR Chief Scientist: Peter Kurczynski

Program Scientist: Eric Tollestrup → Manuel Bautista



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COPAG prior activities of note

SAG-10: Great Observatories 2019 Report

- identify gaps in wavelength coverage and scientific capabilities anticipated over next 10–20 years as NASA's current space observatories age/decommission (2) analyze how this will affect progress in a rapidly changing scientific landscape.

COVID Impact on NASA Cosmic Origins Research: Request for Input on ADAP

The NASA Cosmic Origins Program Analysis Group Executive Committee (COPAG EC; https://cor.gsfc.nasa.gov/copag/), is soliciting input on the impacts of COVID-19 on NASA astrophysics research, with special focus on the preparation and submission of proposals for the Astrophysics Data Analysis Program (A

The goal of this 5-1(the Astrophysics Di the survey data will the ExoPAG and Phy community.

This survey deadlin

The plan is to prese (https://science.nas schedule for June 2

* Required

Astrophysics Data Analysis Program (ADAP)

COVID Impact on NASA Cosmic Origins Research: Request for Input on ADAP
Janice C. Lee & Misty Bentz on behalf of COPAG EC

Main Results:

"Overall, on a scale from 1 to 5, how do you think the change in ADAP solicitation cadence impact your research. (1=negative impact; 3=no impact; 5=positive impact)."

Demographic	N	Net Negative	Net Positive	Neutral
All	169	59%	11%	30%
Male	68%	53%	11%	36%
Female	32%	76%	9%	15%
Early career/ non-tenured	27% (44% female)	64%	11%	25%

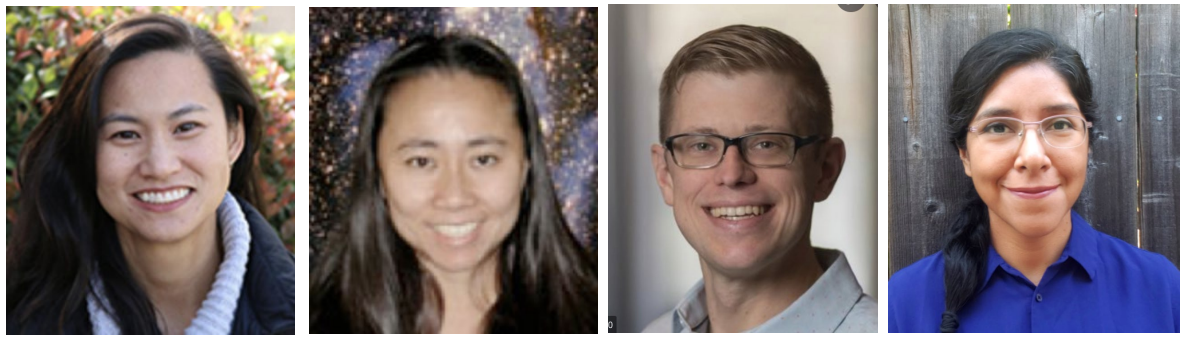
Majority response is that change in solicitation cadence will negatively affect resea **women, early-career researchers, and those without job security expect to be ev negatively impacted** than the general population of ADAP proposers.

COVID/ADAP 2020 Community Survey

- Indicated women and early-career scientists may be disparately impacted by COVID shutdown
- Helped guide decision to reverse cancellation of FY21 ADAP solicitation

COSMIC ORIGINS EXECUTIVE COMMITTEE: Review of charge and organization

	Term	Institution
Janice Lee (Chair)	November 2017–October 2022 Chair-elect/Chair Jan 2021	Gemini/NOIRLab
Stephan McCandliss	November 2018–October 2022	Johns Hopkins University
Alexandra Pope	November 2018–October 2022	University of Massachussetts
Alina Kiessling	February 2020–October 2022	Jet Propulsion Laboratory
Christine Chen	November 2020–January 2024	Space Telescope Science Institute
Chris Hayward	November 2020–January 2024	Flatiron Institute
Lisseth Gavilan-Marin	November 2020–January 2024	NASA Ames Research Center
Sabrina Stierwalt	November 2020–January 2024	Occidental College
Hsiao-Wen Chen	April 2022–October 2024	Univeristy of Chicago
Shouleh Nikzad	April 2022–October 2024	Jet Propulsion Laboratory
Enrique Lopez Rodriguez	April 2022–October 2024	Stanford University



Rotating Off

New members Instrumentation; IR; UV; IGM

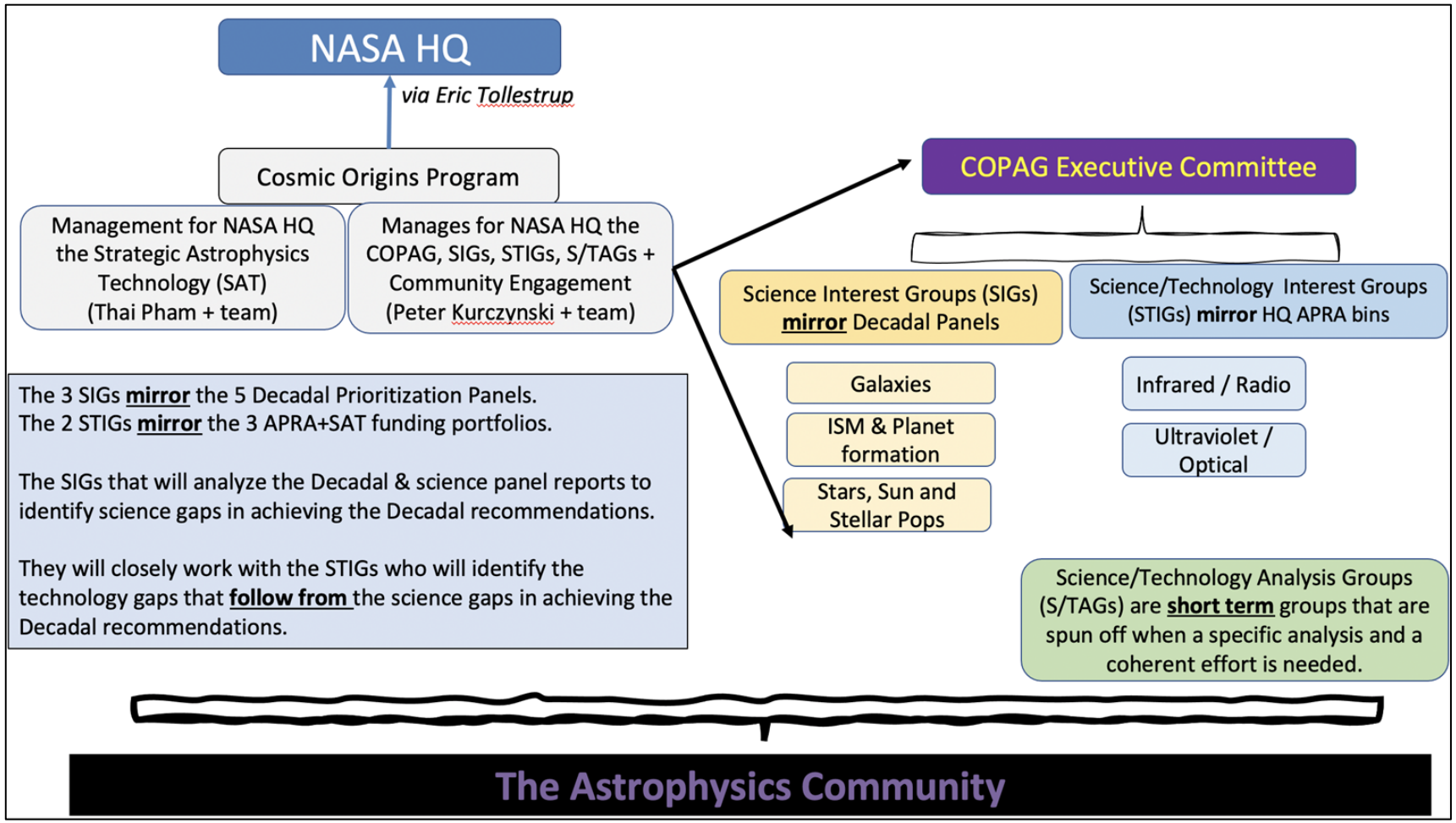
- N=11
- 4 members ending terms in Oct incl Chair (Lee, McCandliss, Pope, Kiessling)

IR and UV STIGS: active since 2000s; established networks and participation

New SIGS proposed by former EC Chair Meixner to prepare for analysis of Astro2020

- Galaxies, Stars active
- new AGN SIGs activated by Cosmic Origins Program Office

From Oct 2021 APAC Report:



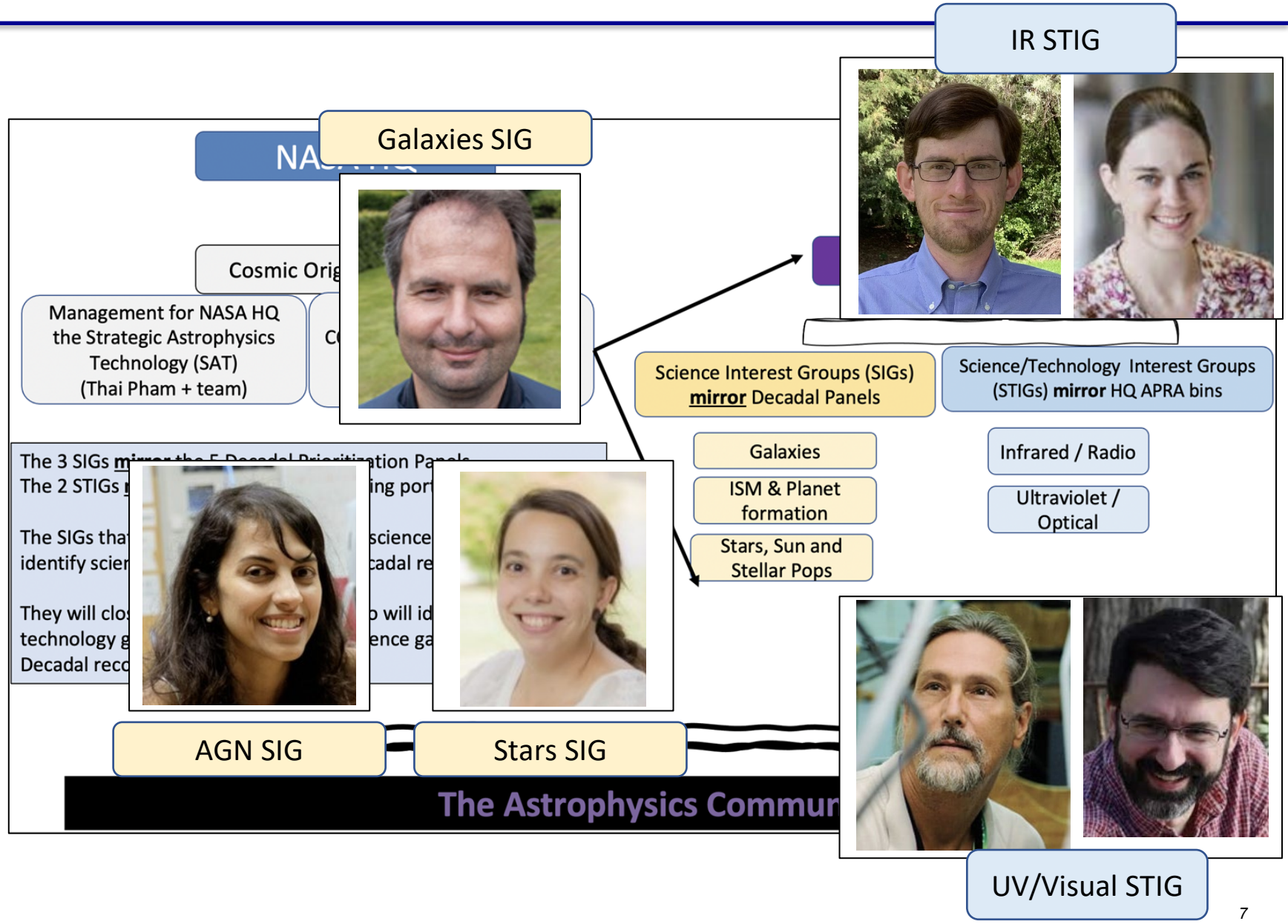
IR and UV STIGS: active since 2000s; established networks and participation

New SIGS formed by Meixner EC to prepare for analysis of Astro2020

➔ Galaxies and Stars SIGs now active

STIG/SIG Leadership

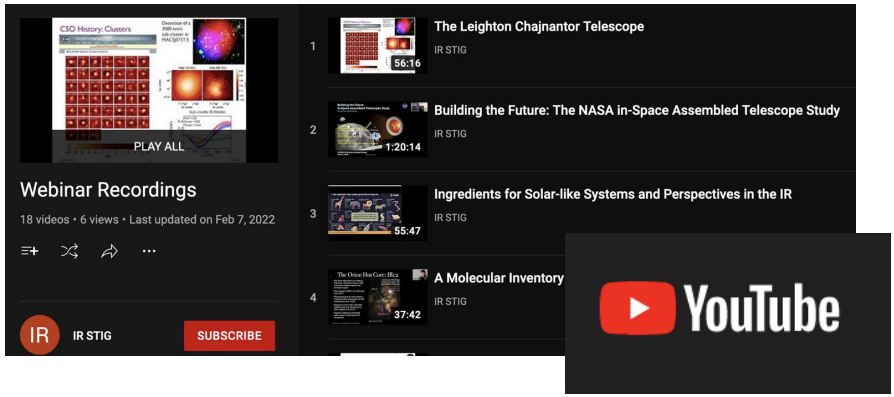
- **IRSTIG**: M. MacGregor (Colorado), J. Connors (NIST)
- **UVSTIG**: S. McCandliss (JHU), J. Tumlinson (STScI)
- **Galaxies SIG**: B. Holwerda (Louisville)
- **Stars** SIG: R. Beaton (STScI)
- **AGN** SIG: S. Satyapal (GMU)



Infrared Science Technology Integration Group: Highlights (Connor, MacGregor et al.)

Restarted Webinar Series in October 2022

- Incorporated 'Far-IR Great Observatory Technology Updates'
- Two talks per webinar – one each focusing on science and technology
- Will continue to meet on the first Monday of each month at 3pm Eastern
- Attendance growing, typically 30-60 scientists from around the globe.
- All recordings posted to YouTube channel and website.



Continuing Biannual Newsletter

- Released latest version Aug 2022; next release ~Jun 2022.
- Mix of news and views, science and technology highlights, upcoming events, etc.

Supported Community Discussion on Decadal Recommendations and Probe Missions

- Upcoming splinter session at Winter AAS meeting
- Planning for community surveys to help gather community input

Hosted In-Person Workshop "The Impacts of Astro2020 on IR Astrophysics"

- >100 in-person participants + "viewing mode" virtual participation
- Report included in last newsletter
- Talks archived: https://casa.colorado.edu/~mema5817/irworkshop.html

https://cor.gsfc.nasa.gov/sigs/irstig.php **@ir_stig**

1) **Preping** AAS241 UVSTIG Splinter Session to be held hybrid on (requested) Tuesday 10 January 2023 13:00 - 15:00 PT

Title: **Science and Technology Tradespace for IOU-ST (IROUV): Working Towards a Design Reference Architecture**

- **Draft Program** (nominally 10+5 min talk+questions)

• Decadal Science Goals Overview: TBD • Telescope Architecture: TBD • Coronagraph: TBD • Multi-object Spectrograph: **Kevin France**	• HighDefinition Imager: TBD • Star Shade: **Aki Roberge and Scott Gaudi** • Workforce Development: **Rachael Beaton** • GOMAP Process: TBD

1) **Convened Precursor Science Brainstorming Sessions on 21 Sept and 04 Oct at STScI with presentations by Tumlinson, Beaton and McCandliss**
2) **UVSTIG -- Quorum for Ultraviolet Exploration of Science and Technology (QUEST) Seminar**
   - **QUEST09** – 20 October 2022
     - Speaker: Fiona Harrison, Caltech – UVEX (UV Explorer)
     - https://www.caltech.edu/about/news/nasa-selects-uvex-mission-proposal-for-further-study
   - **Quest10** – 01 December 2022
     - Speaker: Hsiao-Wen Yan, U Chicago – CUBS (the Cosmic UV Baryon Survey)
     - https://cubs.uchicago.edu
   - Archived QUEST Seminars https://www.youtube.com/playlist?list=PL_dmnk6FeUeASWgZwzBIUR--Ut8axxSut

Stars Science Interest Group: Highlights (Beaton et al.)

