National Aeronautics and Space Administration

Cosmic Origins Program Analysis Group (COPAG) Report to Astrophysics Advisory Committee (APAC) July 20 2022

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

1. The beginning of JWST sciops: a remarkable time for the cosmic origins community

2. COPAG EC Overview
    + Charge
    + Membership & Staffing; SIG/STIG Structure
    + Community Engagement

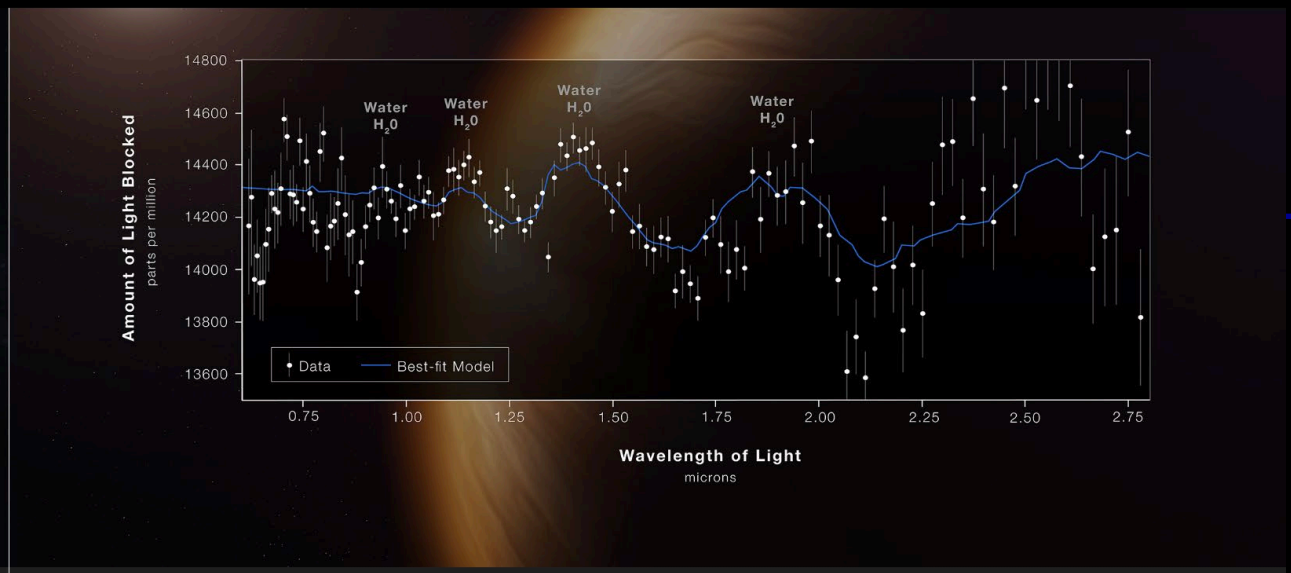
3. Cosmic Origins Future Analysis Activities: Supporting Informed Leadership in a Rapidly Changing World and Scientific Landscape

"The world is about to be new again." -Eric Smith
"Every field is a deep field." -David Law

the Cosmic Origins community is very busy with the new brilliant data….

INSTRUMENT: NIRCAM, MIRI

Southern Ring Nebula



INSTRUMENT: NIRISS

Exoplanet WASP-96 b

INSTRUMENT: NIRCAM

Webb's First Deep Field

INSTRUMENT: NIRCAM

"Cosmic Cliffs" in Carina

INSTRUMENT: NIRCAM MIRI COMPOSITE

Stephan's Quintet

TOP

JWST Early Release Observations

JWST Cycle 1 Treasury Programs

Large Scale Structure of the Universe

ID	Program Title	PI & Co-PIs
1727	COSMOS-Web: The JWST Cosmic Origins Survey	**PI:** Jeyhan Kartaltepe **Co-PI:** Caitlin Casey

Exoplanets and Disks

ID	Program Title	PI & Co-PIs
1584	A DSHARP-MIRI Treasury Survey of Chemistry in Planet-forming Regions	**PI:** Colette Salyk **Co-PI:** Klaus Pontoppidan

Galaxies

ID	Program Title	PI & Co-PIs
1837	PRIMER: Public Release IMaging for Extragalactic Research	**PI:** James Dunlop
2079	The Webb Deep Extragalactic Exploratory Public (WDEEP) Survey: Feedback in Low-Mass Galaxies from Cosmic Dawn to Dusk	**PI:** Steven Finkelstein **Co-PIs:** Casey Papovich and Norbert Pirzkal
2561	UNCOVER: Ultra-deep NIRCam and NIRSpec Observations Before the Epoch of Reionization	**PI:** Ivo Labbe **Co-PI:** Rachel Bezanson

Stellar Populations and the Interstellar Medium

ID	Program Title	PI & Co-PIs
2107	A JWST-HST-VLT/MUSE-ALMA Treasury of Star Formation in Nearby Galaxies	**PI:** Janice Lee **Co-PIs:** Karin Sandstrom, Adam Leroy, Eva Schinnerer, David Thilker, and others*

COSMIC ORIGINS EXECUTIVE COMMITTEE: Cosmic Origins & JWST

JWST Director's Discretionary Early Release Science Programs

Stellar Populations

ID	Program Title	PI & Co-PIs	Instruments
1334	The Resolved Stellar Populations Early Release Science Program	**PI:** Daniel Weisz	

