Cosmic Origins Program Analysis Group (COPAG 101)

Shouleh Nikzad
COPAG Executive Committee Chair
On behalf of the COPAG EC
& Sabrina Stierwalt, COPAG EC Vice Chair

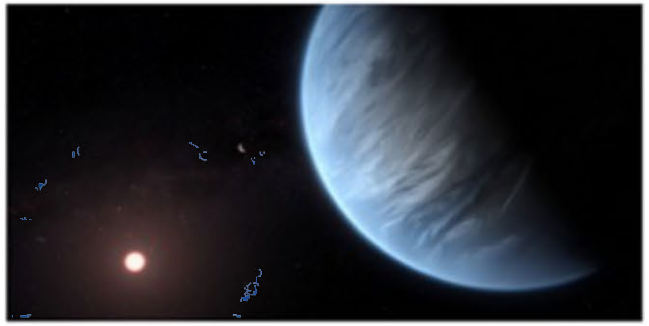
American Astronomical Society Meeting #245
12 January 2025

Agenda

Opening Remarks and COR Introduction	Peter Kurcynski
COPAG Introduction	Shouleh Nikzad
Galaxies SIG, Stars SIG, Diffuse Gas Cosmic Ecosystems SIG & UV STIG	SIG Leads
• The need for space-based IFU spectroscopy	Claudia Scarlata
• Deciphering the true properties of galaxies across cosmic time w/ UV spectroscopy	Bethan James
• A “massive” future for UV spectroscopy	Christi Erba
• Resolving the multiphase CGM: Current Progress & Future Prospects in the UV	Fakhri Zahedy
• IFU Using the slit stepping	Susan Kassin
• UV Star Formation Rate	Janice Lee
Spatially Resolved UV Spectroscopy Panel	Sanch Borthakur, Moderator
	Panelists: Paul Scowen, Erika Hamden, Steve McCandliss, Emily Witt, David Schiminovich, Susan Kassin
Science and data release from Euclid, an ESA mission with NASA participation	**Claudia Scarlata (for** Harry Teplitz)
Driving the Early Career Algorithm: First Year Impact of the Cosmic Pathfinders Program	Ron Gamble
Cosmic Origins Technology Gaps and Portfolio Highlights	Rachel Rivera, NASA-GSFC)
Roman Space Telescope	Rachael Beaton
Unpacking the Blackbox: The role of AI and ML-assisted tools in astronomy research	Karthek Iyer
Preparing for Astro20230: The astrophysics decadal survey process	Rachel Osten

Program Analysis Groups

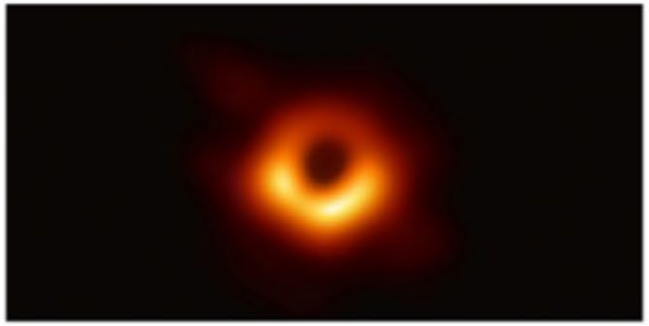
Key Scientific Challenges for the Next Decade



Worlds and Suns in Context

Priority Area: Pathways to Habitable Worlds

Exoplanet Exploration Executive Committee (ExoPAG EC)
Chair: Ilaria Pascucci



New Messengers and New Physics

Priority Area: New Windows on the Dynamic Universe

Physics of the Cosmos Executive Committee (PhysPAG EC)
Chair: Justin Finke

Cosmic Ecosystems

Priority Area: Unveiling the Drivers of Galaxy Growth

Cosmic Origins Executive Committee (COPAG EC)
Chair: Shouleh Nikzad

PAGs are community-based interdisciplinary forums for coordinating community input in support of NASA SMD science objectives and their implications for future exploration. PAGs provide their findings to NASA Astrophysics and the scientific community

What is COPAG's Charge?

The COPAG serves as a community-based, interdisciplinary forum for soliciting and coordinating community analysis and input in support of Cosmic Origin objectives and of their implications for architecture planning and activity prioritization and for future exploration. It provides findings of analyses to the NASA Astrophysics Division Director and the astrophysics community.

