National Aeronautics and Space Administration

Cosmic Origins Program Analysis Group (COPAG) Report to Astrophysics Advisory Committee (APAC) March 31 2022

Dr. Janice C. Lee
Chair, Cosmic Origins Program Executive Committee

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

2. COPAG Activities
    + Community Engagement: Monthly Activities, AAS
    + Technology Gap Analysis (led by UV+IR STIGs)

3. Cosmic Origins Future Analysis Activities: Supporting Informed Leadership in a Rapidly Changing World and Scientific Landscape

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

The National Academies of SCIENCES ENGINEERING MEDICINE

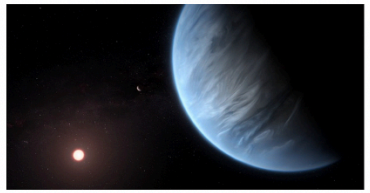
Pathways to Discovery in Astronomy and Astrophysics for the 2020s

What are the key scientific challenges for astronomy and astrophysics in the next decade? *Pathways to Discovery in Astronomy and Astrophysics for the 2020s*, the National Academies' latest decadal survey, identifies the most compelling science goals and presents an ambitious program of ground- and space-based activities for future investment. The report recommends critical near-term actions to support the foundations of the profession as well as the technologies and tools needed to carry out the science.

Get involved to represent your communities:

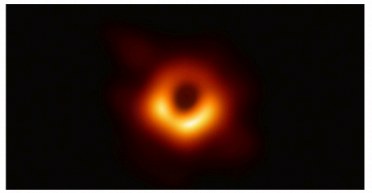
NASA Program Analysis Groups (PAGs) serve as community-based, interdisciplinary forums for soliciting and coordinating community analysis and input in support of NASA SMD Science Program objectives and of their implications for architecture planning, activity prioritization, for future exploration. It provides findings of analyses to the NASA Astrophysics Division Director.

Key Scientific Challenges for the Next Decade



Worlds and Suns in Context

Priority Area: Pathways to Habitable Worlds



New Messengers and New Physics

Priority Area: New Windows on the Dynamic Universe

Cosmic Ecosystems

Priority Area: Unveiling the Drivers of Galaxy Growth

Exoplanet Exploration (EXCEP)
ExoPAG
EC Chair: Michael Meyer

Physics of the Cosmos (PCOS)
PhysPAG
EC Chair: Grant Tremblay

Cosmic Origins (COR)
COPAG
EC Chair: Janice C. Lee

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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 deadline

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

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~12 EC members at any given time, meets biweekly with SIG and STIG chairs

- Meixner completed 3-yr term as Chair; Lee began as Chair
- Finkelstein, Pope, McCandliss completed 3-yr terms
- Waiting for appointment of new members - technologists; TDA; IGM

From Oct 2021 APAC Report:

COPAG Executive Committee

Rotating off soon

Margaret Meixner (Chair)	*2021*	*SOFIA Science Mission Operations/USRA*
Janice Lee (Chair-elect)	*2022*	*Gemini/NOIRLab*
Christine Chen	*2024*	*Space Telescope Science Institute*
Chris DePree	*2024*	*National Radio Astronomy Observatory*
Steve Finkelstein	*2021*	*University of Texas, Austin*
Lisseth Gavilan-Marin	*2024*	*NASA/Ames*
Christopher Hayward	*2024*	*Flatiron Institute*
Alina Kiessling	*2022*	*Jet Propulsion Laboratory, Caltech*
Stephan McCandliss	*2021*	*Johns Hopkins University*
Alexandra Pope	*2021*	*University of Massachusetts*
Sabrina Stierwalt	*2024*	*Occidental College*

COPAG EC has a rolling application deadline, and we asked for applications by Oct. 7 to address vacancies. Those applications are under review by E. Tollestrup.
https://cor.gsfc.nasa.gov/news/Call_for_Nominations_to_COPAG_EC.php

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https://cor.gsfc.nasa.gov/news/Call_fo