Webinar Series Continutes in 22B (see right)

- Bi-weekly "Colloquium-like" talk series with 2 x 30 minute talks that are topically related. Goal is to fill the gap for folks that do not get topically-related colloquium-style talks.
  - 1 meeting set-aside for Post-Precursor Science Meeting and GOMAP discussions (Nov 01)
- 30-40 Average Attendance, Recorded posted to YouTube
- Last week a participant said:
  "**Thank you for continuing this is the highlight of my week.**"

Facilitating Participation in NASA/COPAG Events

- Promoting/Advertising workshops, relevance of workshops, etc. -- helping people find the crucial stuff through the noise.
- Still in Progress:
  Stars and stellar physics critical components that unites three focus areas of Astro2020, but not always explicit statements in recommendations

Merged Splinter with Galaxies SIG at AAS241 - Next Great Observatory Focus

https://cor.gsfc.nasa.gov/sigs/starssig.php

Recent Events

October 04, 2022, 4:00 PM–5:00 PM ET
The First Settlers of the Universe (are also in our Backyard)
Mapping the most metal-poor stars in the Milky Way's Dwarf Galaxies—current science and connections to upcoming surveys
Anirudth Chiti (Univ of Chicago)
The past, present, and future of the r-process
Terese Hansen (Stockholm)
Host: Ting Li (University of Toronto)

Upcoming Events

October 18, 2022, 4:00 PM–5:00 PM ET
Theoretical Stellar Modelling: What Hard Thing is Next?
Anish Amarsi (Uppsala) and Rana Ezzeddine (University of Florida)
Host: Derek Buzasi (Florida Gulf Coast University)

November 01, 2022, 4:00 PM–5:00 PM ET
We Need You: Getting Involved with the Next Great Observatories
Rachael L. Beaton (STScI) and TBD

November 15, 2022, 4:00 PM–5:00 PM ET
Connecting Galaxies Near and Far with Early JWST Observations
Nicha Leethochawalit (Melbourne / NARIT) and Sandro Tacchella (Cambridge)
Host: Kathleen Kraemer (Boston College)

November 29, 2022, 4:00 PM–5:00 PM ET
Unlocking New Science Using the New Technical Capabilities with JWST
Marshall Perrin (STScI) and Alberto Noriega-Crespo (STScI)
Hosts: Rosemary Wise (JHU) and Yuan-Sen Ting (ANU)

December 13, 2022, 4:00 PM–5:00 PM ET
Stars at Radio Frequencies: What we learn and how we use it
To be Determined
Host: Yuan-Sen Ting (ANU)

- Part of COPAG started late 2021
- Remit to identify science gaps (“potholes”) on the road to the final vision of Astro2020
- Monthly presentations and community discussion (30min talk + 30min discussion)
  - Considering questions such as “How does galaxy science scale with the aperture?” “What kind of commensal science is possible?”
  - Identify precursor and preparatory science for next IR/UV/O Flagship
  - First issues identified: Scaling randomized Deep Fields and how to identify enough quasars for circumgalactic medium studies.

https://cor.gsfc.nasa.gov/sigs/Galaxies-SIG.php

Some examples of recent topics

There is the opportunity to do deep imaging together with exoplanet transit observations. What would we need to make those extra-galactic observations a success?

- Do we know the likely exoplanet target list? YES
- Are those at high Galactic Latitude? Some! Not all?
- How big do those fields need to be to beat cosmic variance? Bigger camera? How many filters?
- Can one change filter while extra-galactic observations are ongoing? ¯_(ツ)_/¯
- Is the onboard data storage enough to allow this commensal kind of observing (linked to the needed size of camera)? ¯_(ツ)_/¯

AGN Science Interest Group: Highlights (Satyapal et al.)

- New AGN SIG began in August 2022
- Biweekly seminar series - with recorded talks on YouTube
  - 3 seminars in Aug-Sep with attendance of ~30-40 people
- Planned Monthly informal zoom lunch meetings for Faculty/Research Staff and separately for Postdocs/Grad Students
- Planned "AGN Vision Series" Colloquia - 30 minute talks followed by community discussion on most outstanding questions in the field and the current and future facilities needed to answer them.

September 27, 2022
A high angular resolution view of the PAH emission in Seyfert galaxies using the James Webb Space Telescope
Ismael G. Bernete

September 13, 2022
Measuring AGN Hosts Properties at z>3 with JWST
Dale Kocevski

August 30, 2022
Dust in the Central Parsecs of AGNs
Almudena Prieto

https://cor.gsfc.nasa.gov/sigs/agnsig.php

October 11, 2022
Newborn Quasar Jets Discovered in the Very Large Array Sky Survey
Kristina Nyland

October 25, 2022
JWST ERO observations of NGC 7319
David Law

November 8, 2022
Revealing Low Luminosity AGN with JWST
Anil Seth

November 22, 2022
Low-power jet-ISM interaction in NGC 7319 revealed by JWST/MIRI MRS
Miguel Pereria Santaella

December 13, 2022
Magnetic fields as the cause or effect of the origin of radio-loud and radio-quiet AGN
Enrique Lopez Rodriguez

2023 Winter AAS planning

- Splinter proposals submitted by COS program office for 7 different sessions (COPAG general annual mtg, 2 STIGS, 4 SIGS) as placeholders
- After feedback from Cosmic Origins community to EC chair and extended discussion by EC, provided feedback to program office to reduce to 3 splinters
  - integrate activities of SIGS into COPAG general annual mtg
  - continue with splinters for UV/O and IR STIGs.

Precursor Science Workshop II (2022 Oct 11-13)

- Worked with EC and community on short timescale to increase participation of IR community through IR STIG and support large mission studies session.

The APAC requests that the COPAG provide further details of the COPAG technical workforce study at the October 2022 APAC meeting.

Initial Motivations and Ideas

- **Risk Charts** for big transformative science programs now include in their top risks **the hiring of technical personnel** from industry

  (to write software, develop systems, build infrastructure, among others.)

- **Attrition** also an issue because of knowledge loss and small teams

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- **Why?**
  - Conflict between **hiring practices** in Academia vs. Industry
    - Timescales (many months vs. several weeks)
    - Supply >> Demand vs. Supply << Demand

      a.k.a. Employer-centric vs. Employee-centic hiring environment

      especially with industry teams adopting hybrid/remote/distributed work structures

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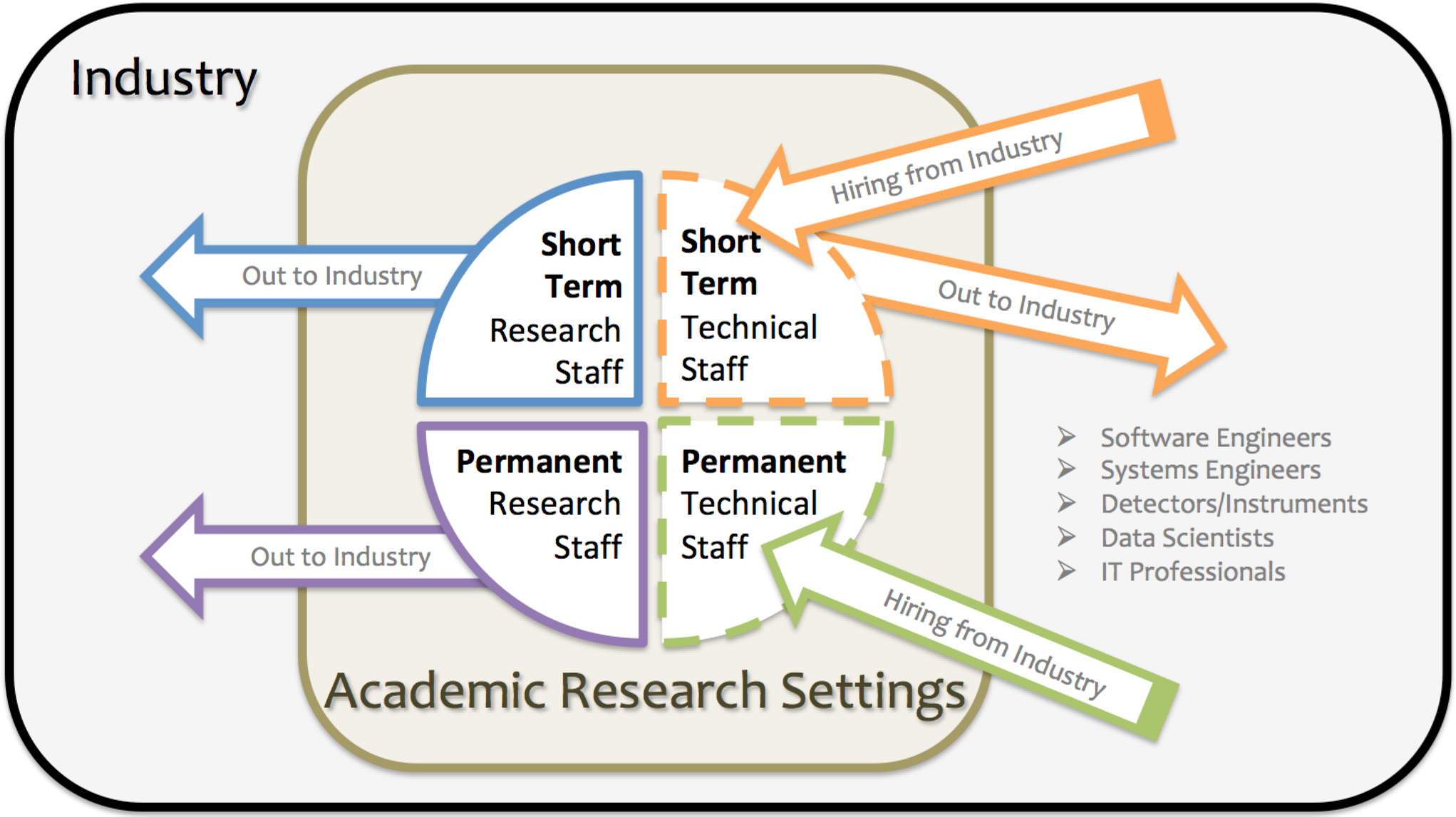
- ➔ At the same time, **only ~1 in ~10 PhDs** will become tenure track professors
  - ◆ Number of BA degrees in Astronomy up 25% from 2014-2018
  - ◆ Number of Ph.D. degrees up 20% from 2014-2018
  - ◆ Tenure Track in Astro Dept up 4% from 2014-2018
  - ◆ **Unable to find data on technically-focused jobs, non-teaching jobs, non-university settings**

Research Recruitment and Attrition



Very little differentiation between Industry and Academic Research Skillsets, Sense of Freedom/Choice, and other commonly raised differences.

See: https://www.aip.org/statistics/phd-plus-10
(note this data is old, but does span the late 1990's tech bubble)

Initial Motivations and Ideas

- Move beyond anecdotal discussion and personal experience to understand why **highly trained** and **highly successful** researchers **leave** the field

- Present analysis on what factors could reinforce the foundation of science:

  the **people** that do science

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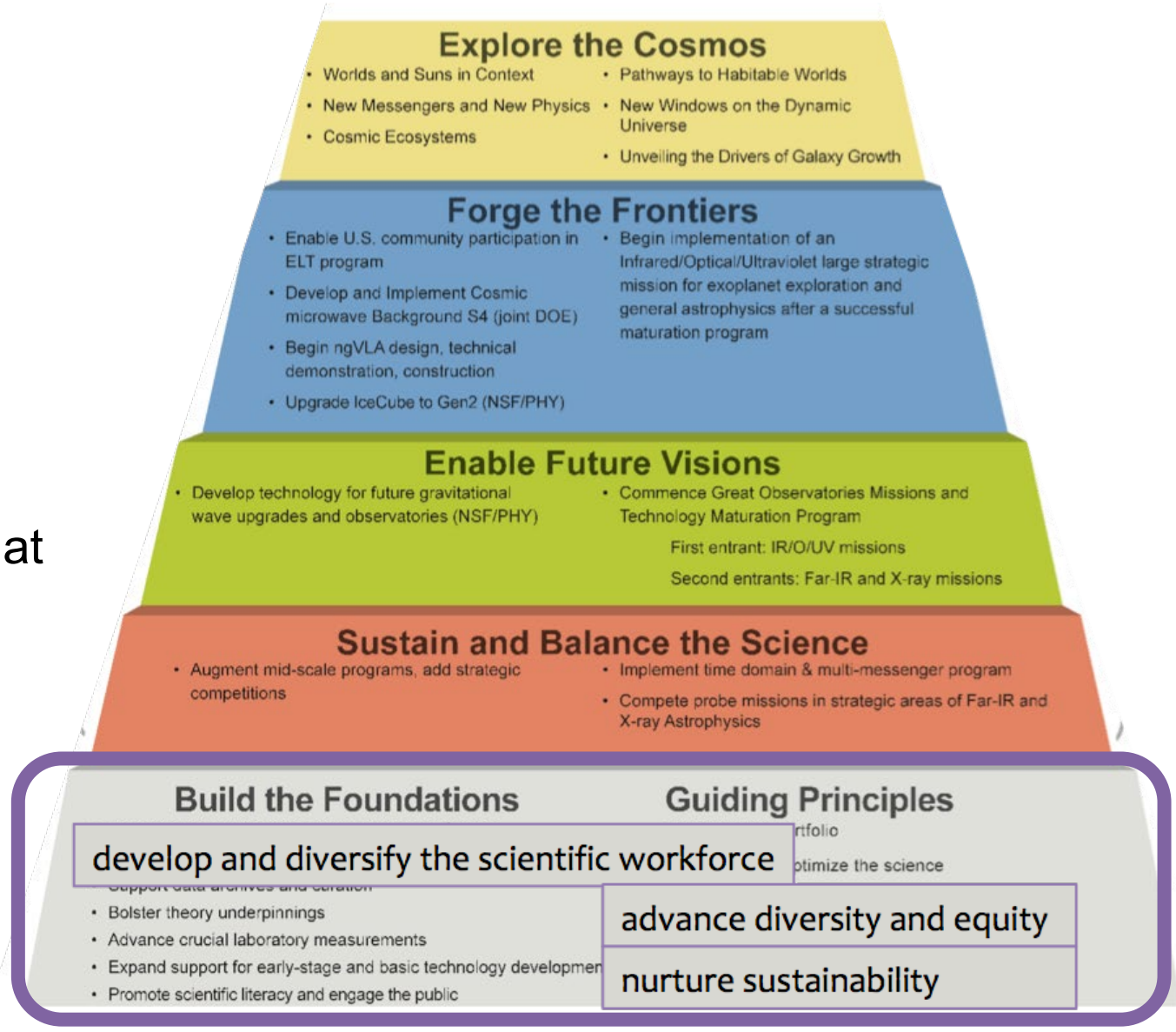

Why Now? What is the urgency?

- **Coming out of the pandemic scientists of all career stages are reevaluating**
  - The structural weaknesses in our community were revealed and experienced in aggregate and in full display
    - Issues related to caring for family, managing collaborations, among others have always been there but happening at the individual, rather than institutional, levels
- **We are starting to seriously examine the layers of inequity in our field**
  - NASA Inclusion Plans, AIP Team Up Report
- **Industry recruiting continues to grow**
  - Ph.D. holders are promising hires for the same reason they are promising within academia
  - Employers willing to invest in specific training for specific tasks
- **Decadal Survey has made Workforce Issues a critical component of our outlook**
  - Report of the Panel on the State of the Profession and Societal Impacts

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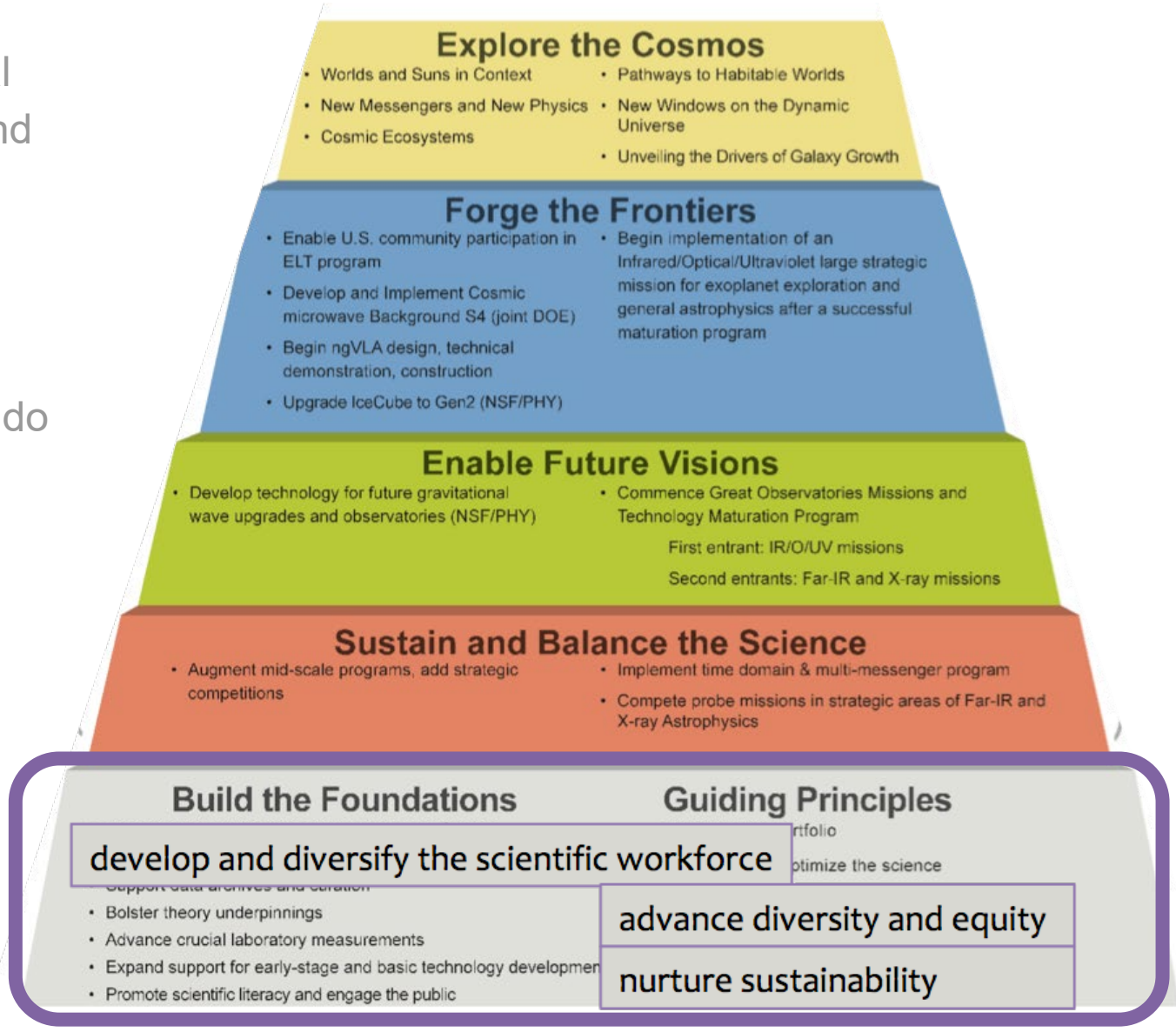
- ➔ **Roadblock**:
  - ◆ We can't collect new data now due to Paperwork Reduction Act and limitations to our Terms of Reference
- ➔ **Solution**:
  - ◆ Use the literature, public data as motivation
  - ◆ No Data on non-physics degree holders, so we will do our best to contextualize.