Planets and Planet Formation

ID	Program Title	PI & Co-PIs
1366	The Transiting Exoplanet Community Early Release Science Program	**PI:** Natalie Batalha **Co-PIs:** Jacob Bean and Kevin Stevenson
1386	High Contrast Imaging of Exoplanets and Exoplanetary Systems with JWST	**PI:** Sasha Hinkley **Co-PIs:** Andrew Skemer and Beth Biller

Galaxies and Intergalactic Medium

ID	Program Title	PI & Co-PIs
1324	Through the Looking GLASS: A JWST Exploration of Galaxy Formation and Evolution from Cosmic Dawn to Present Day	**PI:** Tommaso Treu
1328	A JWST Study of the Starburst-AGN Connection in Merging LIRGs	**PI:** Lee Armus **Co-PI:** Aaron Evans
1345	The Cosmic Evolution Early Release Science (CEERS) Survey	**PI:** Steven Finkelstein
1355	TEMPLATES: Targeting Extremely Magnified Panchromatic Lensed Arcs and Their Extended Star Formation	**PI:** Jane Rigby **Co-PI:** Joaquin Vieira

Solar System

ID	Program Title	PI & Co-PIs	Instruments
1373	ERS Observations of the Jovian System as a Demonstration of JWST's Capabilities for Solar System Science	**PI:** Imke de Pater **Co-PI:** Thierry Fouchet	MIRI NIRCam NIRISS NIRSpec

Massive Black Holes and Their Host Galaxies

ID	Program Title	PI & Co-PIs	Instruments
1335	Q-3D: Imaging Spectroscopy of Quasar Hosts with JWST Analyzed with a Powerful New PSF Decomposition and Spectral Analysis Package	**PI:** Dominika Wylezalek **Co-PIs:** Sylvain Veilleux and Nadia Zakamska	MIRI NIRSpec
1364	Nuclear Dynamics of a Nearby Seyfert with NIRSpec Integral Field Spectroscopy	**PI:** Misty Bentz	NIRSpec

Stellar Physics

ID	Program Title	PI & Co-PIs	Instruments
1288	Radiative Feedback from Massive Stars as Traced by Multiband Imaging and Spectroscopic Mosaics	**PI:** Olivier Berne **Co-PIs:** Emilie Habart and Els Peeters	MIRI NIRCam NIRSpec
1309	IceAge: Chemical Evolution of Ices during Star Formation	**PI:** Melissa McClure **Co-PIs:** Abraham C. Boogert and Harold Linnartz	MIRI NIRCam NIRSpec
1349	Establishing Extreme Dynamic Range with JWST: Decoding Smoke Signals in the Glare of a Wolf-Rayet Binary	**PI:** Ryan Lau	MIRI NIRISS