Executive Secretary: Stephanie Clark
COR Chief Scientist: Peter Kurczynski
Program Scientists: Eric Tollestrup, Ronald Gamble

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

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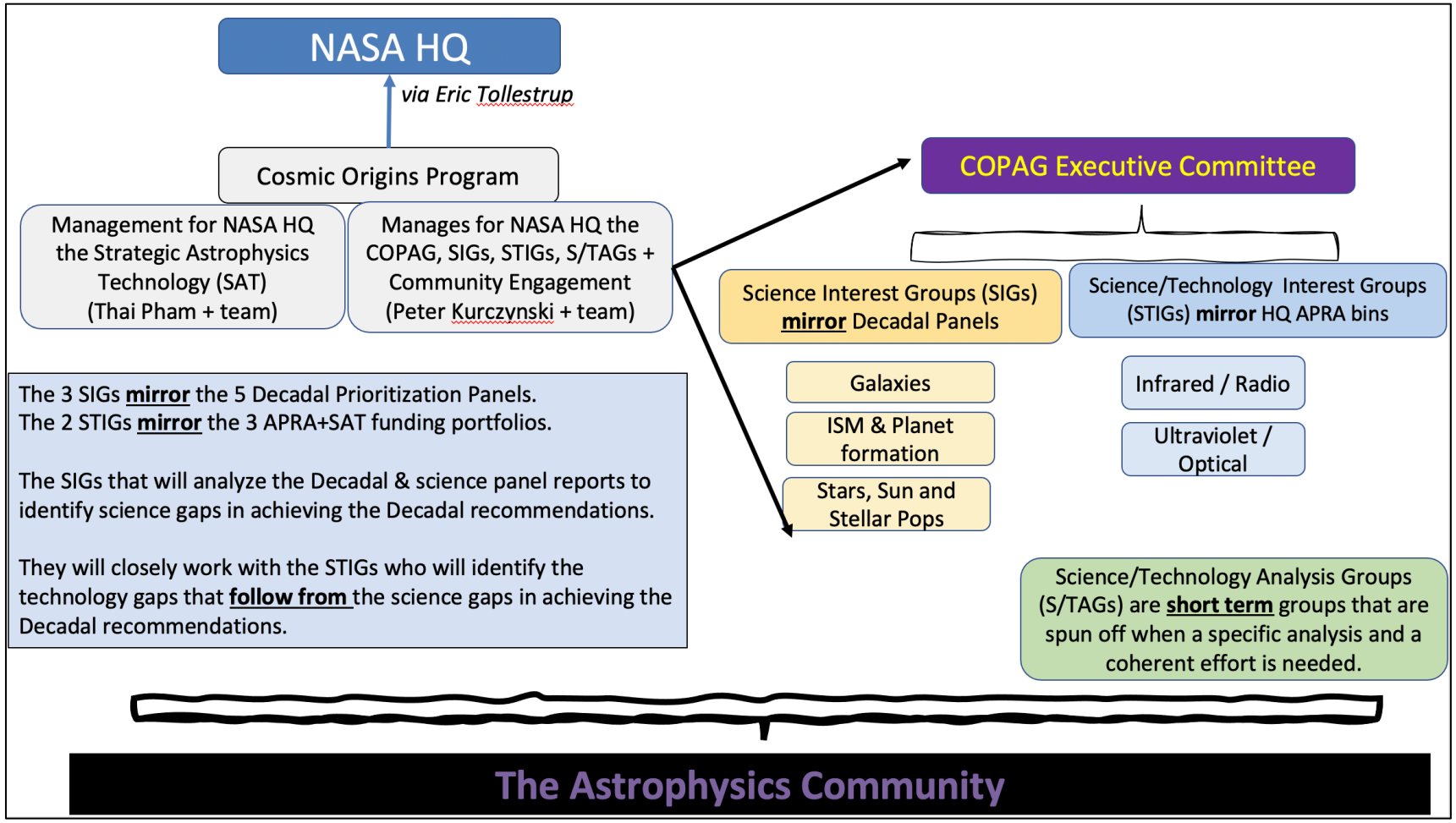