- Science
  - future great observatories (c.f. Astro 2020 decadal survey)
  - Science gaps & precursor science
- Technology
  - Astrophysics technology gaps
  - Biennial Technology Report
- People
  - State of the profession
  - Diversity, Equity and Inclusion

Cosmic Origins Program Analysis Group (COPAG)

Get involved to represent your communities:

PAGs are community-based interdisciplinary forums for coordinating community input in support of NASA SMD science objectives and their implications for future exploration. PAGs provide their findings to NASA Astrophysics and the scientific community

COPAG Executive Committee (EC) leads analysis and coordinates COPAG activities. Members span the breadth of COR science and technology

COPAG EC created a strategic plan to make efficient and effective use of volunteers to serve the community and NASA

Current activities: Quarterly Town Halls, AAS Splinters, Science Gap Analysis, Cosmic Pathfinders

Science (and Technology) Interest Groups: Galaxies, Stars, Diffuse Gas in Cosmic Ecosystems, AGN, IR STIG & UV STIG

We work closely with the COR Program Office to reach our objectives.

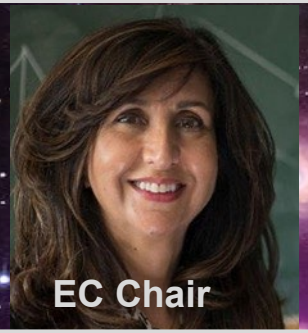
Program Scientist:
Patricia Knezek

COR Chief Scientist:
Peter Kurczynski

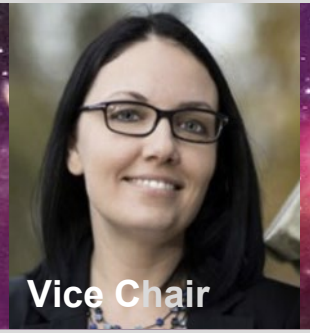
COR Deputy Chief Scientist:
Swara Ravindranath

COR Scientist:
Ronald Gamble

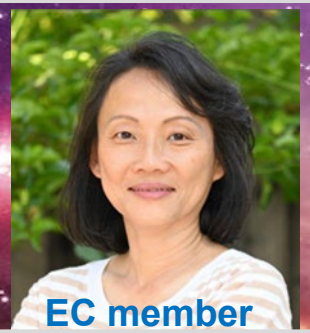
Program Support Manager:
Stephanie Clark



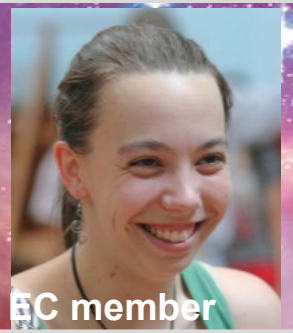
Shouleh Nikzad



Sabrina Stierwalt

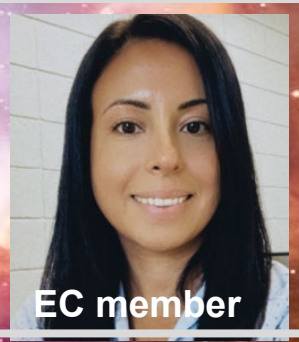


Hsiao-Wen Chen

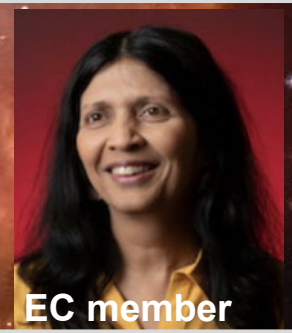


Rachael Beaton

Sanchayeeta Borthakur



Rana Ezzeddine



Varsha Kulkarni

We thanks COPAG-EC Members
who recently rotated off for their volunteer and dedicated service!

Steve McCandliss
Johns Hopkins University

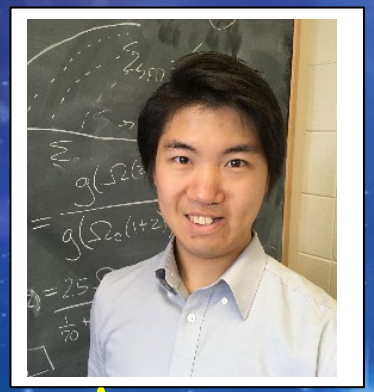
Enrique Lopez Rodriguez
Stanford University