Anecdotally what are the issues?

- Location
- Salary

- Long-Term Stability
- Work/Life Balance

- Lack of Support/Room for Growth

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AAS Committee on the Status of Women in Astronomy (CSWA) has 8 years of non-academic career profiles that asked **why scientists leave** (27 from 2013 to 2021).

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- ➔ **Location** (48%)
- ➔ **Salary** (30-40%)
- ➔ **Work Environment** (19%)
- ➔ **Long-Term Stability** (48%)
- ➔ **Work/Life Balance** (37%)
- ➔ **Funding** (11%)
- ➔ **Lack of Support/Room for Growth** (41%)
- ➔ **Did not want Research Job** (33%)
- ➔ **Did not get Academic Jobs** (4%)

Note:
This is *my* coding that is not fully scientific, just contextual.

This is still anecdotal in nature because there is bias in who was contacted and who responded. A systematic survey of those that stayed in academia and those that left across a variety of jobs would be more reliable.

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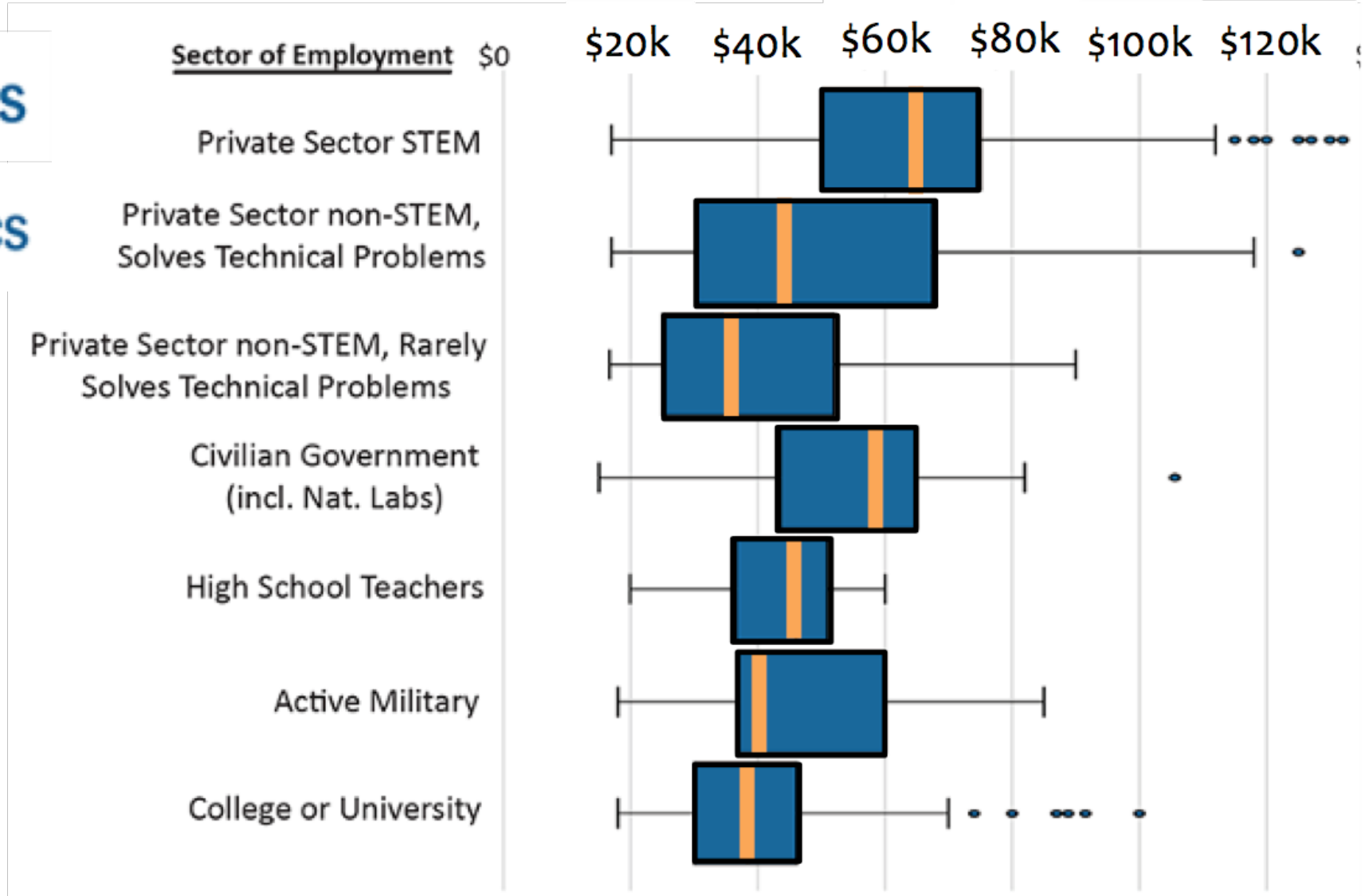
Starting Salaries for Physics Bachelor's Degrees 2019 and 2020

AIP | Statistics

aip.org/statistics



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Starting Salaries for Physics PhD Degrees 2019 and 2020

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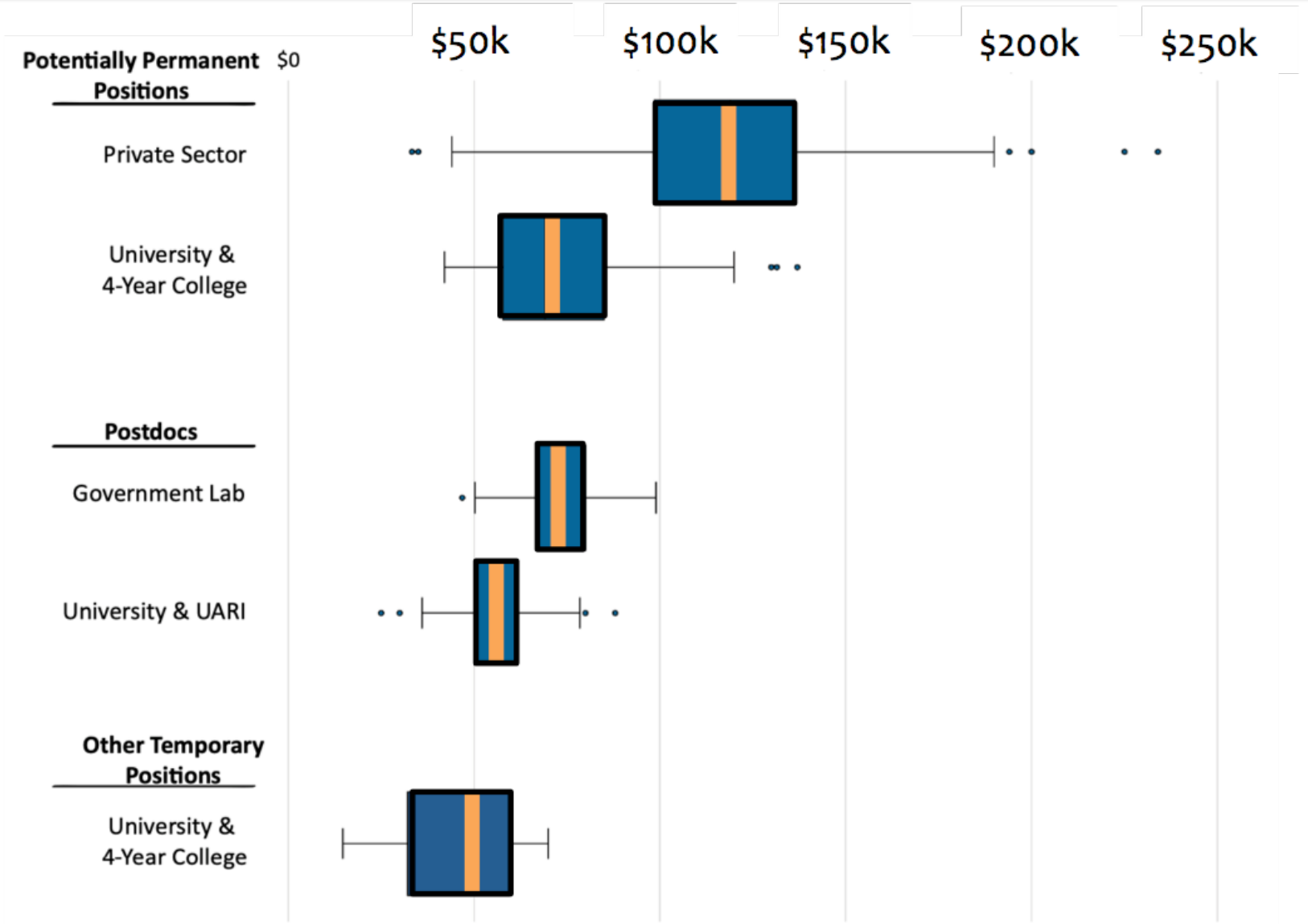

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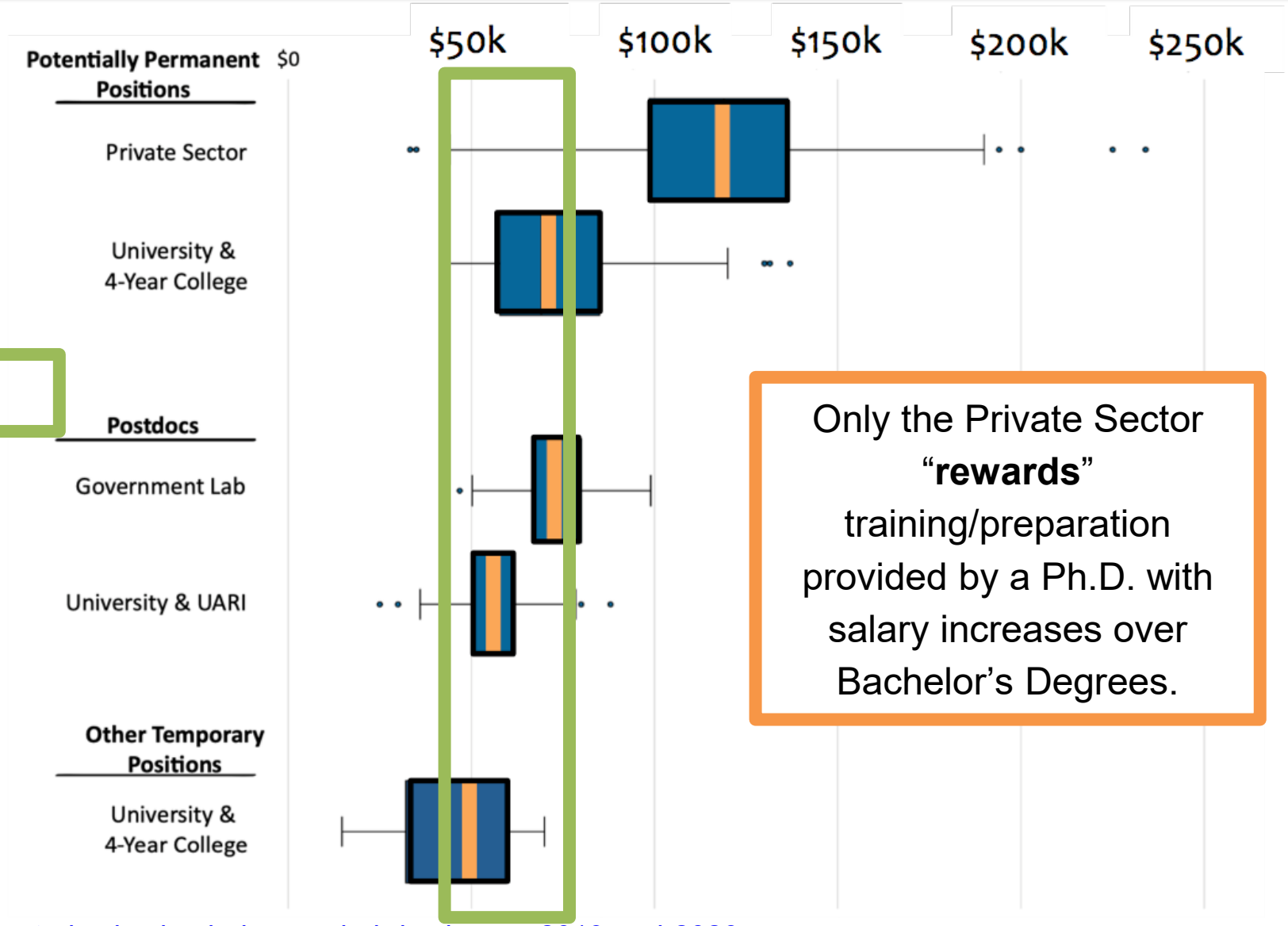
IQR of All **Physics** Bachelor's Degrees



Only the Private Sector "**rewards**" training/preparation provided by a Ph.D. with salary increases over Bachelor's Degrees.

Figure adapted from:
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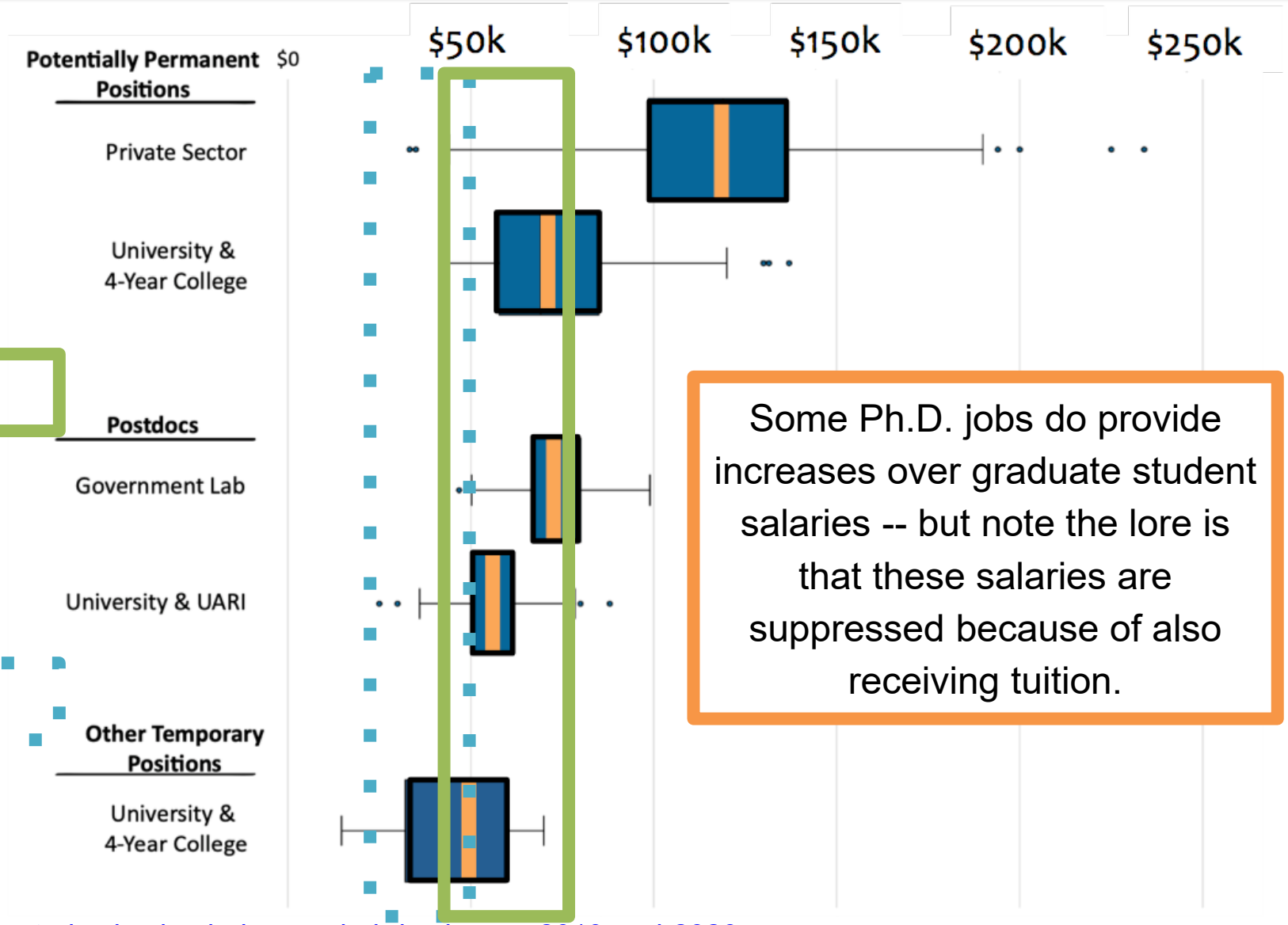
Starting Salaries for Physics PhD Degrees 2019 and 2020

AIP | Statistics

aip.org/statistics

IQR of All **Physics** Bachelor's Degrees

Physics Graduate Student Salaries



Some Ph.D. jobs do provide increases over graduate student salaries -- but note the lore is that these salaries are suppressed because of also receiving tuition.