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STIG/SIG Leadership

- **IRSTIG**: M. MacGregor (Colorado), M. Zemcov (RIT)
- **UVSTIG**: S. McCandliss (JHU), J. Tumlinson (STScI)
- **Galaxies SIG**: B. Holwerda (Louisville), A. Yung (GSFC)
- **Stars** SIG: R. Beaton (Princeton), Y-S Ting (ANU)

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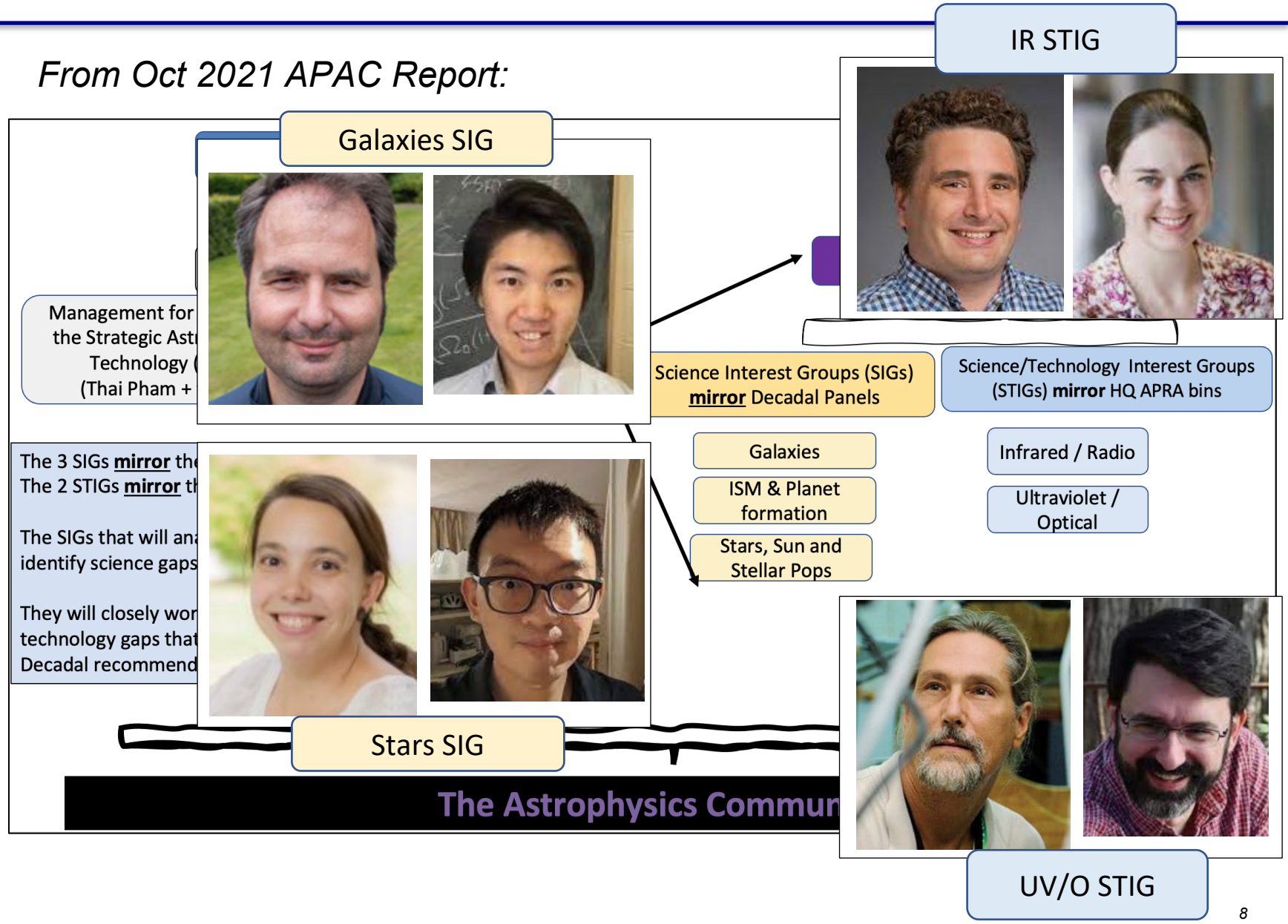
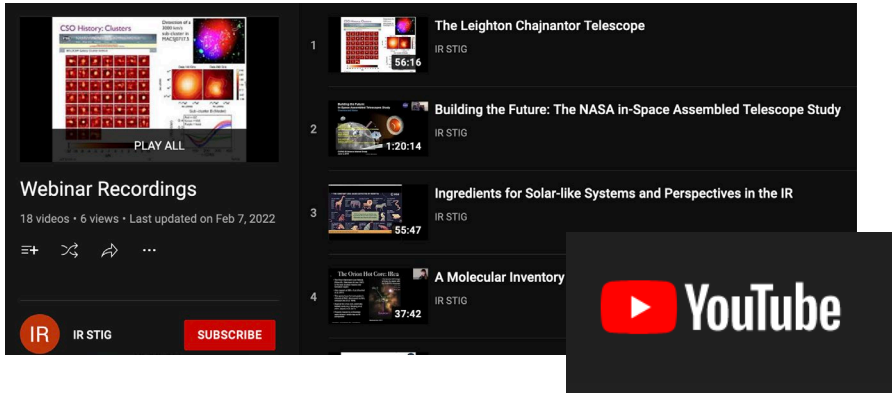