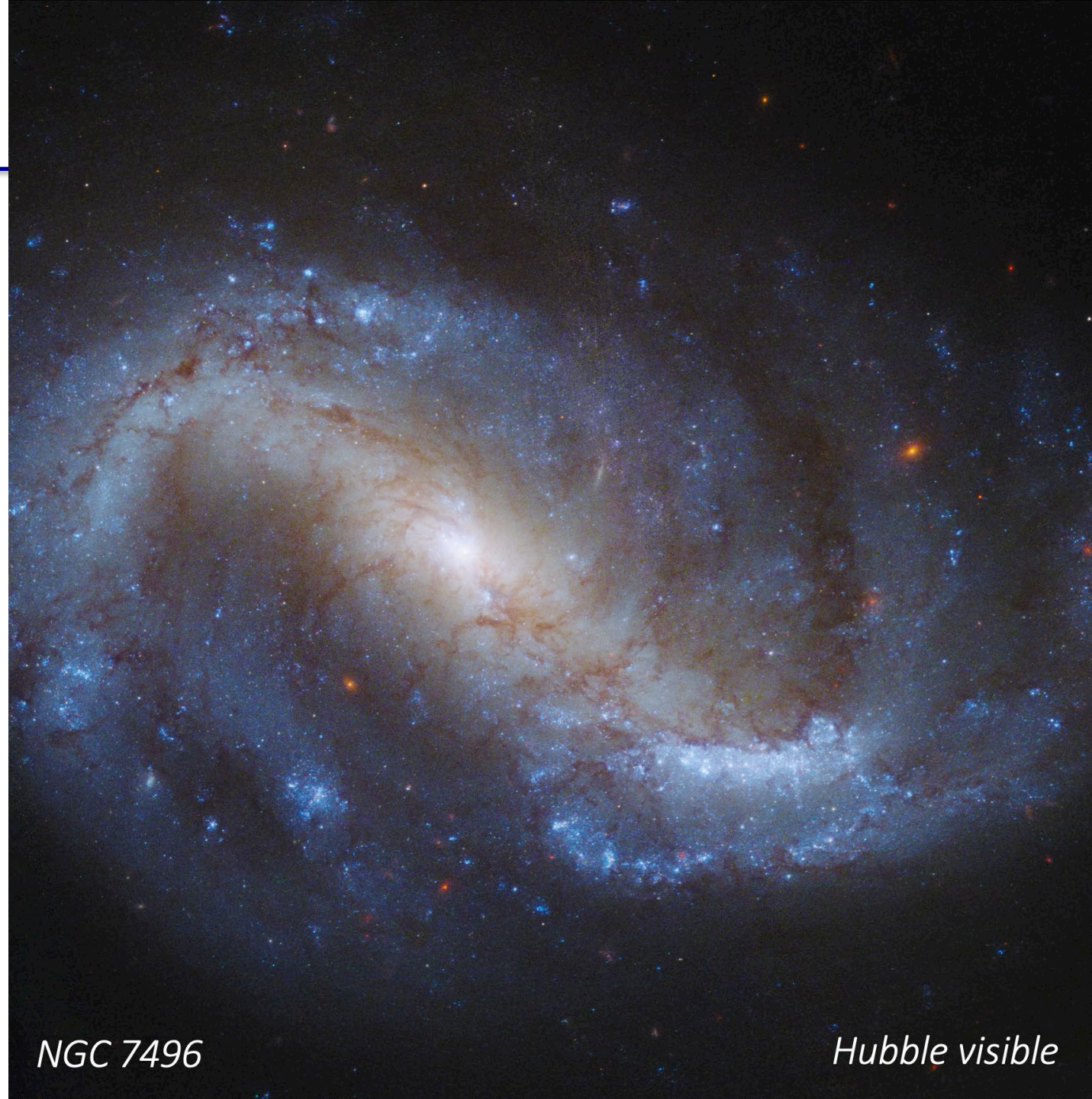
Mark McCaughrean @markmccaughrean · 3h

Now that the #JWST data floodgates are open, you're going to be seeing a flood of gorgeous images of the infrared sky, beyond Tuesday's releases.

Here's a beautiful example of star formation in the dust lanes of a spiral Galaxy by @janiceleeastro et al. 🙂

> **Dr. Janice Lee** @janiceleeastro · 7h
>
> Our #phangs team was up in the early morning with @SpaceGeck waiting to download our 1st!! @NASAWebb obs... data are just ✨ miraculous✨ lighting up dark dust lanes, revealing earliest stages of star formation in detail & ALL THAT FEEDBACK #pinwheelonfire #ngc7496
>
> Show this thread
>
> 
>

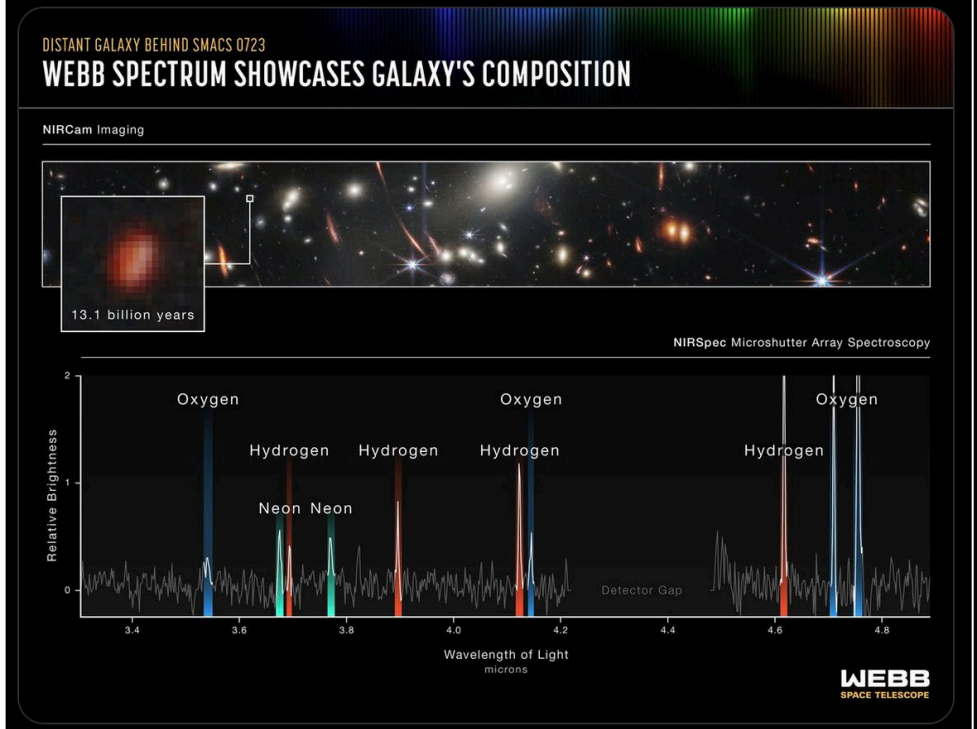
And why we need an ensemble of observatories working in harmony



You Retweeted

Hakim Atek
@dyonysos

now you are casually measuring metallicity in a z=8.5 galaxy ?



8:05 AM · Jul 12, 2022 · Twitter for iPhone

92 Retweets **21** Quote Tweets **711** Likes

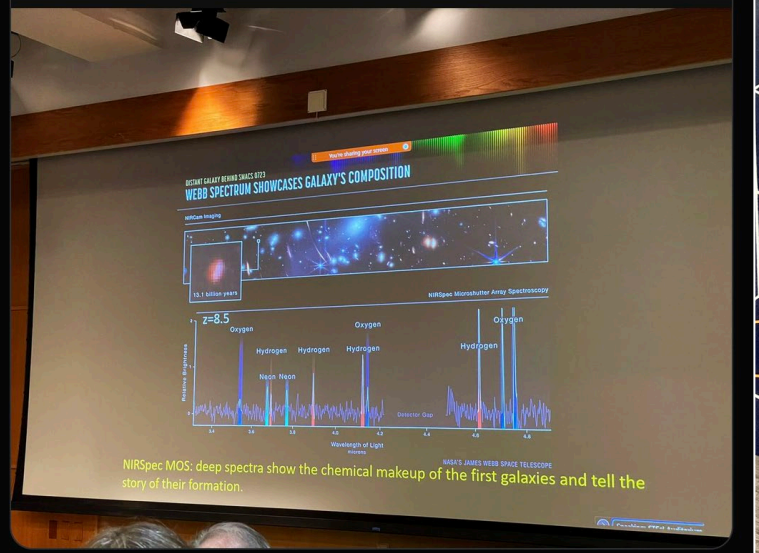
Bruce Macintosh @bmac_astro · 17h

I like the WASP spectrum and the images, but from my not-even-remotely-expert-about-galaxies standpoint this seems like the thing that's the most really transformational of everything in the release. This is what JWST was built to do.