Figure adapted from:
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Starting Salaries for Physics PhD Degrees 2019 and 2020

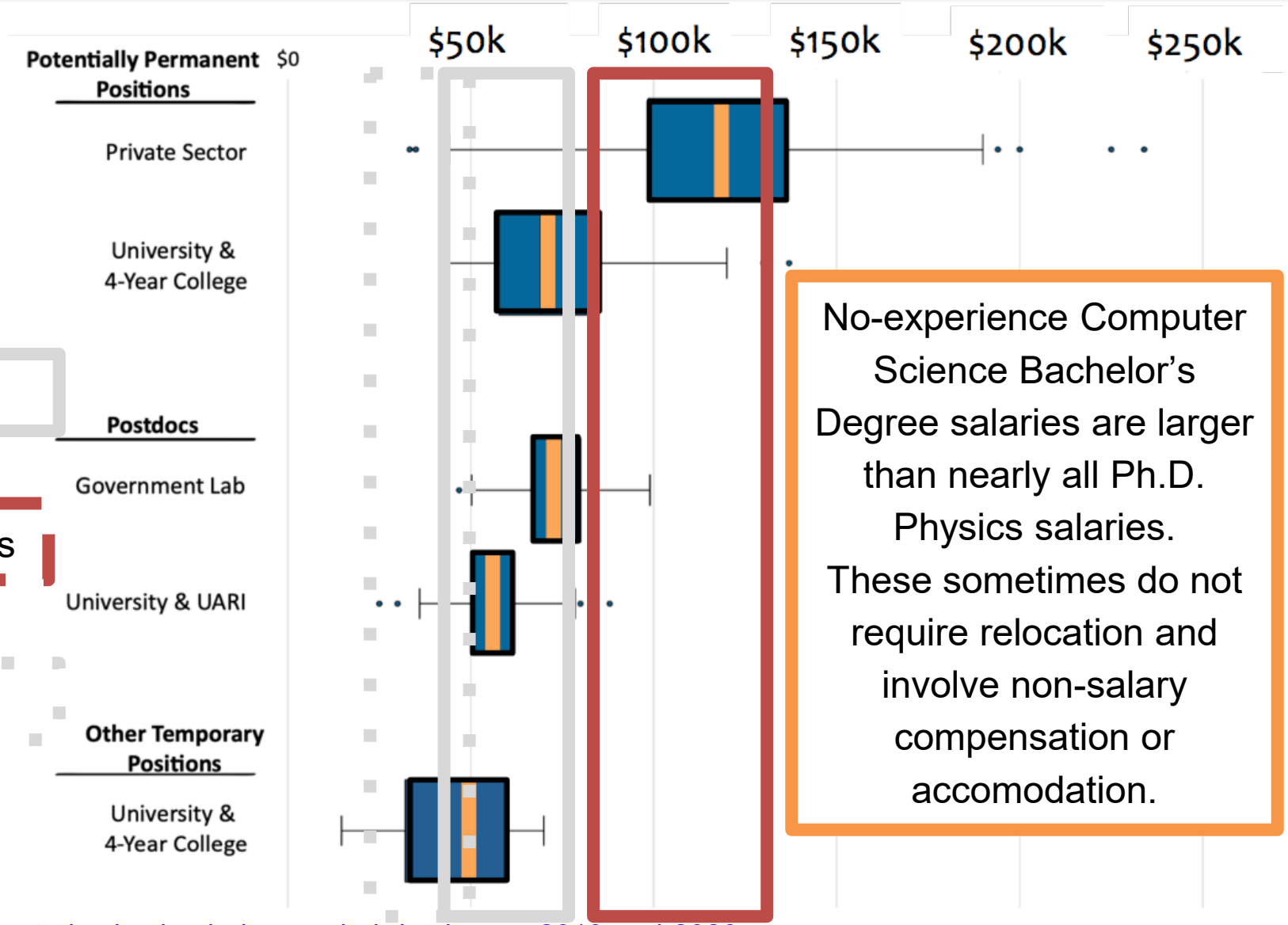
AIP | Statistics

aip.org/statistics

IQR of All **Physics** Bachelor's Degrees

~IQR of All **CompSci** Bachelor's Degrees

Physics Graduate Student Salaries



No-experience Computer Science Bachelor's Degree salaries are larger than nearly all Ph.D. Physics salaries. These sometimes do not require relocation and involve non-salary compensation or accomodation.

Figure adapted from:
https://www.aip.org/statistics/resources/initial-employment-physics-bachelors-and-phds-classes-2019-and-2020

Salaries Impact Who Can Be a Scientist

THE STATE OF SCIENCE SALARIES

Stagnating salaries, persistent pay divides and a competitive job market are dampening scientists' optimism. **By Chris Woolston**

Direct from the Article:

… she struggled with relatively low salaries during more than five years of postdoctoral work in the United Kingdom …

"Postdoc salaries are OK, but it was a difficult situation for saving money. I never felt great financial security. **If something went wrong, I'd have to rely on my parents.**"

Nature | Vol 599 | 18 November 2021

Based on Nature's 2021 salary and satisfaction survey

https://media.nature.com/original/magazine-assets/d41586-021-03041-0/d41586-021-03041-0.pdf

Salaries Impact Who Can Be a Scientist

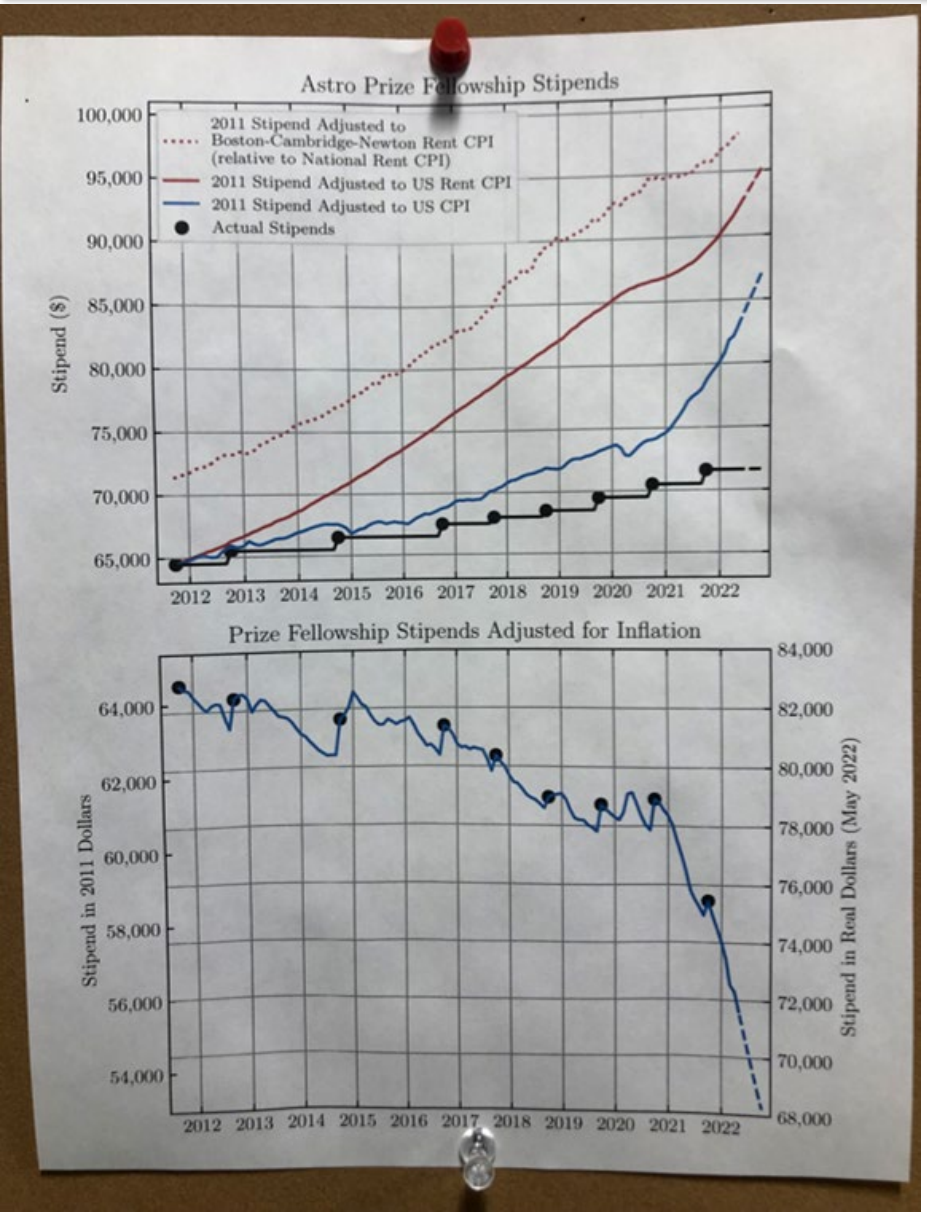
Being able to rely on family members for financial support is a privilege that most do not have. Those that face these issues without that privilege, would have to quit academic research and take a higher paying job.

For context, from the Economic Well-Being of US Households:

- ➔ 24% of households in the US are just able to pay their monthly expenses or are a single unplanned $400 expense away from hitting this point.
  This quantity has **sharp racial divides**:
  - ◆ 40% of African American households
  - ◆ 35% of Hispanic households
  - ◆ 20% of white households
  - ◆ 11% of Asian households
- ➔ 27% of Americans do not have cash-on-hand to cover three months of bills
- ➔ Lower income households (< $50,000) **2x more likely to experience job disruption or family emergencies** than higher income households (> $100,000) including impacts of natural disasters.

Source: https://www.federalreserve.gov/publications/2022-economic-well-being-of-us-households-in-2021-dealing-with-unexpected-expenses.htm

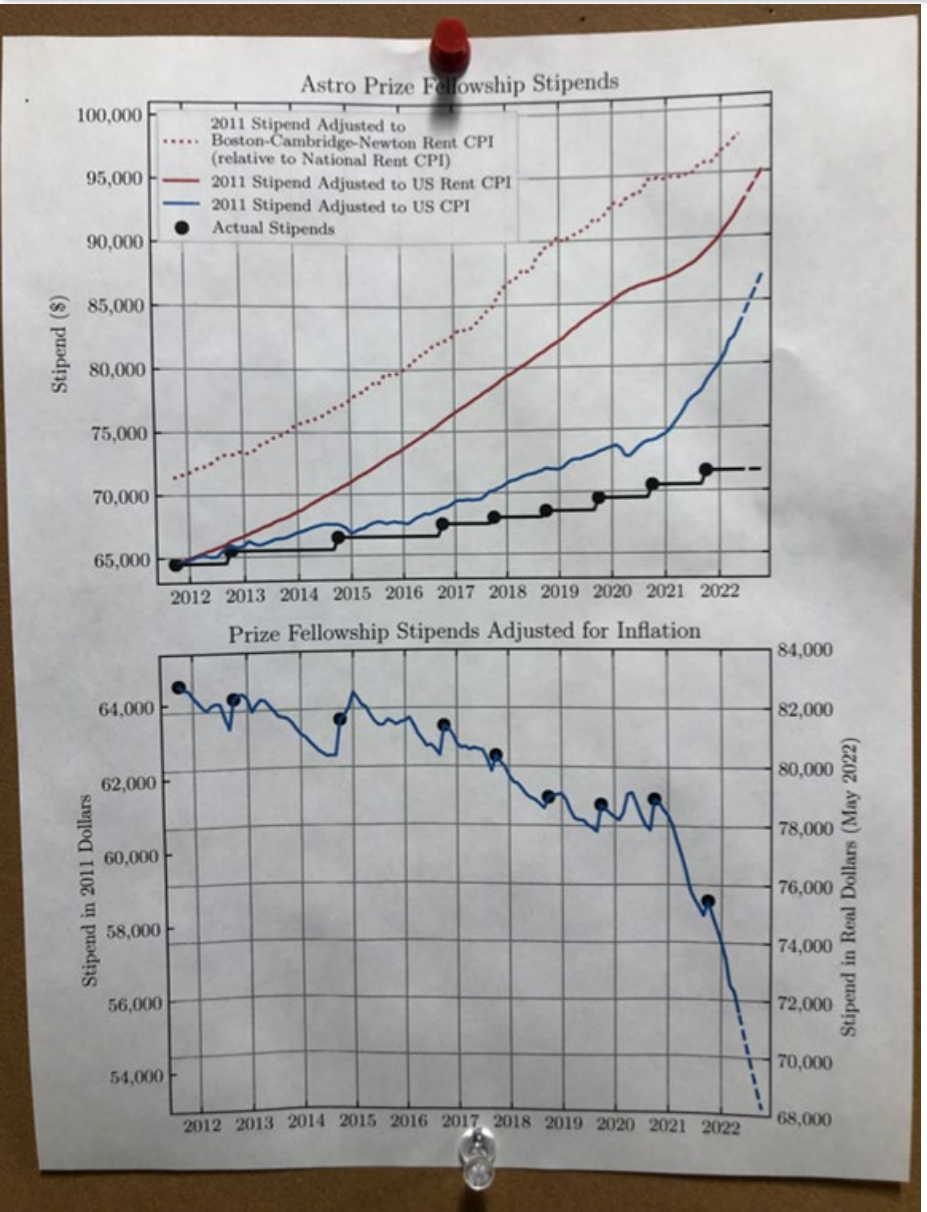
Salaries and Cost of Living

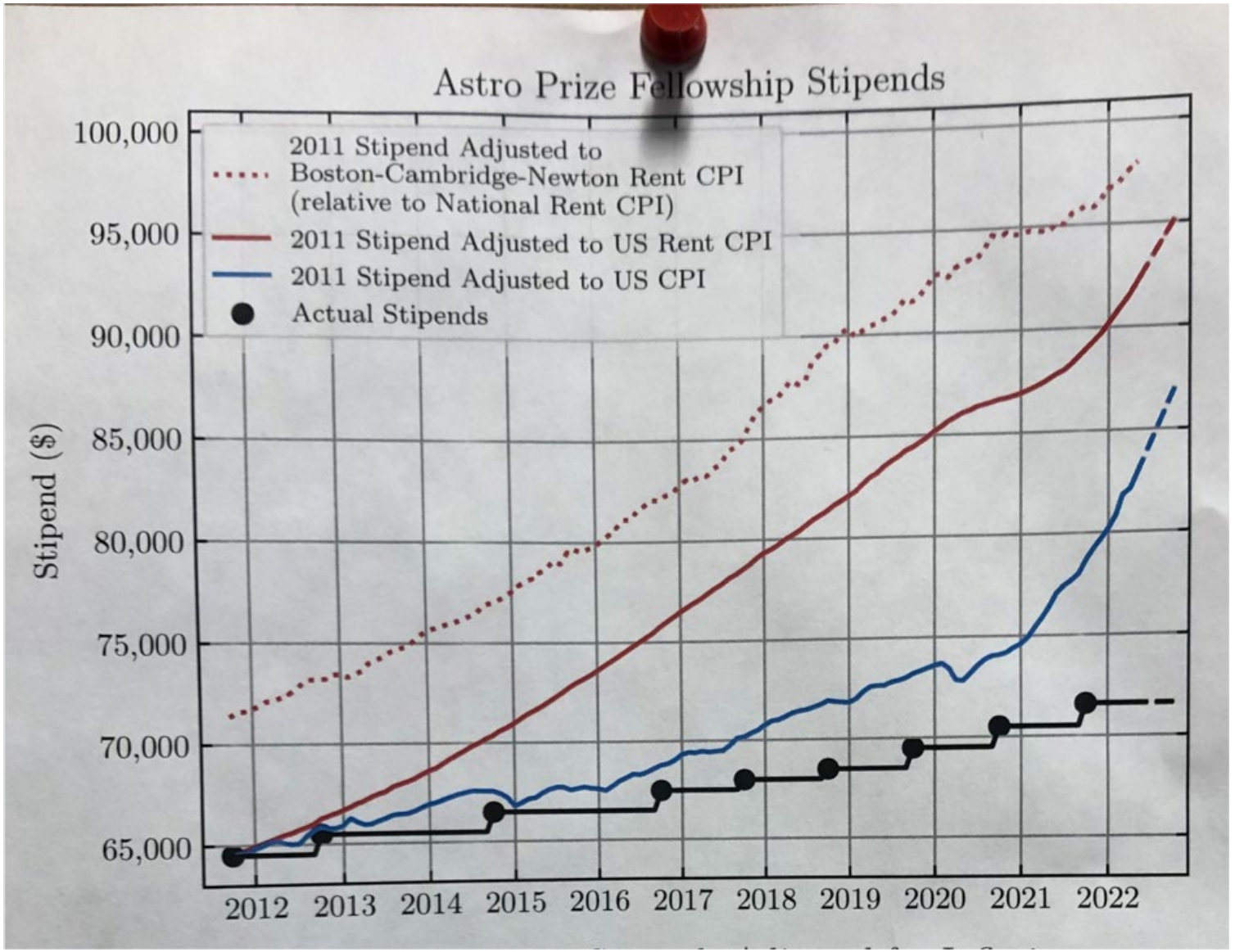


This a picture that made its way to the COPAG discussion via a telephone-of-Slack channels and is from the bulletin board of distinguished university in the Boston-Cambridge-Newton Area.