Infrared Science Technology ~~Interest~~ Integration Group: Highlights (MacGregor, Zemcov et al.)

Continuing webinar series

- Continuing cadence of ~1 talk/month.
- Attendance high, typically 30-60 scientists from around the globe.
- All recordings posted to YouTube channel and website.



Continuing Newsletter

- Released latest version Jan 2022; next release ~Jun 2022.
- Usual mix of news and views, science and technology highlights, etc.

Supported Community Discussion on Decadal Recommendations

- Published SOFIA letter to NASA HQ in Jan newsletter.

Upcoming In-Person workshop "The Impacts of Astro2020 on IR Astrophysics" March 30 - April 1.

- Opportunity for community to synthesize Astro2020 priorities.
- Will discuss probe missions, SOFIA, suborbital missions, other priorities.
- >100 in-person participants + "viewing mode" virtual participation.
- Plan to report out in a published venue; details TBD
- https://casa.colorado.edu/~mema5817/irworkshop.html

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

Not AAS UVSTIG Splinter Session held virtually on 11 January 2022

Astro2020 Impact on UV Sci/Tech and Workforce Priorities: Near-Term and Far (83 attendees)

Agenda:

- **Intro & Context** / 10 min / Tumlinson
- **Science**
  - **Time Domain Science** / 10 min / Cenko
  - **Exoplanet Science** / 10 min / Shkolnik
  - **Small Explorers** / 10 min / Heap
- **Technology**
  - **Mirror Coatings** / 10 min / Quijada
  - **Gratings** / 10 min / Fleming
- **Broadening the PI base** / 10 min / Hamden
- **Panel** / 20 min / McCandliss, Siegmund, Nikzad, Hamden

UVSTIG -- Quorum for Ultraviolet Exploration of Science and Technology (QUEST) Seminar

- **QUEST08** -- 17 February 2022 – ~ 40 attendees
  - Speaker: Stephan McCandliss JHU – COPAG Review of Technology Gaps Related to IOU-ST
  - Solicited community input on how to combine UV-Vis centric gaps with similar performance goals
- **Result** - 26 gaps distilled/culled to 8 *(two gaps were found to be appropriate to a potential Time Domain PAG) Culled Gap List and Executive Summary of Process delivered to Astrophysics Technology Office Head (4 Mar 2022)*

https://cor.gsfc.nasa.gov/stigs/uvstig.php

Formation & Growth

- 2022A focus on growing distribution list and webinar attendance with active cross-posting and tracking.
- Terms of Reference Submitted