Molly Peeples @astronomolly · Jul 12

At @stsci @alh_ast is presenting spectra of the #jwst deep field. SPECTRUM of a=8.5 galaxy! With super easy to measure metallicity indicators!

Show this thread



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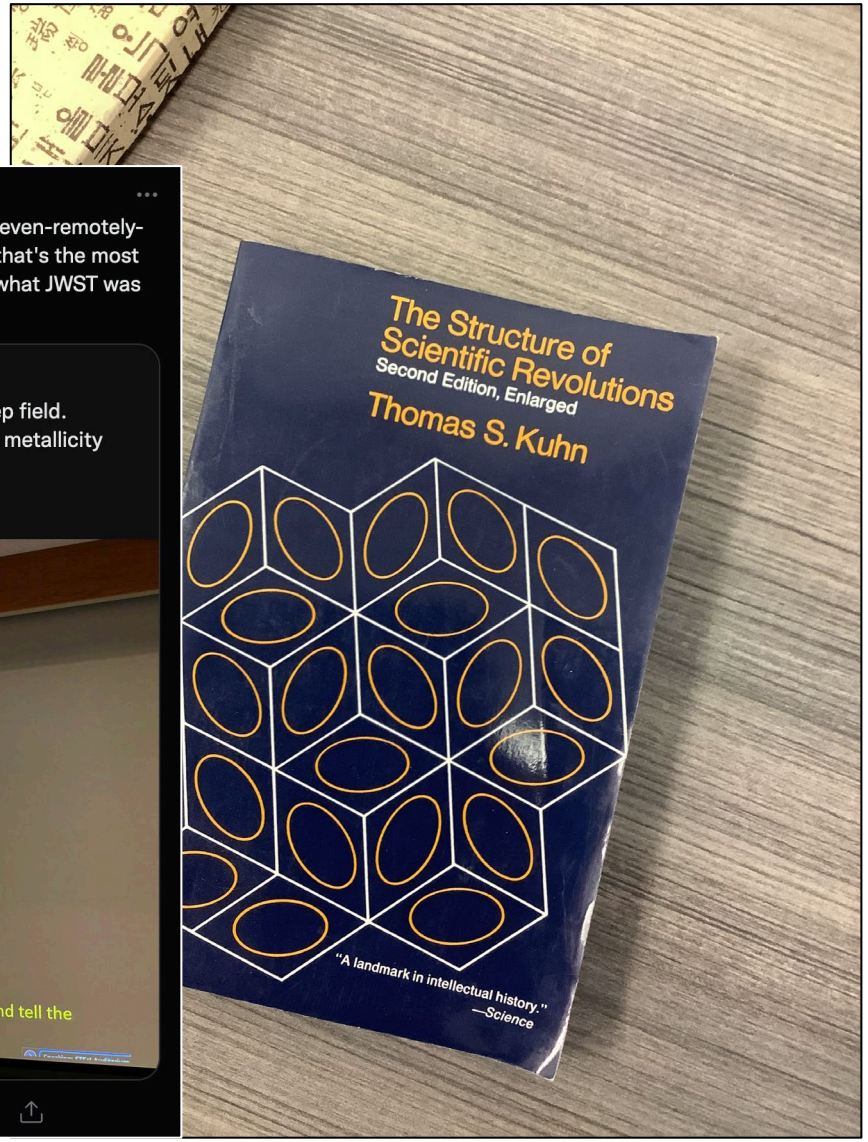


COSMIC ORIGINS EXECUTIVE COMMITTEE:
Review of charge and organization

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

The National Academies of SCIENCES ENGINEERING MEDICINE

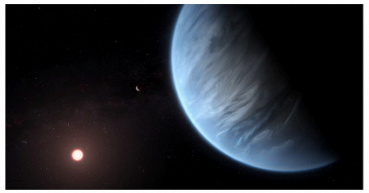
Pathways to Discovery in Astronomy and Astrophysics for the 2020s

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:

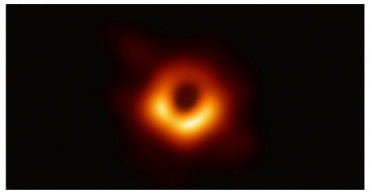
NASA Program Analysis Groups (PAGs) serve as community-based, interdisciplinary forums for soliciting and coordinating community analysis and input in support of NASA SMD Science Program objectives and of their implications for architecture planning, activity prioritization, for future exploration. It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

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

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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

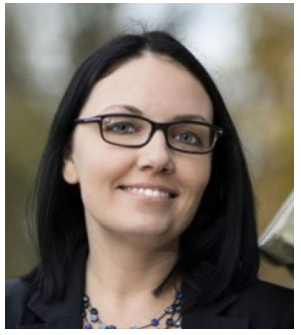
- Indicated women and early-career scientists may be disparately impacted by COVID shutdown
- Helped guide decision to reverse cancellation of FY21 ADAP solicitation