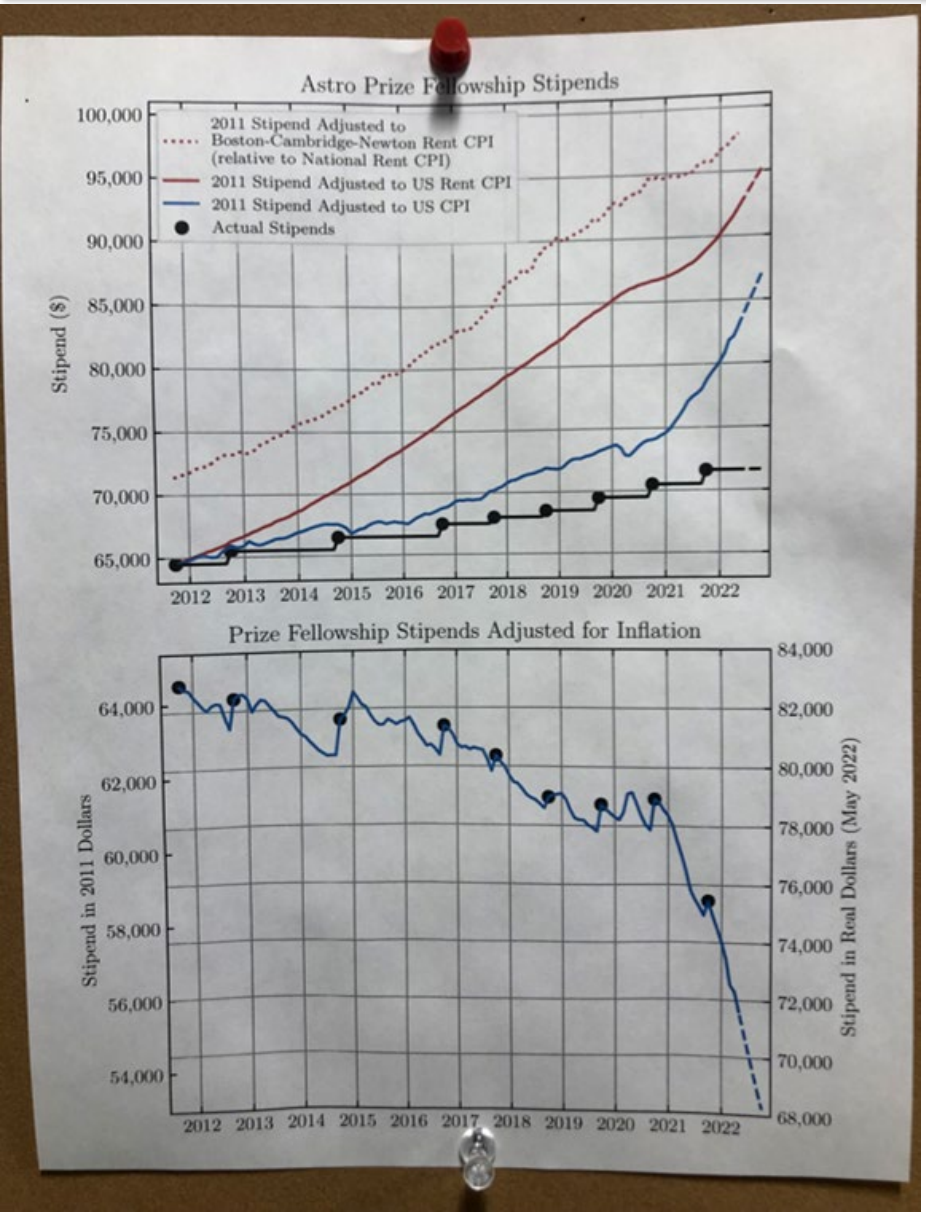
This is an example of the type of analysis that early career researchers are motivated do on their own and distribute in their own networks when it comes to career decision making.

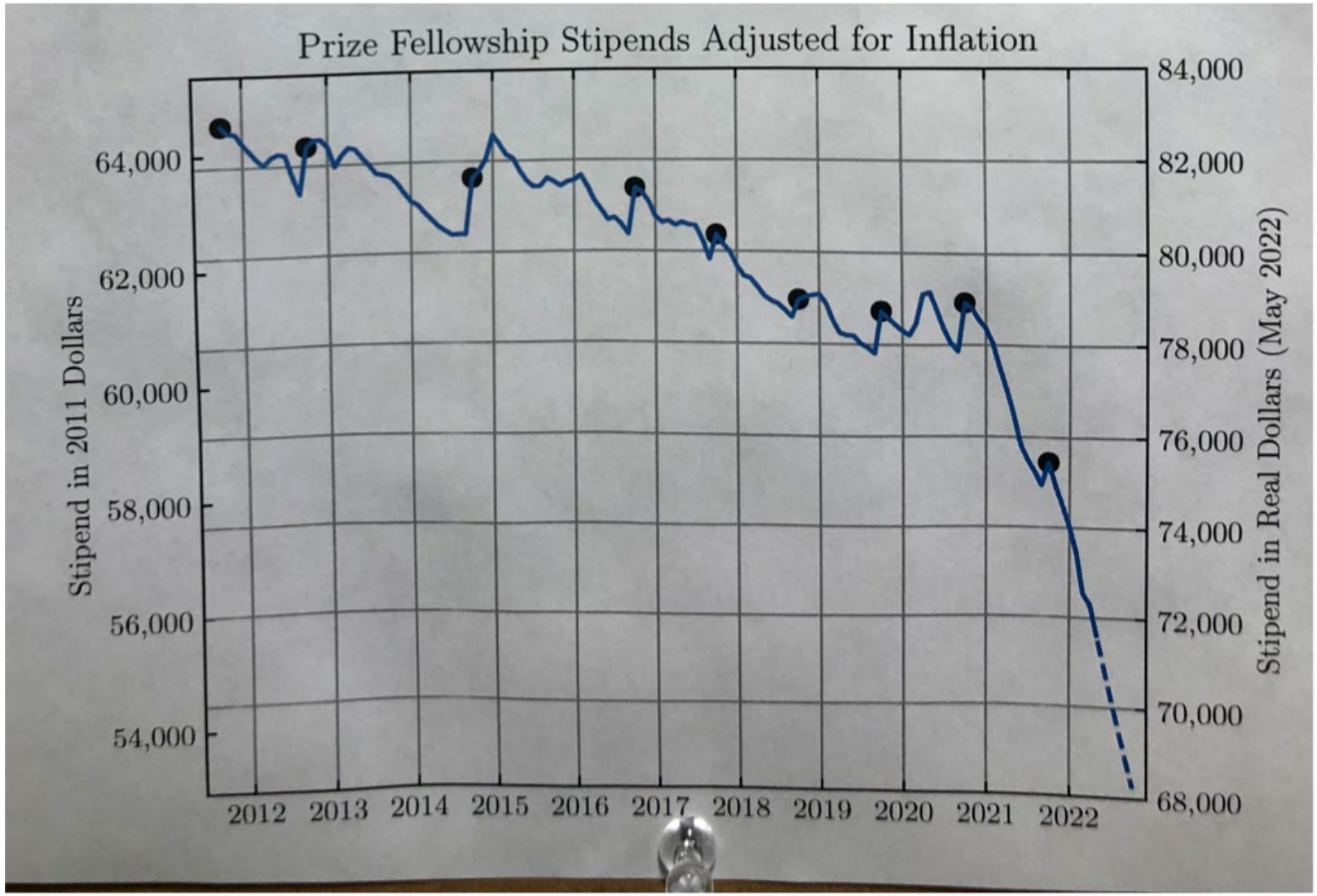
Salaries and Cost of Living



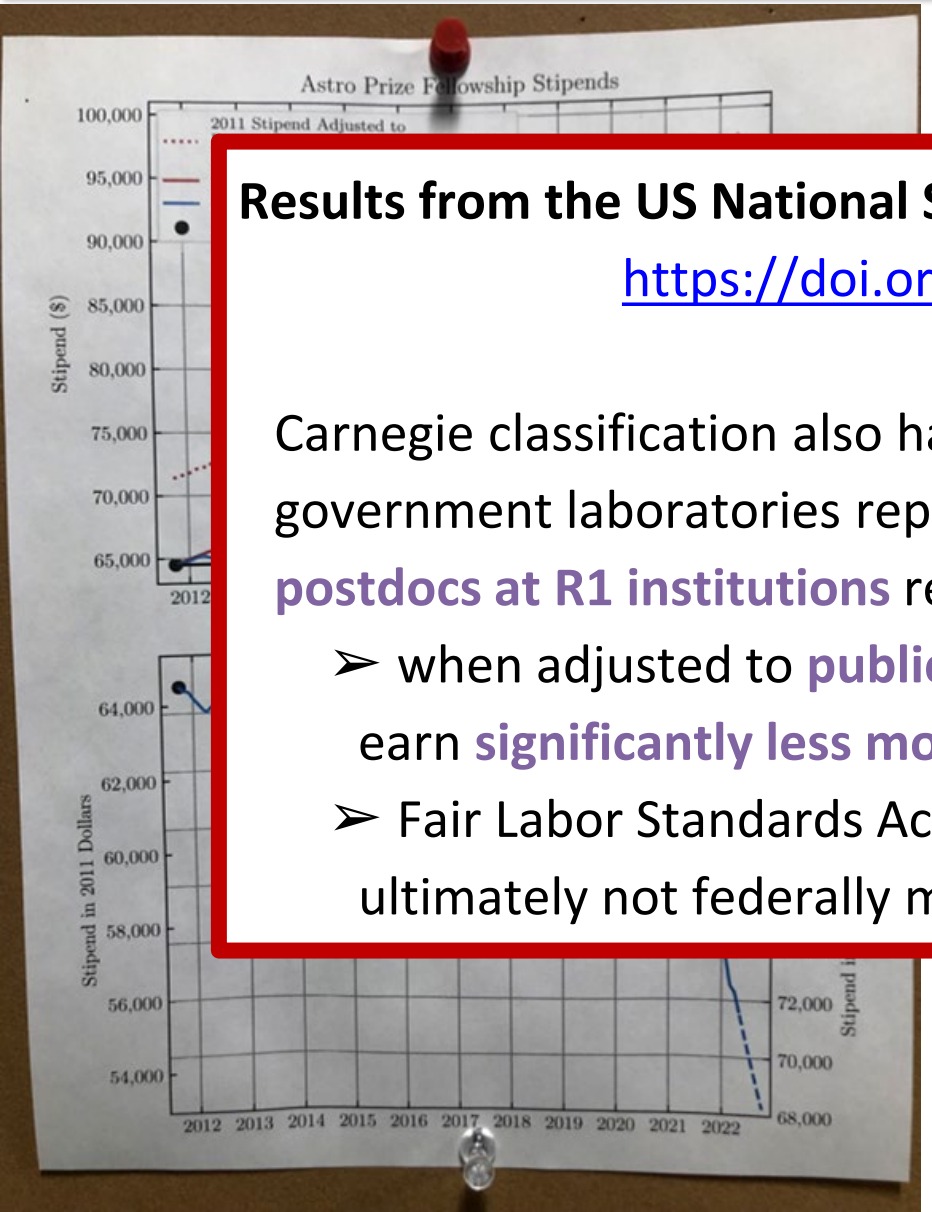


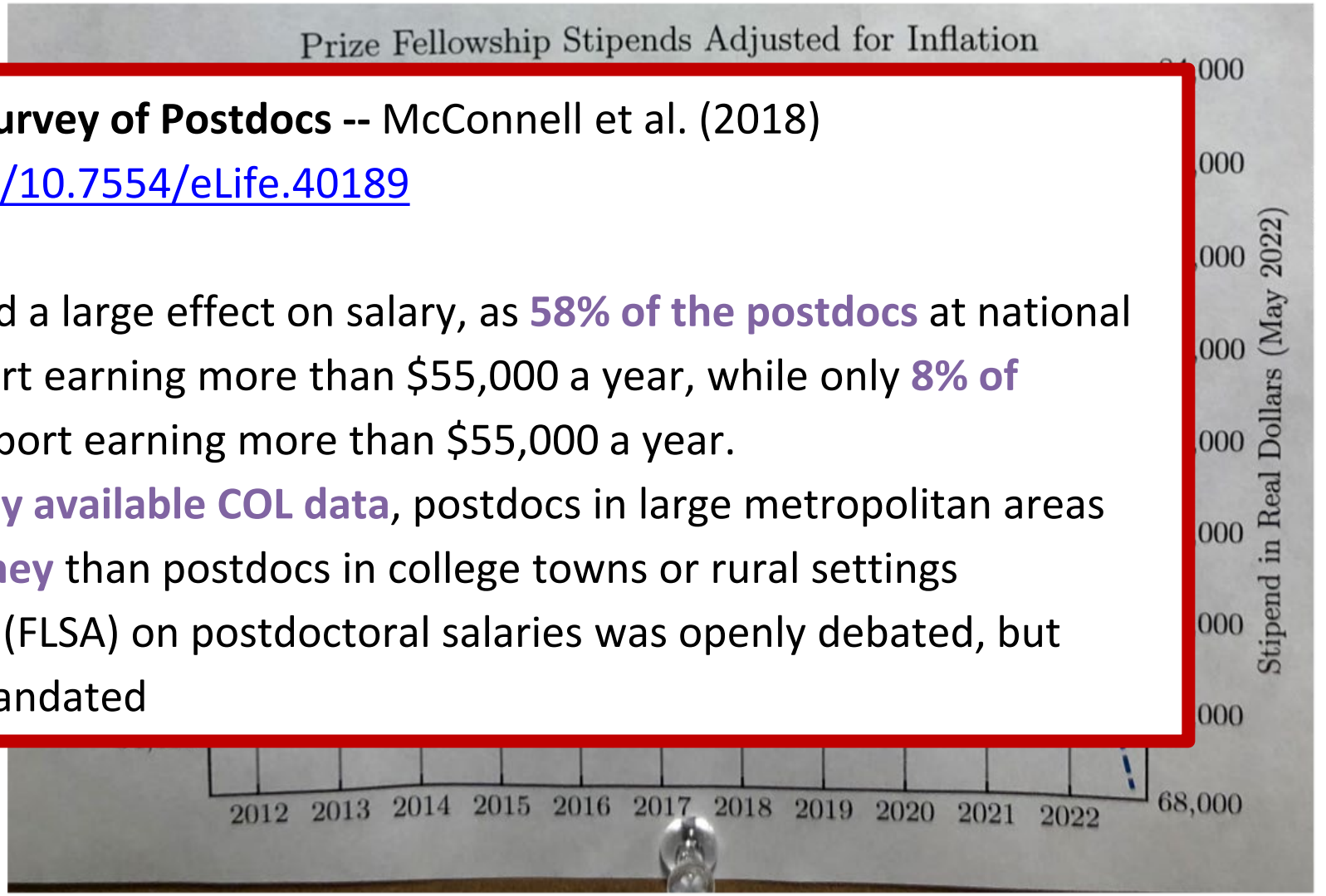
Salaries and Cost of Living





Salaries and Cost of Living





Results from the US National Survey of Postdocs -- McConnell et al. (2018)
https://doi.org/10.7554/eLife.40189

Carnegie classification also had a large effect on salary, as **58% of the postdocs** at national government laboratories report earning more than $55,000 a year, while only **8% of postdocs at R1 institutions** report earning more than $55,000 a year.

- ➢ when adjusted to **publicly available COL data**, postdocs in large metropolitan areas earn **significantly less money** than postdocs in college towns or rural settings
- ➢ Fair Labor Standards Act (FLSA) on postdoctoral salaries was openly debated, but ultimately not federally mandated

Salaries Impact Who Can Be a Scientist

Article | Open Access | Published: 29 August 2022

Socioeconomic roots of academic faculty

Allison C. Morgan ✉, Nicholas LaBerge, Daniel B. Larremore, Mirta Galesic, Jennie E. Brand & Aaron Clauset ✉

Nature Human Behaviour (2022) | Cite this article

From the article:

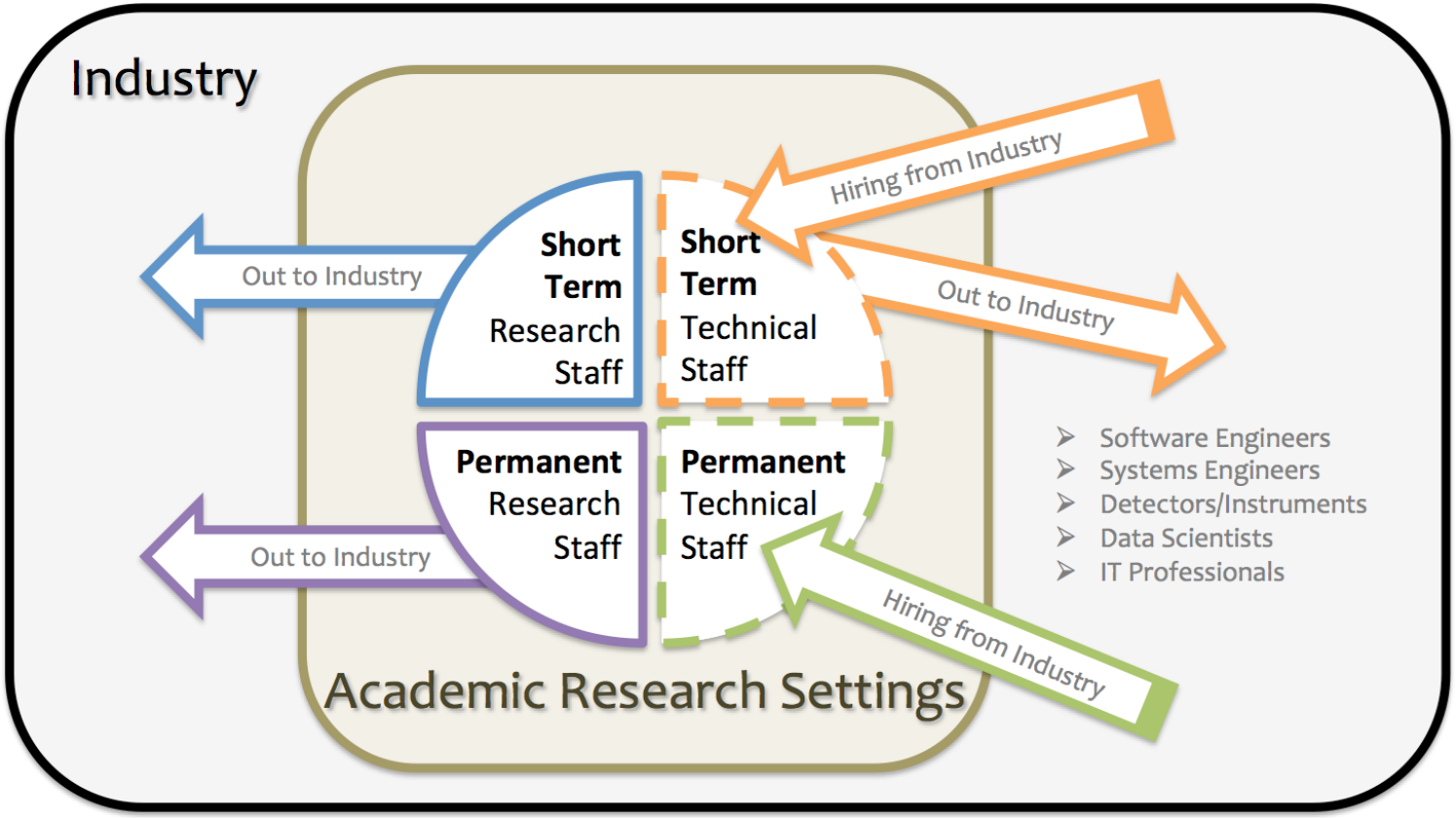
… we show that **faculty are up to 25 times more likely to have a parent with a Ph.D.**

Moreover, **this rate nearly doubles at prestigious universities** and is stable across the past 50 years.