Webinar Series

- Hosting seminar once in every two weeks
  - Full schedule posted for 22A posted
  - Archiving recordings and other supporting documents to events page
- **2021B Series:** Covering 8 major facilities/research areas **(Avg: 25 ppl)**
  - JWST, Rubin, TESS, Multi-Object Spectrographs, Hydrodynamics Simulations (Oct to Dec)
- **2022A Series:** Mix of major facilities/research areas and Early Career Researcher talks **(Avg. 35+ ppl)**
  - US ELTP, Gaia, Roman, Interferometry; M dwarfs, Seismology, Star Clusters (Feb to May)

Facilitating Discussion

- Stars and stellar physics critical components that unites three focus areas of Astro2020, but not always explicit statements in recommendations
- Promoting attendance at other COPAG events
- Still brainstorming how to use Townhalls and Discussion more effectively around the recommendations in Astro2020

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

- 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
  - 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
  - 30min talk + 30min discussion.
  - First speakers: John O’Meara and Scott Gaudi

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

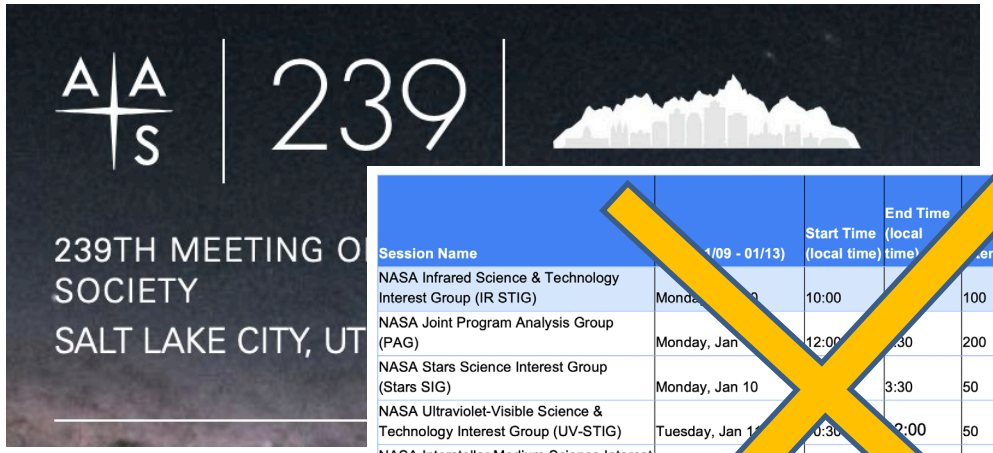
Some examples of recent topics

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)_/¯

Winter AAS virtual replan
https://cor.gsfc.nasa.gov/copag/AAS_Jan2022/AAS2022-agenda.php

- COPAG Annual Meeting (60-70 ppl)
- All four SIGS/STIGS held virtual meetings



Session Name	1/09 - 01/13)	Start Time (local time)	End Time (local time)	ated Attendance	Organizer/Requestor
NASA Infrared Science & Technology Interest Group (IR STIG)	Monda	10:00		100	Meredith MacGregor
NASA Joint Program Analysis Group (PAG)	Monday, Jan	12:00	:30	200	Peter Kurczynski
NASA Stars Science Interest Group (Stars SIG)	Monday, Jan 10		3:30	50	Peter Kurczynski
NASA Ultraviolet-Visible Science & Technology Interest Group (UV-STIG)	Tuesday, Jan 11	0:30	2:00	50	Jason Tumlinson
NASA Interstellar Medium Science Interest Group (ISM SIG)	Wednesd	12:30		50	Sangeeta Malhotra
NASA Galaxies Science Interest Group (Galaxies SIG)	We	, Jan 12	2:00	3:30	Sangeeta Malhotra
NASA Cosmic Origins Program Analysis Group (COPAG)	sday, Jan 13	12:30	3:30	100	Janice Lee