Apr' 22 - Oct '24

COSMIC ORIGINS Program Analysis Group
Science (and Technology) Interest Groups

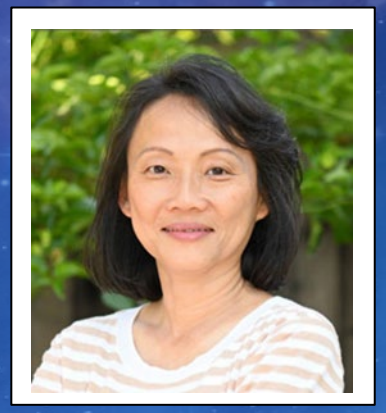
Galaxies SIG

Benne



Aaron

Cosmic Ecosystem SIG



Hsiao-Wen

Erika

IR STIG

Jake

Roberta

- Anyone can join!
- Virtual and in-person events

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

AGN SIG

Shobita

Stars SIG

Rachael

UV/Visible STIG

Steve

Jason

COSMIC ORIGINS Program Analysis Group EXECUTIVE COMMITTEE: Ex Officio Members and Liaisons

Program Scientist: Patricia Knezek

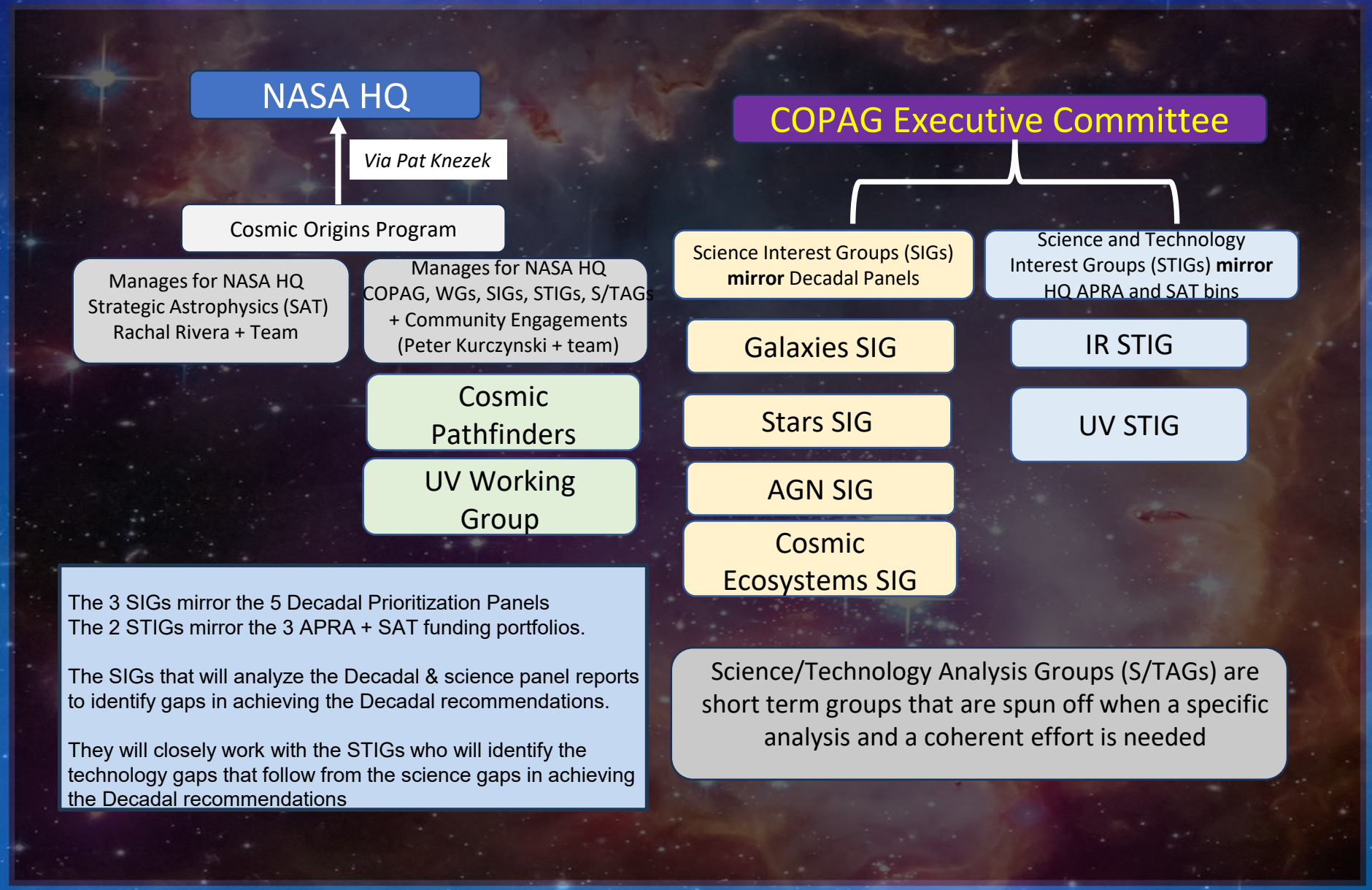
COR Chief Scientist: Peter Kurczynski

COR Deputy CS: Swara Ravindranath

COR Scientist: Ron Gamble

Program Support Manager: Stephanie Clark

COSMIC ORIGINS Program Analysis Group EXECUTIVE COMMITTEE: Organizational Context of SIGs and WGs



SIGs and STIGs Updates

- **IRSTIG**
  - Continuing cadence for webinar ~1 talk/month
  - Planning a workshop in DC May 5-7, 2025 to reconvene the IR community to discuss its future
  - Planning for a winter AAS splinter session focusing on IR contributions to HWO
- **UVSTIG**
  - kicked off new QUEST seminar series in April with talk by Kevin France: *STAMP: Smallest Technology Accelerated Maturation PlatforM*
  - Members are on the guest editorial board for the special edition of Jatis-UV science and Instrumentation
- **DIFFUSED GAS IN COSMIC ECOSYSTEM SIG**
  - Continuing well attended monthly online talks
- **Galaxy SIG**
  - Continuing well attended monthly talks, focusing on early career speakers
- **Stars SIG**
  - Planning to kick off seminars in the Spring 2025, recruiting, also working on COR Science Gaps