Our results suggest that the professoriate is, and has remained, **accessible disproportionately to the socioeconomically privileged**, which is likely to **deeply shape their scholarship and their reproduction**.

https://doi.org/10.1038/s41562-022-01425-4

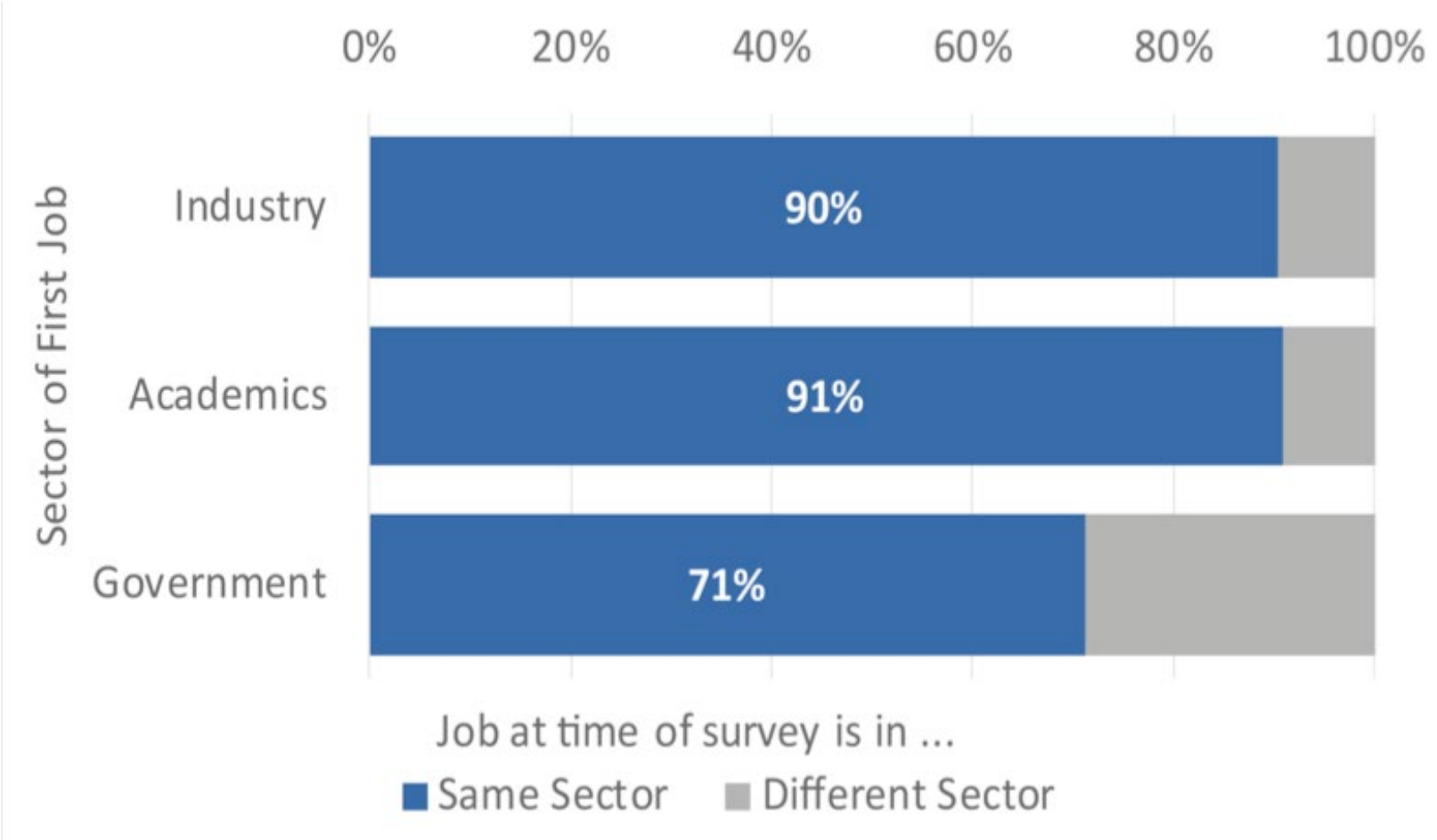
Research Recruitment and Attrition



COPAG Salary Study Summary:

- Little differentiation between Industry and Academic Research preparation and overall skillset usage in 10-year retrospective study
- Differences between how expertise and experience are compensated between Industry and Academia
- Academic salaries have not kept up with general Cost-of-Living and many are not scaled to regional Cost-of-Living differences
- Large biases in professoriate in terms of socio-economic background (correlated with other demographic axes as well).
- Data limited to research-focused jobs and Physics Degree holders. Needs expansion to cover key technical careers.

Fluidity Between Industry & Academia



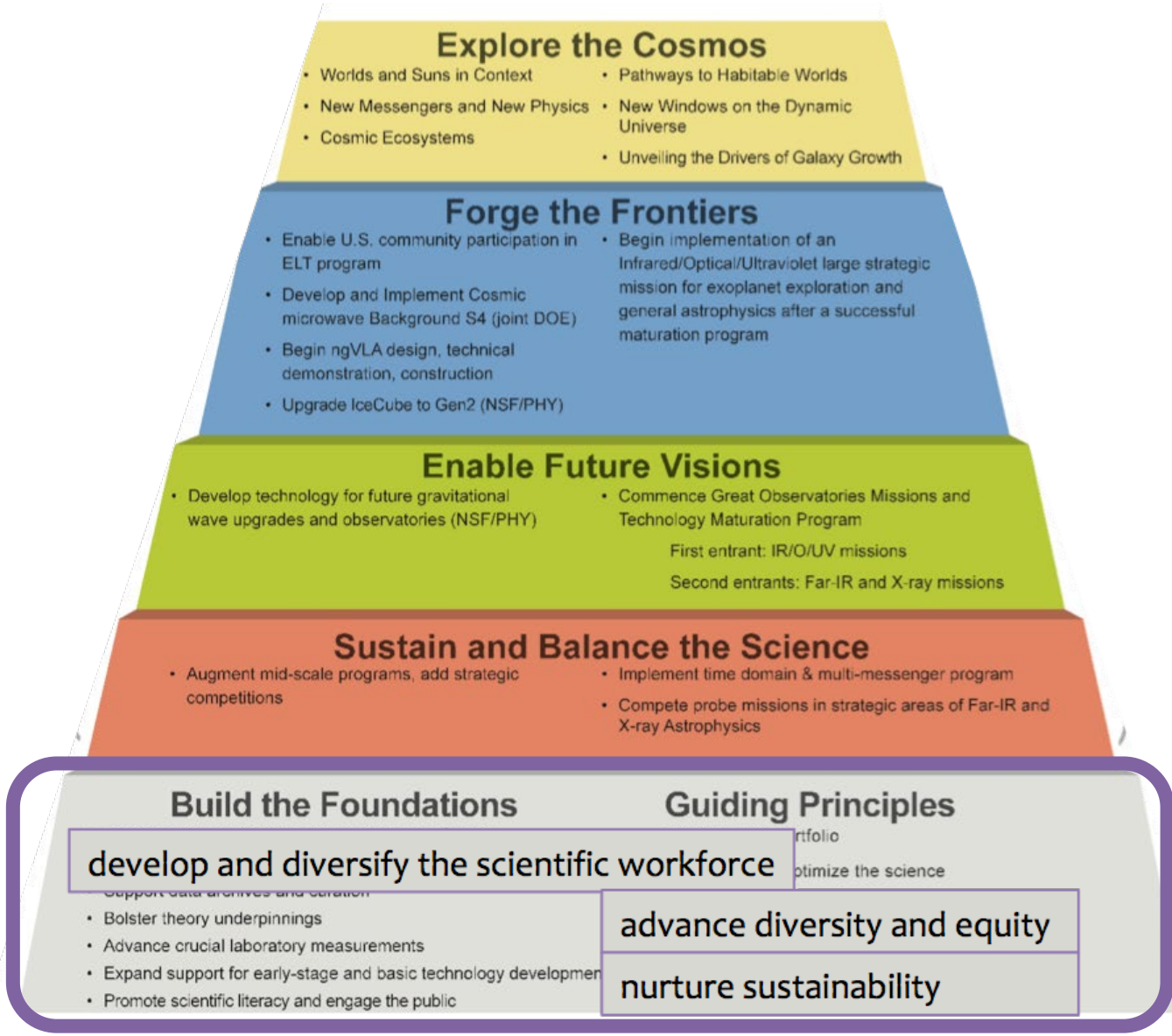
The categories on the y-axis are the sector of the first permanent job after earning a physics PhD and completing any Postdocs.

After the Postdoc Phase, people stay where they were hired. Slightly more movement in Government.

https://www.aip.org/statistics/reports/phdplusten-jobsector-movement

Urgency of Going Beyond this Analysis

- Funding agencies are important for setting priorities in the scientific community
- Critical Path Employees
  - highly trained people leave because of structural problems
  - struggle to recruit highly trained people
  - existing plans/contracts may not have flexibility to retrain or to retire this risk
- Major impact on who can proceed in the Astronomy workforce
- We have only looked at one factor that could be impacting recruitment and attrition and only within Physics Ph.D. holders.



RESERVE Slides

The following slides include information that may be useful for questions as well as more context and source material for some numbers quoted in the main presentation.

Articles Just in Nature, Mostly 2021-2022:

CAREER FEATURE | 24 October 2018

Satisfaction in science

***Nature*'s survey offers a snapshot of salaries and career paths in t**

Article | Open Access | Published: 21 September 2022

Quantifying hierarchy and dynamics in US faculty hiring and retention

K. Hunter Wapman, Sam Zhang, Aaron Clauset & Daniel B. Larremore

2022) | Cite this article

EDITORIAL | 01 December 2021

Industry scores higher than academia for job satisfaction

***Nature*'s salary survey finds that industry researchers are more positive about t careers. Academia must raise its game.**

NEWS AND VIEWS | 29 September 2022

Narrow hiring practices at US universities revealed

An analysis of faculty members employed at academic institutions in the United States reveals that most employees were trained at just a few universities. The finding provides insights into how hiring perpetuates inequalities.

CAREER FEATURE | 16 November 2021

Stagnating salaries present hurdles to career satisfaction

Fewer than half of respondents to *Nature*'s 2021 salary and satisfaction surve positive about their prospects.

CORRESPONDENCE | 14 June 2022

Industry versus academia — a mid-life career switch

Socio Economic Routes of Faculty

Article | Open Access | Published: 29 August 2022

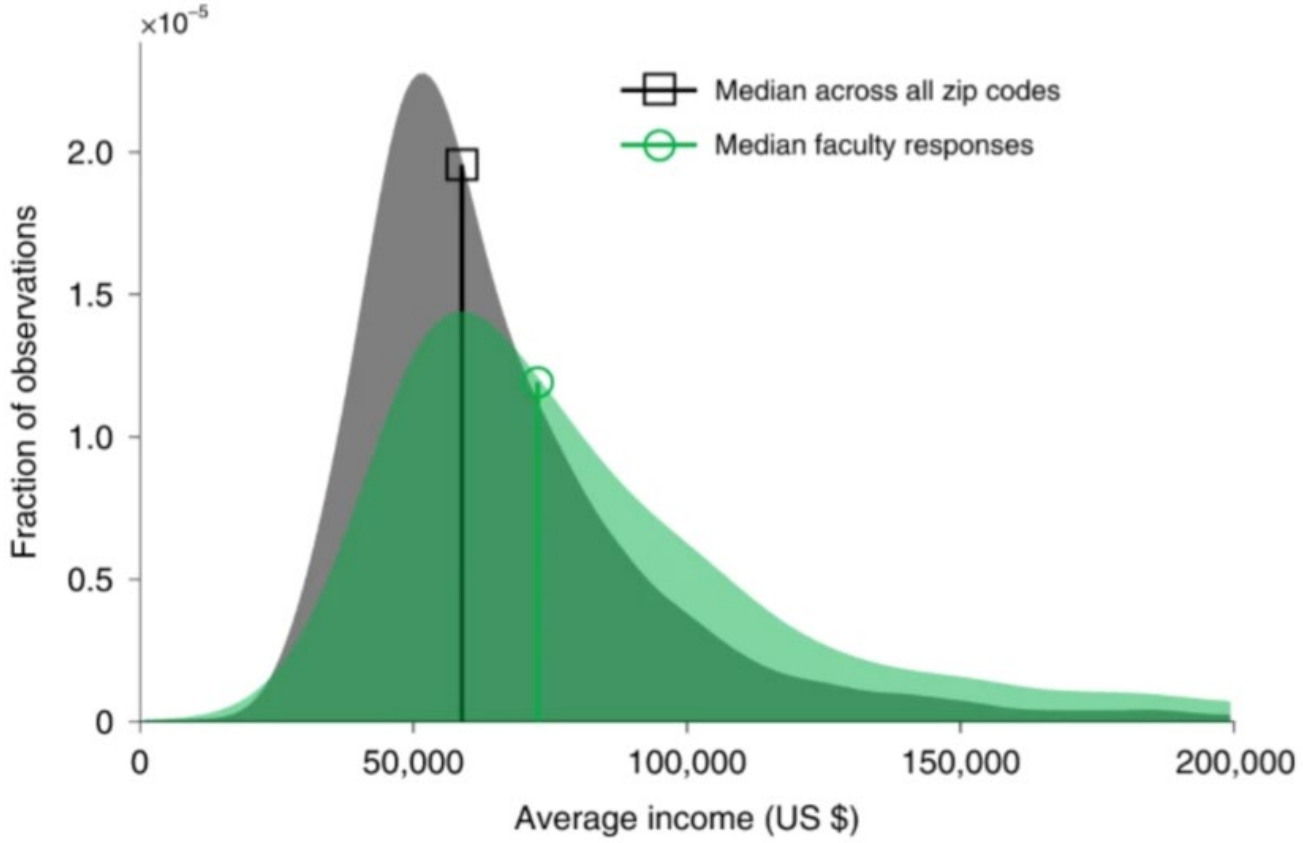
Socioeconomic roots of academic faculty

Allison C. Morgan, Nicholas LaBerge, Daniel B. Larremore, Mirta Galesic, Jenr Clauset

Nature Human Behaviour (2022) | Cite this article

Controlling for geography, the families of academic faculty are more wealthy than the distribution.

Fig. 4: Parental income distribution.