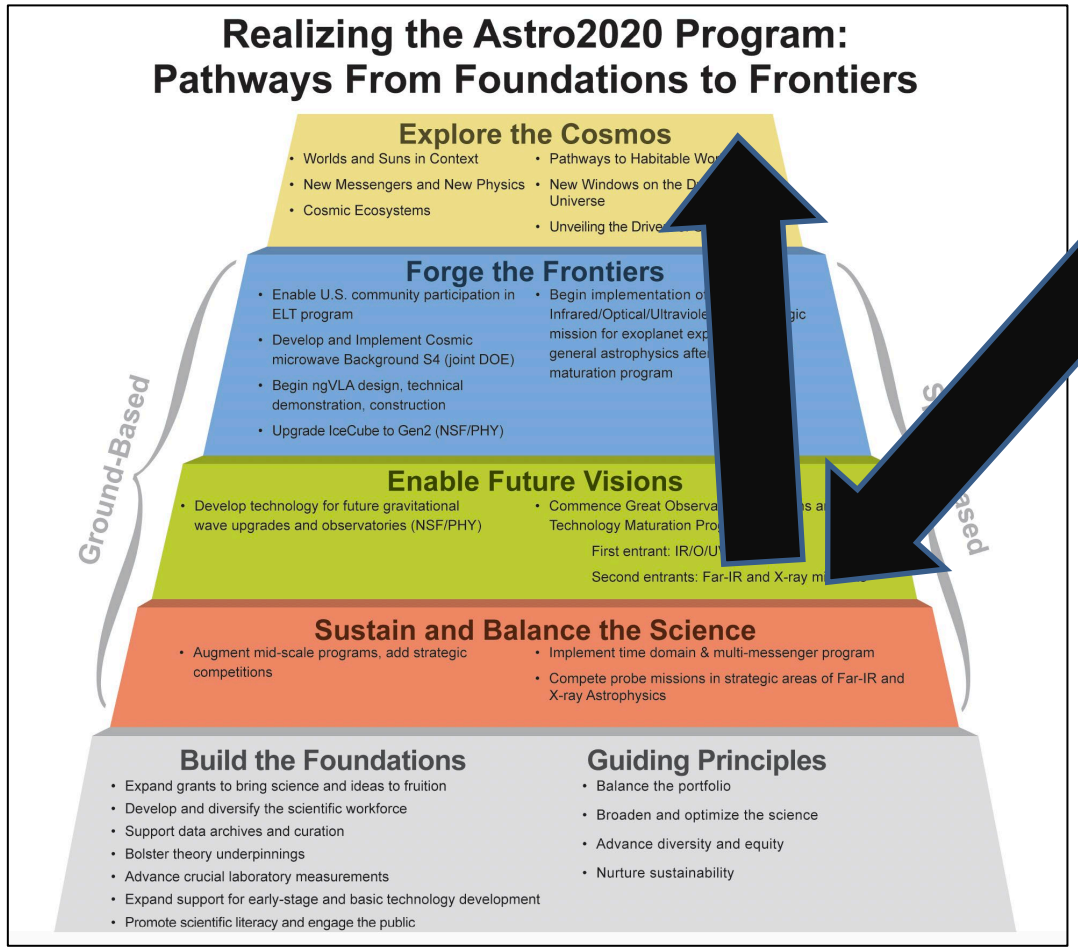
Summer AAS plan

- Support Joint PAG Sun Jun 12
- COPAG Splinter following Joint PAG

- Society for Advancing Chicanos/Hispanics & Native Americans in Science (SACNAS) National Diversity in STEM Digital Conference (Oct 2021)
- National Society of Black Physicists Annual Meeting (Nov 2021)