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





Extended 1 yr



New members Instrumentation; IR; UV; IGM

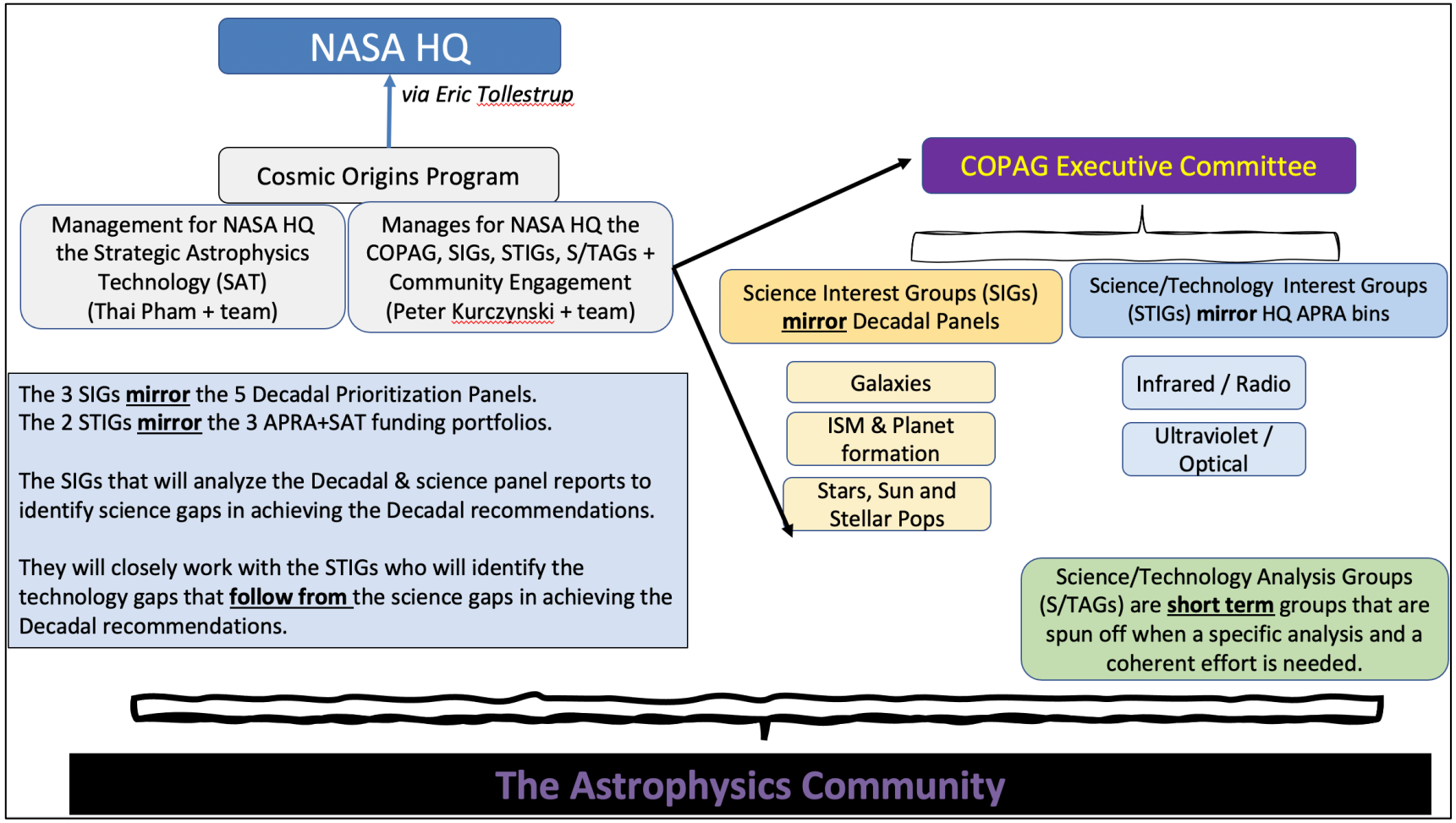
- N=11
- Chris DePree (NRAO) ended term early
- Four members rotations in Oct including Chair
- Request for Chair-elect to be appointed

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

From Oct 2021 APAC Report:



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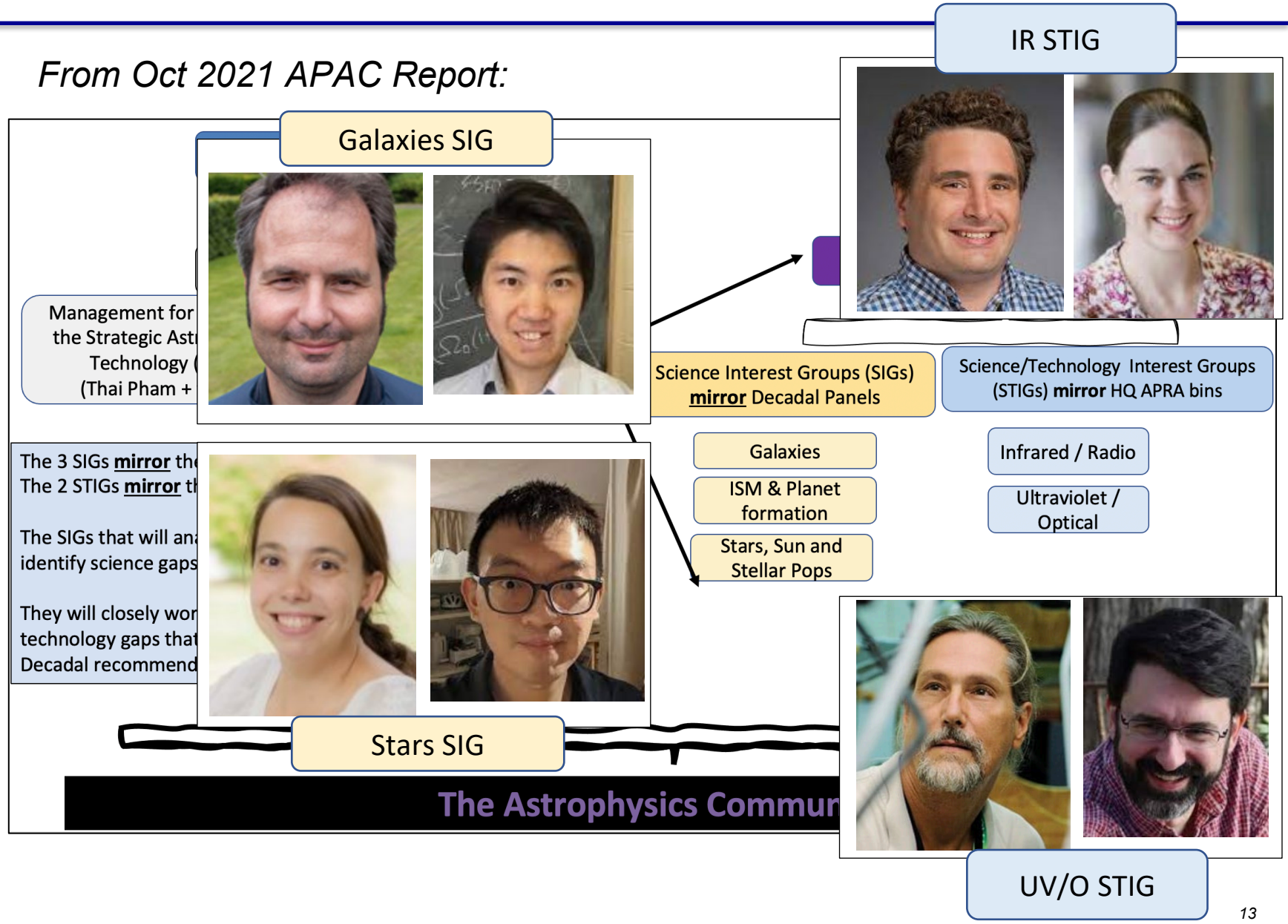
STIG/SIG Leadership

- **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)

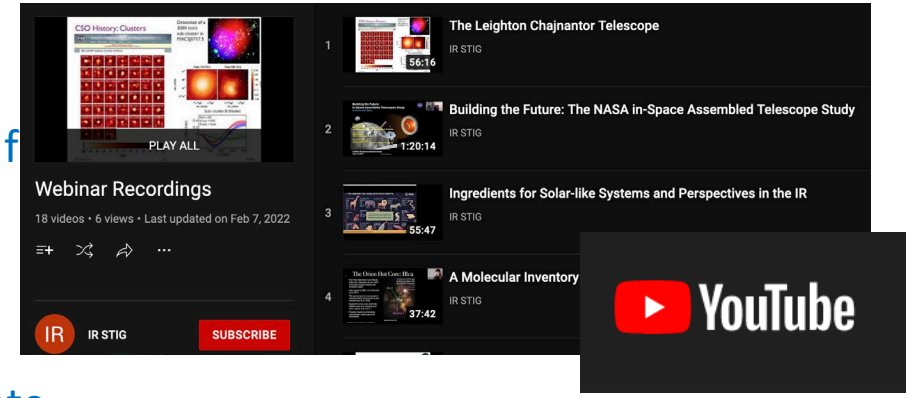
From Oct 2021 APAC Report:



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

Continuing the webinar series

- Continuing cadence of ~1 talk/month.
- Attendance has been high, typically between 30 and 60 scientists f
- All recordings posted to YouTube channel and website.



Continuing Biannual Newsletter

- Next release expected in 1-2 weeks.
- Usual mix of news and views, science and technology highlights, etc.
- Will contain summary of March workshop from IRSTIG.

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

- Community synthesized the priorities from the Astro2020 review.
- Discussed probe concepts, SOFIA retirement, suborbital missions, and other priorities.
- >110 in-person participants, and "viewing mode" virtual participation e

Organizing Community Feedback on Facility Priorities for Next Decade

- Expect online opinion surveys in the next 6 months.