- **AGN SIG**
  - Panel Discussion: X-ray and FIR Probe Missions, 14 May 2024, 12:00pm Eastern, 62 attendees
  - Discussion in Mid Nov in coordination with the HWO AGN working group
- **TDAMM CROSS PAG SIG**
  - Workshops, AAS Splinters, White Papers. See PhysPAG presentation for details.

COPAG Strategic Plan

Introduction

The Cosmic Origins Program Analysis Group (COPAG) undertook a thorough strategic planning process during Spring 2023. The process was kicked off with a 2-day meeting on May 11 and 12 at the Keck Center Think Tank.

This report is the culmination of this extensive process. This strategic plan will guide COPAG over the next five years and beyond as we transform into a more focused, responsive, and collaborative organization.

Our commitment to community and our desire to serve that community with the highest level of engagement and inclusion will be strengthened by the implementation of this far-reaching plan.

Our executive committee will use this strategic plan as a road map into the future, guiding our analysis, processes, and interactions with the community and NASA. The COPAG-EC will measure progress towards the established goals of this plan periodically in order to ensure our vision is kept on target.

The COPAG-EC and leaders of the COPAG-affiliated Science Interest Groups have a great deal of enthusiasm for this strategic plan. Its implementation will only ensure the successful future and effectiveness of COPAG to serve the astrophysics community and help NASA uncover mysteries of the Universe and discover our cosmic origins.