Virtual booth & Special session (joint with Physics of the Cosmos, Exoplanet Exploration, GSFC/Code 660)

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



Supporting 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 with proposals due late 2022

Precursors to Pathways: Science Enabling NASA Astrophysics Future Great Observatories

→ ensure COPAG nodes are both deep, BROAD, INTEGRATED with other PAGS to enable input responsive to onslaught of new discoveries in next few years

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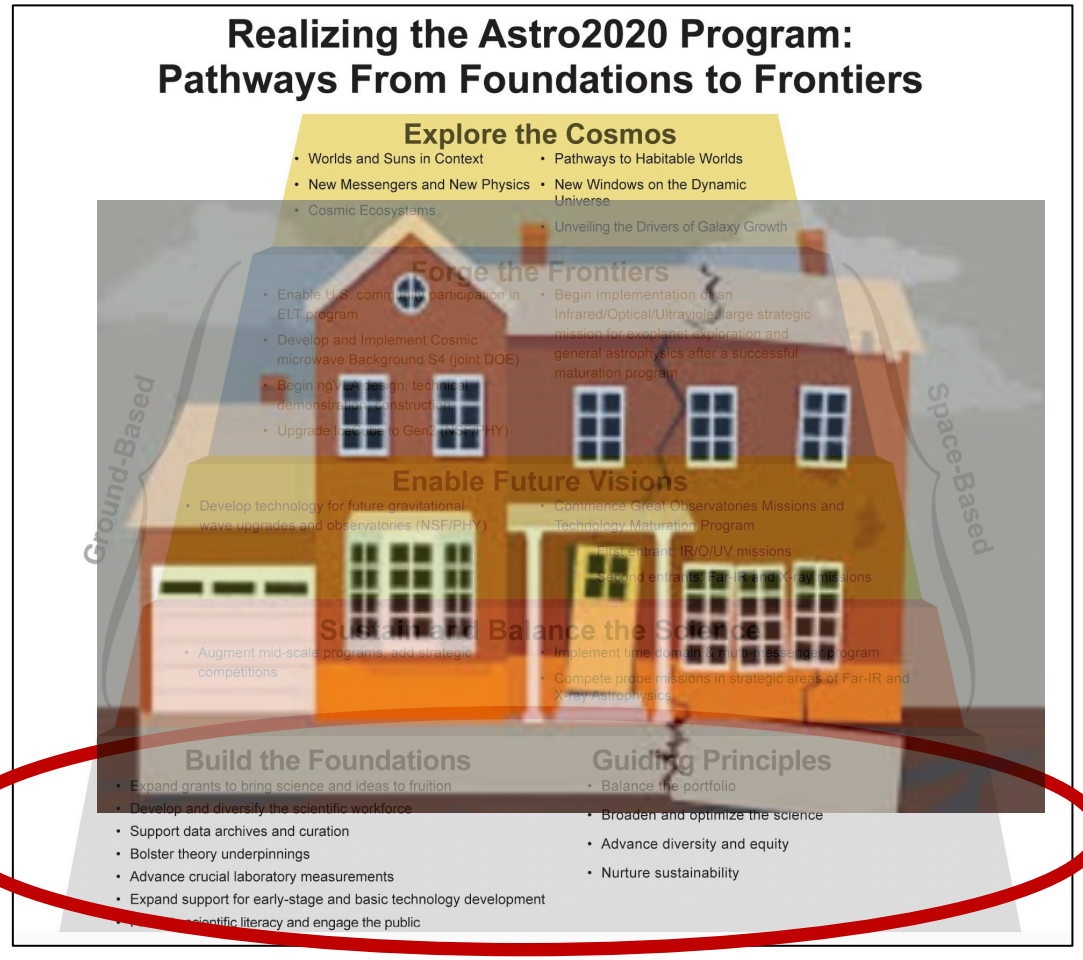

Rapid changes in economics/culture/technology → significant impacts on "Foundations" COPAG esp concerned with

- 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