Average income distribution estimated using faculty members' childhood zip codes (green), compared with the income distribution across the 1998 US population (black).

https://doi.org/10.1038/s41562-022-01425-4

Salaries are an Inclusion Issue

Report on the Economic Well -Being of U.S. Households in 2021 - May 2022

- This report shows **significant demographic differences** in many financial stability indicators.
- Too much to detail in this presentation, but lower income -households experience more disruption

https://www.federalreserve.gov/publications/2022-economic-well-being-of-us-households-in-2021-executive-summary.htm

THE TIME IS NOW | Systemic Changes to Increase African Americans with Bachelor's Degrees in Physics and Astronomy

FACTOR 4: PERSONAL SUPPORT | Many African American students need support to offset financial burdens and stress.

https://www.aip.org/diversity-initiatives/team-up-task-force

Prestige Bias in Academic Hiring

Article | Open Access | Published: 21 September 2022

Quantifying hierarchy and dynamics in US faculty hiring and retention

K. Hunter Wapman, Sam Zhang, Aaron Clauset & Daniel B. Larremore

Nature **610**, 120–127 (2022) | Cite this article

79k Accesses | **1320** Altmetric | Metrics

From the article:

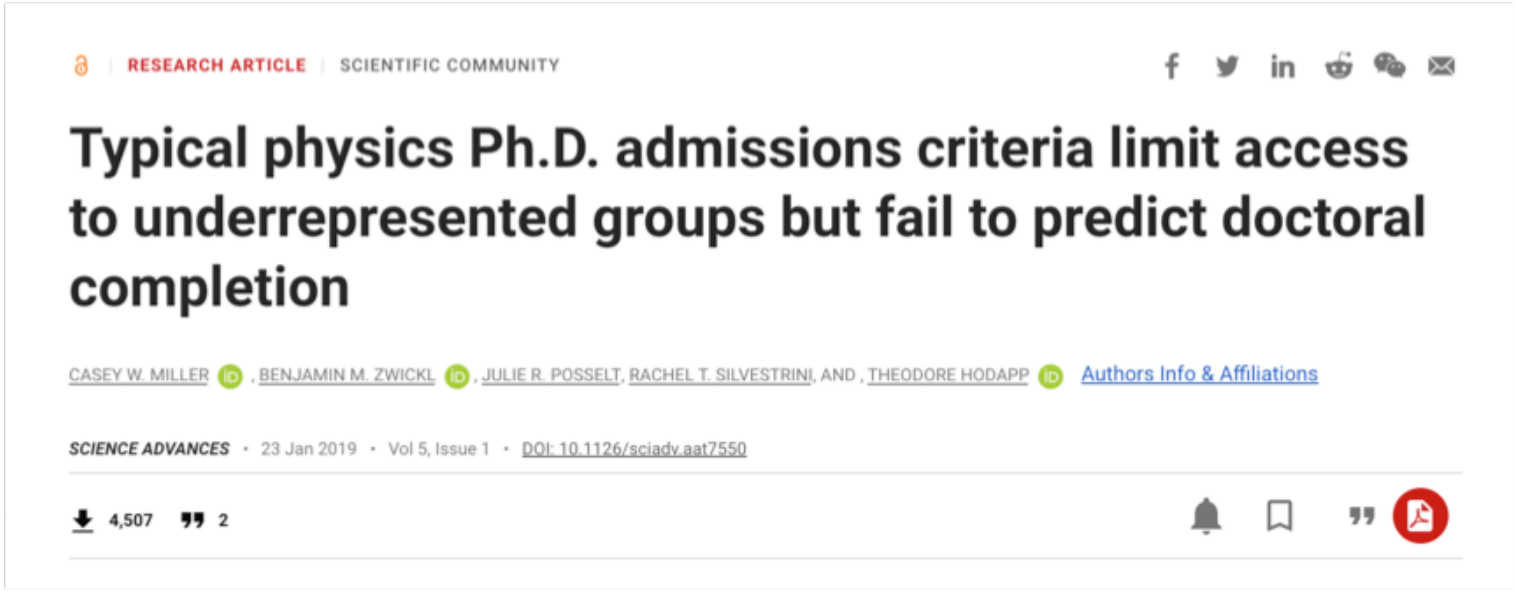
Our analyses show **universal inequalities in which a small minority of universities supply a large majority of faculty** across fields, exacerbated by patterns of attrition and **reflecting steep hierarchies of prestige**.
We identify **markedly higher attrition rates** among faculty trained outside the United States or employed by their doctoral university.

https://www.nature.com/articles/s41586-022-05222-x

Bias in Graduate Admissions

- ➔ If where you go to graduate school predicts if you become faculty …we, again, can find more evidence of how socio-economic, race, and gender impacts admissions.
- ➔ Faculty directly set many of these policies.

https://doi.org/10.1038/nj7504-303a

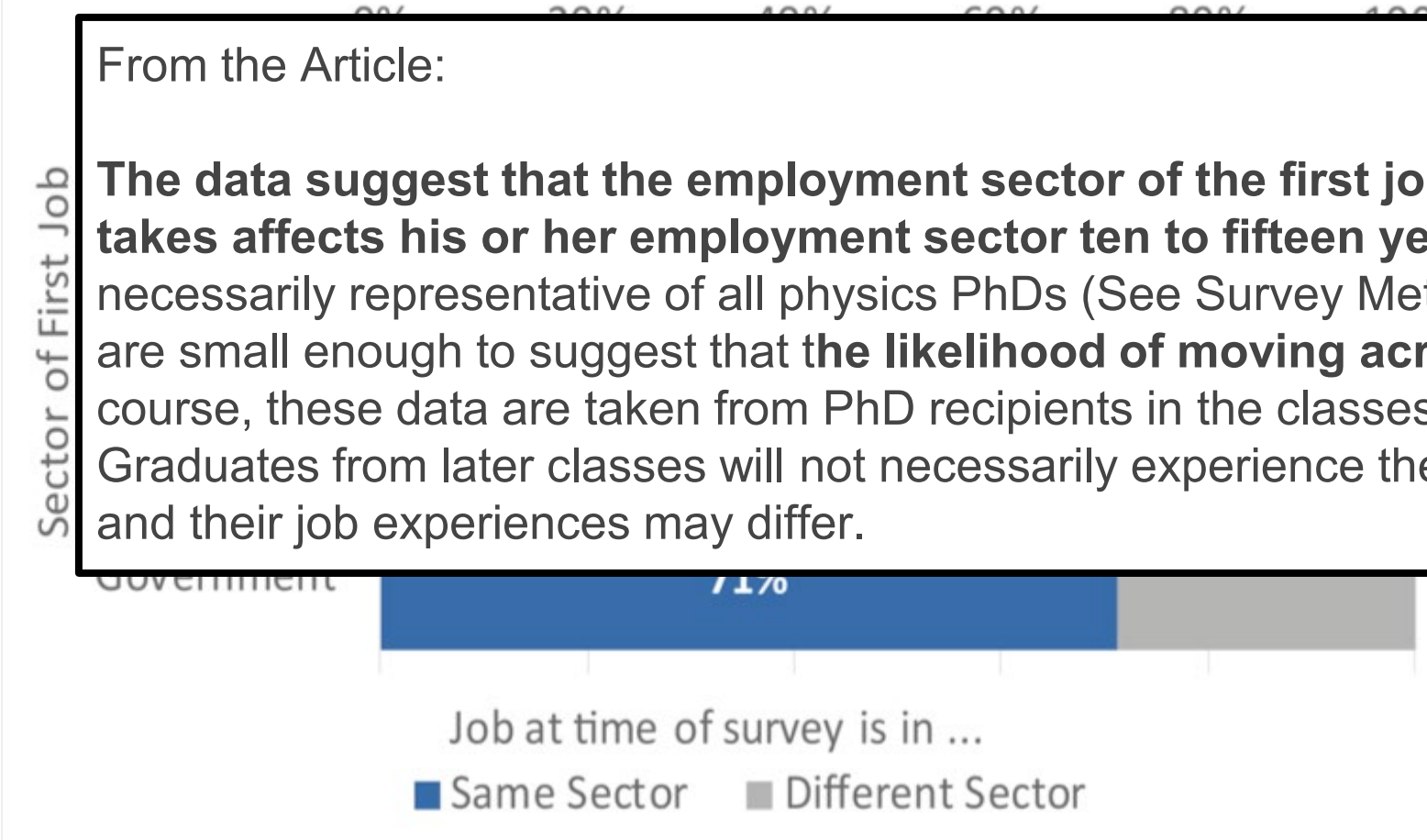


DOI: 10.1126/sciadv.aat7550

Fluidity Between Industry & Academia

From the Article:

The data suggest that the employment sector of the first job a physics PhD recipient takes affects his or her employment sector ten to fifteen years later. While our data are not necessarily representative of all physics PhDs (See Survey Methodology, below.), the p-values are small enough to suggest that t**he likelihood of moving across job sectors is low.** Of course, these data are taken from PhD recipients in the classes of 1996, 1997, 2000, and 2001. Graduates from later classes will not necessarily experience the same economic circumstances, and their job experiences may differ.



https://www.aip.org/statistics/reports/phdplusten-jobsector-movement

Astronomy Faculty

4% increase

Estimated Total Number of Full-Time Equivalent (FTE) Faculty Members in Stand-Alone Astronomy Departments, 2014–2020

	Year			
	2014	2016	2018	2020
Estimated Number of Full-Time Equivalent (FTE) Faculty Members	700 (38)	700 (38)	770 (39)	770 (38)
Percent Employed in Tenure or Tenure-Track Positions	76%	72%	72%	73%
Percent Employed in Temporary or Non-Tenure-Track Permanent Positions	24%	28%	28%	27%

The parentheses show the number of stand-alone apartments that grant degrees in astronomy but not physics.

AIP Statistics aip.org/statistics

76% of 700
532

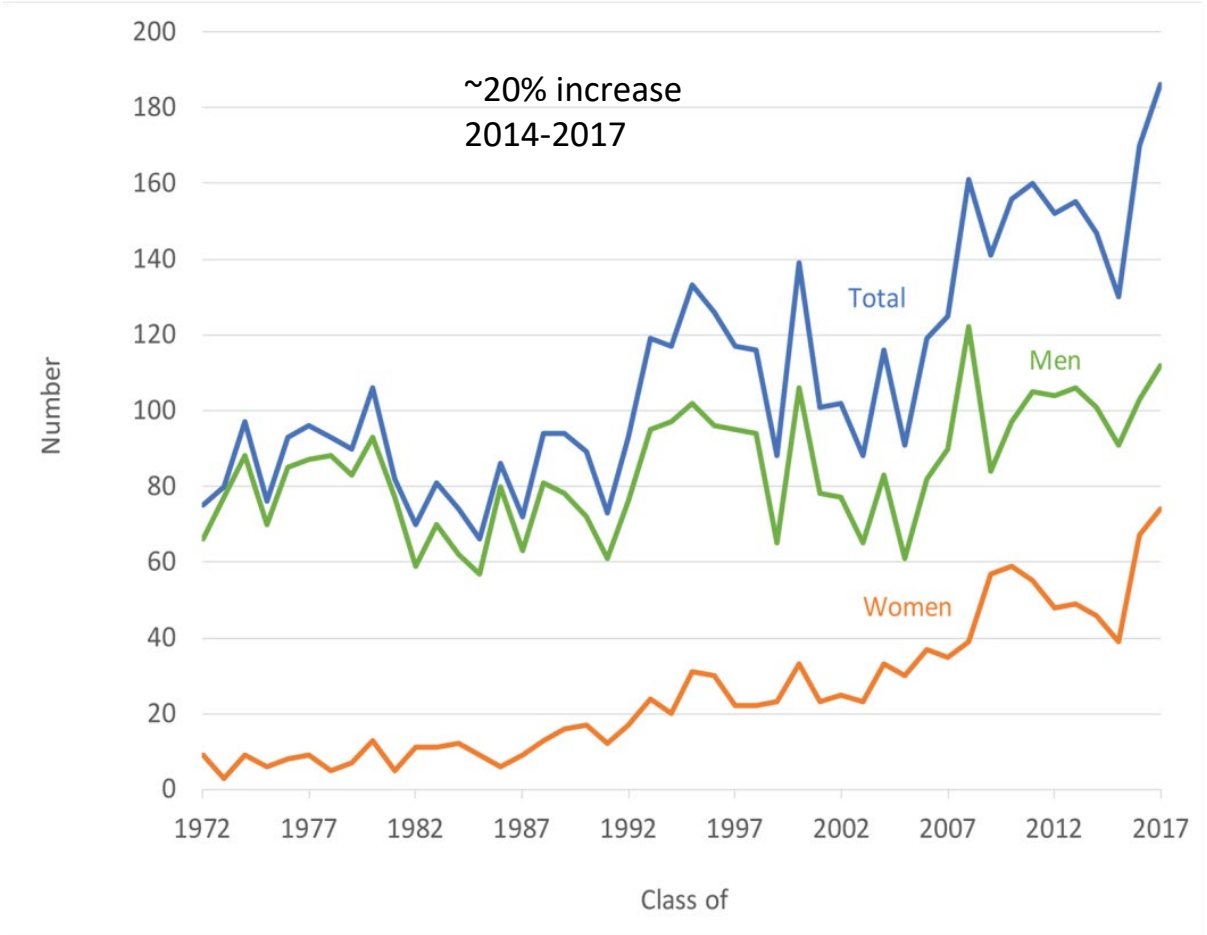
72% of 770
554

https://www.aip.org/statistics/data-graphics/estimated-total-number-full-time-equivalent-fte-faculty-members-stand

https://www.aip.org/statistics/data-graphics/number-doctorates-earned-astronomy

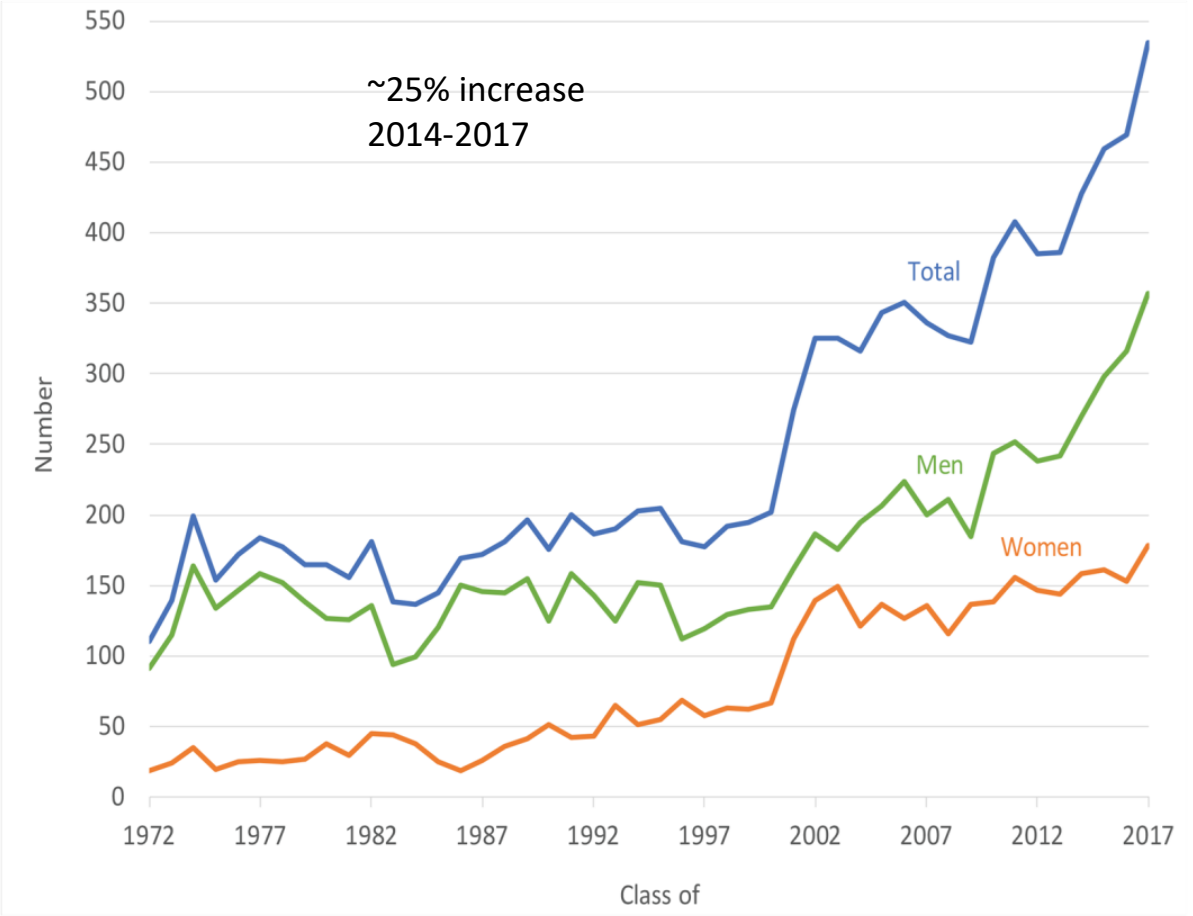
https://www.aip.org/statistics/data-graphics/number-bachelors-degrees-earned-astronomy-0

Number of Doctorates Earned in Astronomy.



AIP | Statistics aip.org/statistics

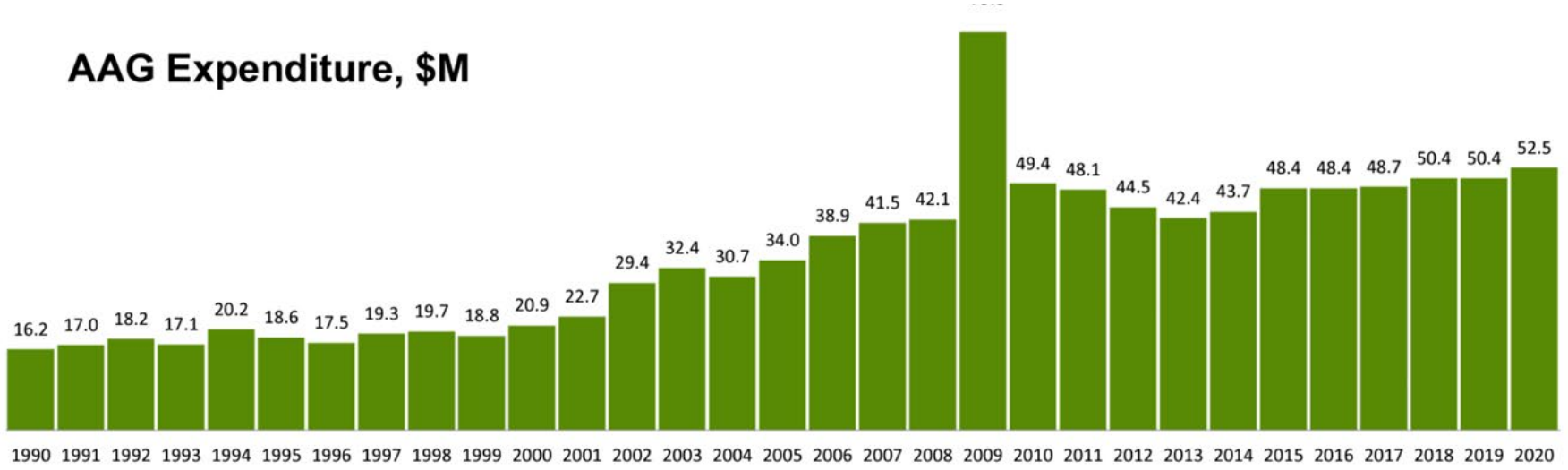
Number of Bachelor's Degrees Earned in Astronomy.