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

UVSTIG members participated in the Precursor Science Workshop I on 20- 22 April 2022

Organized the Paul Feldman memorial on 14 May 2022 at which many UVSTIG members were in attendance

UVSTIG members participated in the AAS 220 splinter session on the New Great Observatories on 14 June 2022 Speakers and topics included:

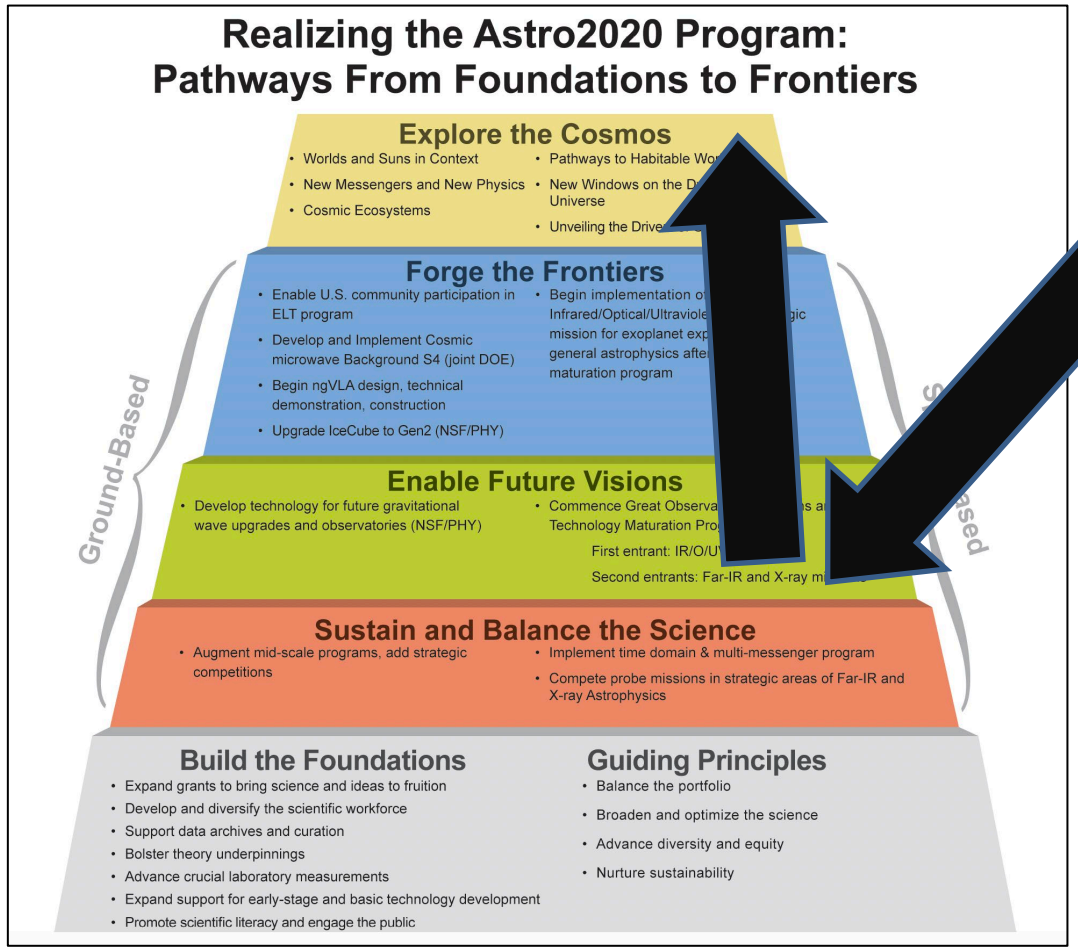
- Tumlinson, STScI - Intro
- Trembly, CfA - New Great Observatories
- Macintosh, Stanford - Astro2020 Perspective
- Rigby, GSFC - Lessons from JWST and the New Great Observatories
- Roberge, GSFC - Maturing the Great Observatories: a New Approach
- Stassum, Vanderbilt - Only NASA Missions can train people for NASA missions
- O'Meara, Keck – How to Join the Movement
- Number of attendees ~ 160 (100 live, 60 virtual)

UVSTIG members also organized public overflow accommodations for JWST ERO event in Baltimore on 12 July 2022

UVSTIG -- Quorum for Uv and Visible Exploration of Science and Technology (QUEST) Seminar is on Summer Hiatus as it digests implications of the 3 stages of GOMAP

- **QUESTxx** will start up in the fall - speakers and dates tbd

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

→ 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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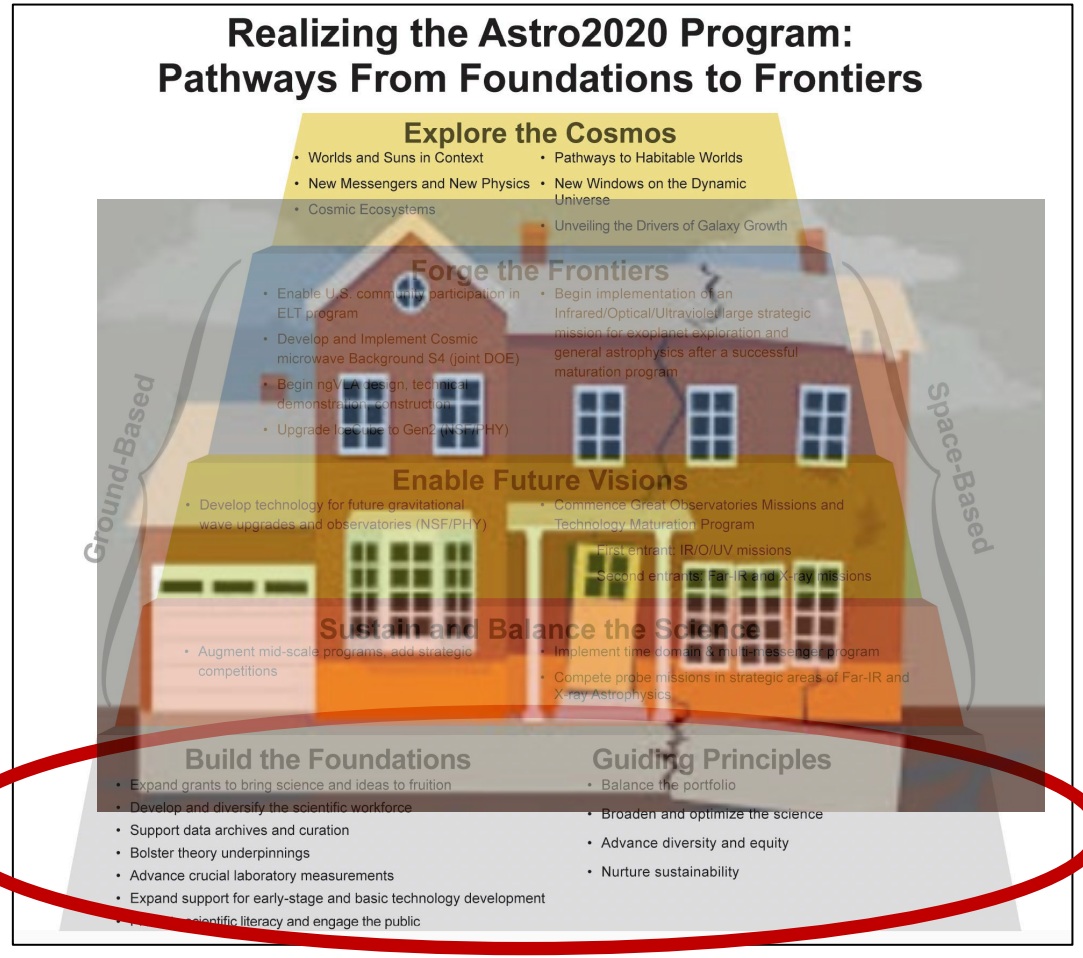