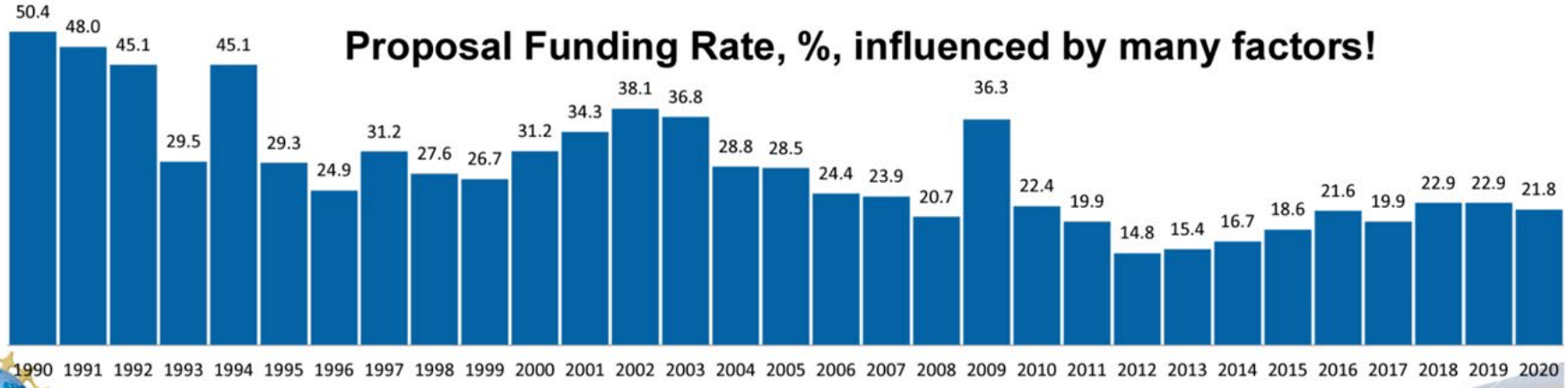


AIP | Statistics aip.org/statistics

Grant Success Rates: AAG NSF 1990 to 2020

https://nsf.gov/attachments/303934/public/5_NSF_AST_Program_Budget_Update_Debra_Fischer.pdf

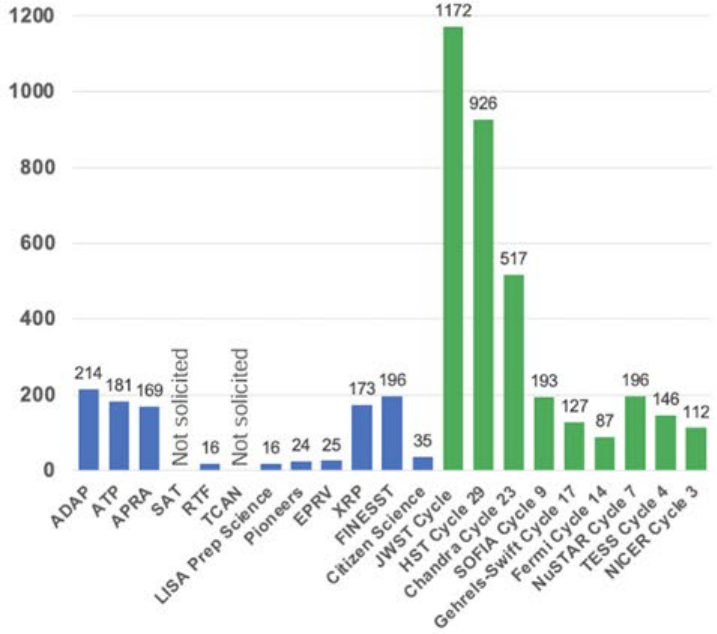




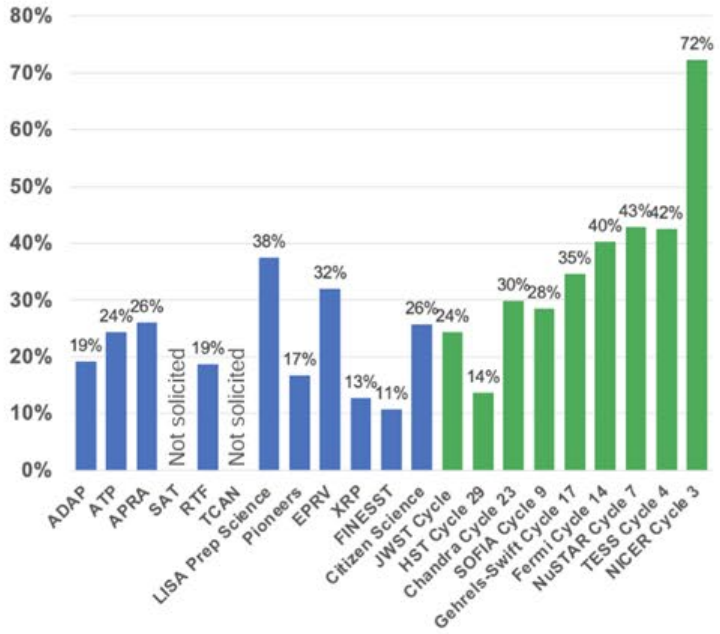
https://nsf.gov/attachments/303934/public/3_NASA_Program_Budget_Update_Paul_Hertz.pdf

Astrophysics R&A Proposal Status Update

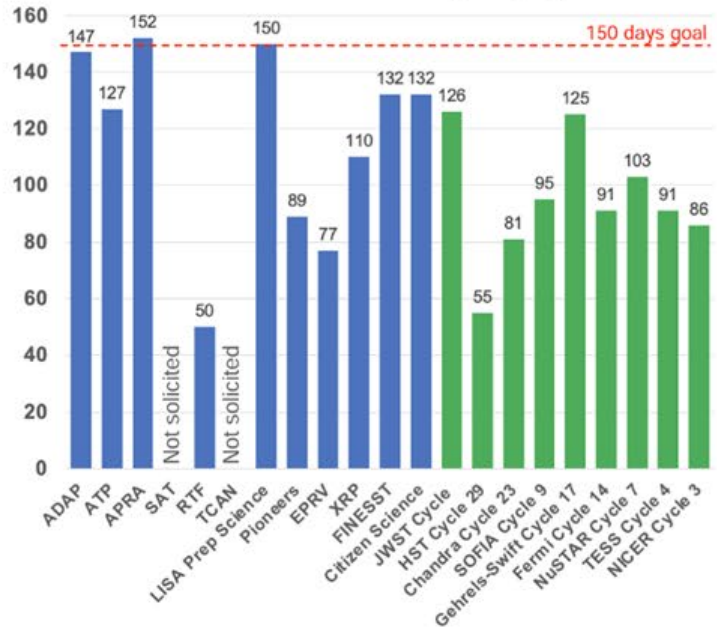
December 2020-2021



R&A: 1,049 proposals
GO/GI: 3,476 proposals
Total: 4,525 proposals

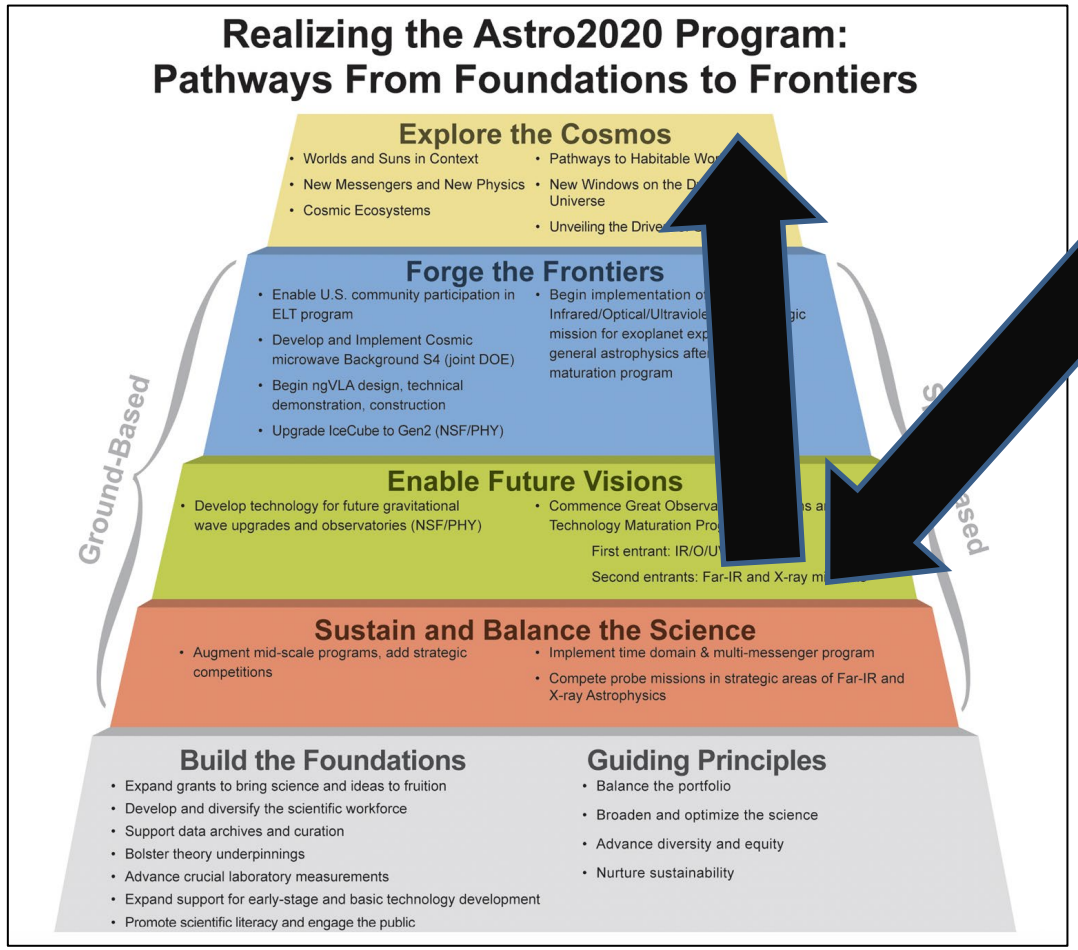


R&A: 19%
GO/GI: 27%
Average: 25%



80% of notifications
R&A: 147 days
GO/GI: 126 days

How can COPAG best support and inform NASA Astrophysics leadership in a **rapidly changing world and scientific landscape**?

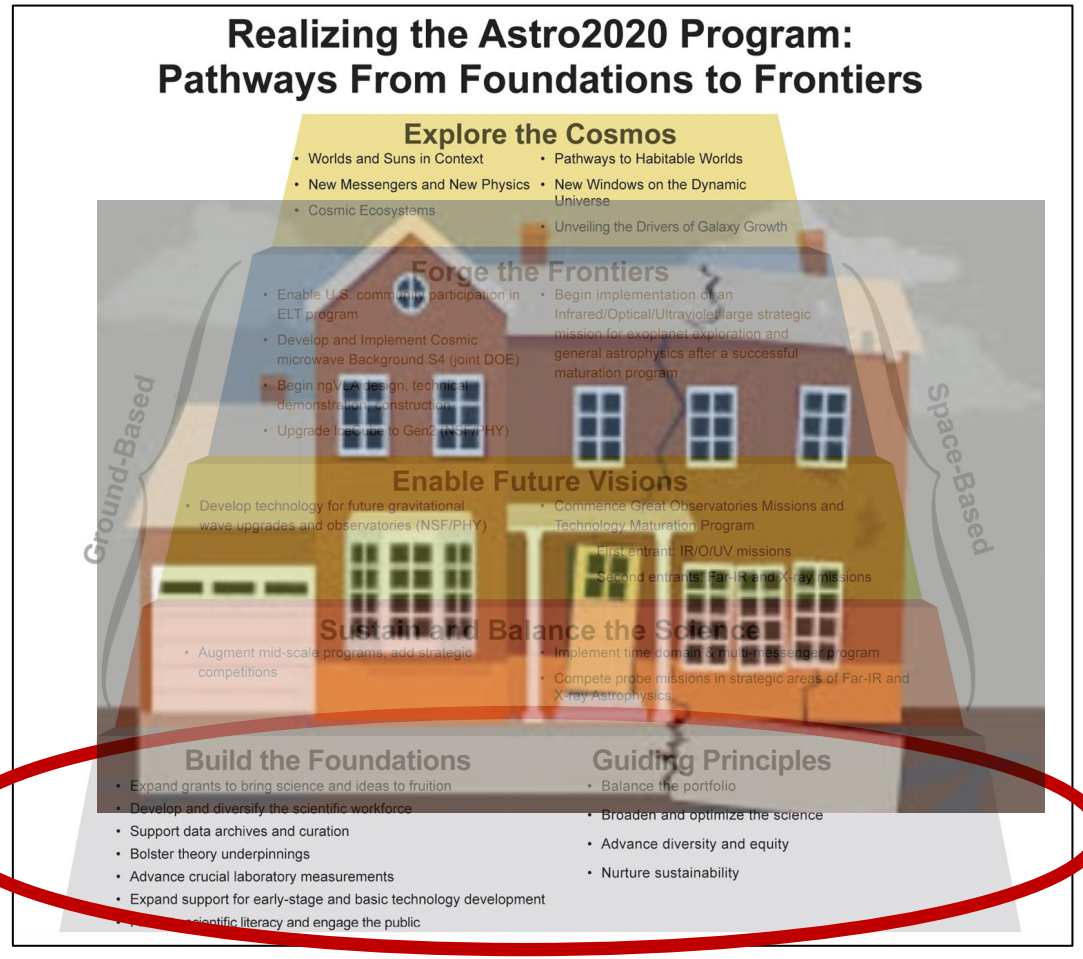


To support NASA implementation of Astro2020

Flow inputs from SIGS/STIGS into identify ”precursor science” to guide future Great Observatory architecture/trades; inform new NASA ROSES funding element;

- ***ensure COPAG nodes are deep, BROAD, INTEGRATED with other PAGS to enable input responsive to onslaught of new discoveries in next few years; support new cross-PAG SAGS***

How can COPAG best support and inform NASA Astrophysics leadership in a **rapidly changing world and scientific landscape**?



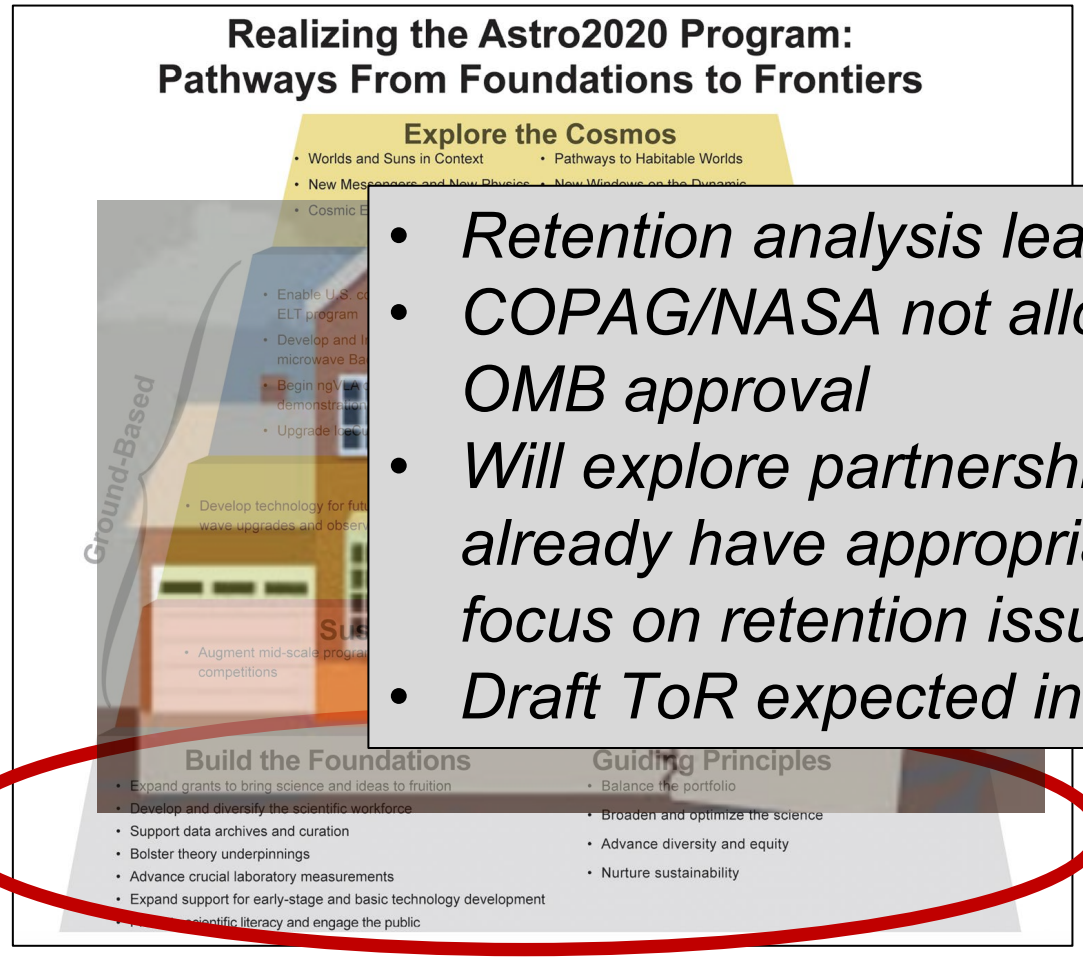
Rapid changes in economics/culture/technology significant impacts on "Foundations" COPAG esp concerned with

- State of Profession & Workforce Issues
- Data Archives/Science

- Challenges with recruitment/retention of software engineers rising to highest levels in science center risk charts; inability to compete with tech/industry $
- Delayed uptake in modern big data analysis techniques (machine learning/AI), gap in Astro2020
- Changes in data policies to support greater open access and sharing of higher level science products

COPAG EC & S/TIG Leadership deliberating on community surveys and analysis to conduct and commence in ~May

How can COPAG best support and inform NASA Astrophysics leadership in a **rapidly changing world and scientific landscape**?



- *Retention analysis leads: Beaton & Stierwalt*
- *COPAG/NASA not allowed to perform surveys without OMB approval*
- *Will explore partnerships (e.g., with AAS) who will/may already have appropriate data for analysis with special focus on retention issues on GOMAP activities*
- *Draft ToR expected in October*

Rapid changes in economics/culture/technology significant impacts on "Foundations" COPAG esp concerned with

f software
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h/industry $
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n Astro2020
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COPAG EC & S/TIG Leadership deliberating on community surveys and analysis to conduct and commence in ~May