Rapid changes in economics/culture/technology → significant impacts on "Foundations" COPAG esp concerned with

- 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

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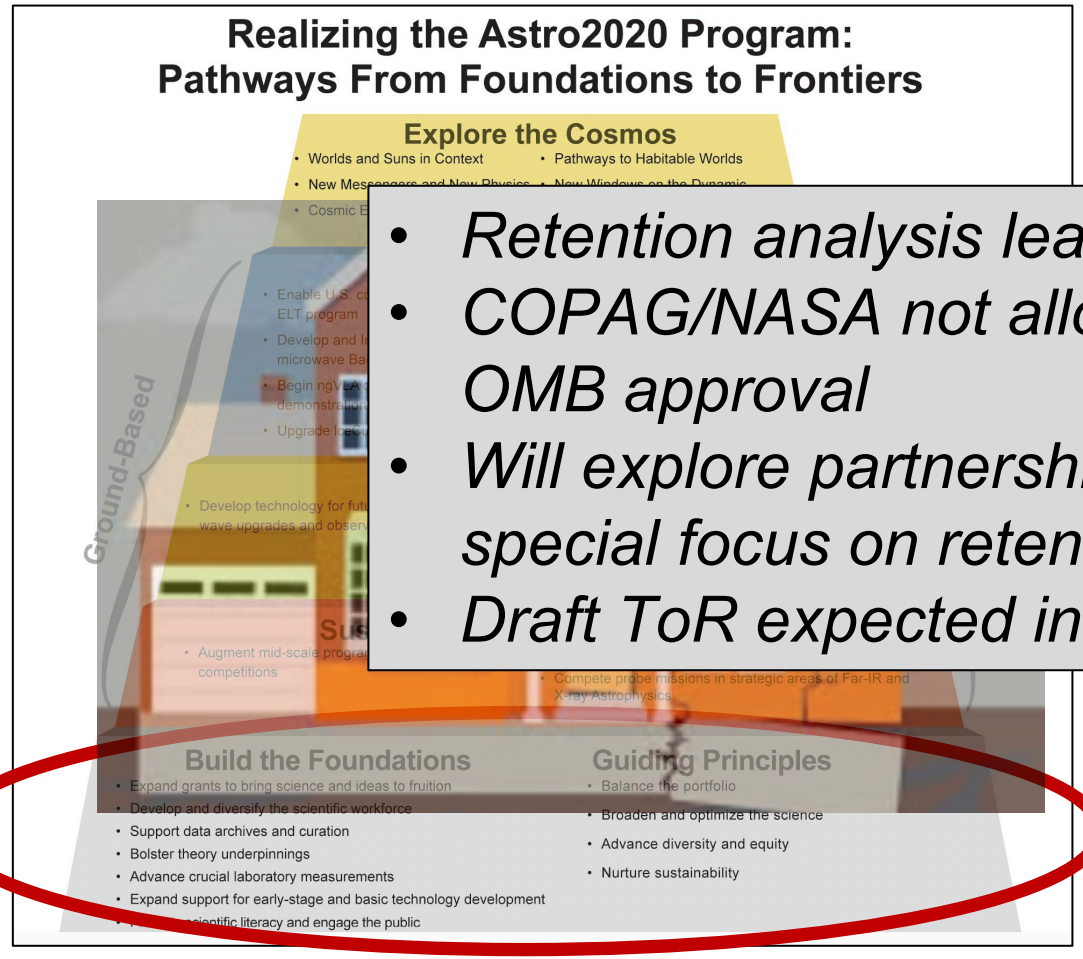

- *Retention analysis leads: Beaton & Stierwalt*
- *COPAG/NASA not allowed to perform surveys without OMB approval*
- *Will explore partnership with AAS to initiate study, with special focus on retention issues on GOMAP activities*
- *Draft ToR expected in October*

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

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