Shouleh Nikzad, Ph.D.
Chair, COPAG EC

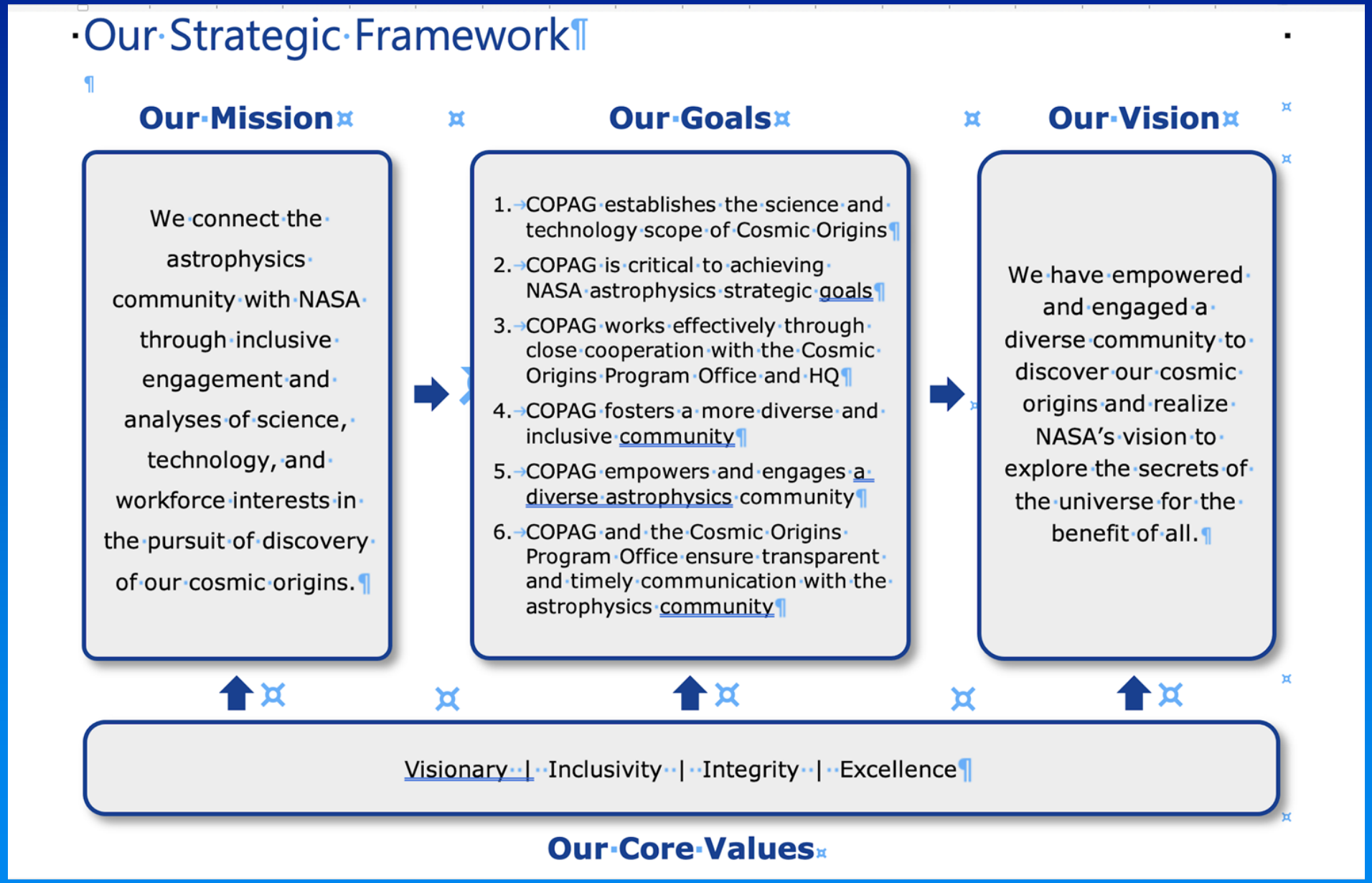
Manuel Bautista, Ph.D.
NASA HQ Program Scientist

Peter Kurczynski, Ph.D.
Chief Scientist, COR

Sabrina Stierwalt, Ph.D.
Vice-chair, COPAG EC

Swara Ravindranath, Ph.D.
Deputy Chief Scientist, COR

Framework


Our Strategic Framework
Our Mission
We connect the astrophysics community with NASA through inclusive engagement and analyses of science, technology, and workforce interests in the pursuit of discovery of our cosmic origins.
Our Goals
1. COPAG establishes the science and technology scope of Cosmic Origins
2. COPAG is critical to achieving NASA astrophysics strategic goals
3. COPAG works effectively through close cooperation with the Cosmic Origins Program Office and HQ
4. COPAG fosters a more diverse and inclusive community
5. COPAG empowers and engages a diverse astrophysics community
6. COPAG and the Cosmic Origins Program Office ensure transparent and timely communication with the astrophysics community
Our Vision
We have empowered and engaged a diverse community to discover our cosmic origins and realize NASA's vision to explore the secrets of the universe for the benefit of all.
Visionary | Inclusivity | Integrity | Excellence
Our Core Values

Sample Strategic Objectives & Assignments

Goal 3: COPAG works effectively through close cooperation with the Cosmic O Program Office and HQ	
Business Results: Collaboration; clearly defined relationships	
Strategic Objectives	**Target Date**
1. A clear streamlined **communication structure** between the COPAG, the Program Office, and HQ	Aug 2023
2. **Management plan** defining the relationships between COPAG – Program Office – NASA HQ	Aug 2023
3. Every COPAG EC members has an **assigned objective** (e.g., strategic plan)	Aug 2023
a. Onboarding process for new EC members	
b. Assign new COPAG EC members with individual objectives	
4. **Engagement plan** for in-person and virtual events with EC and with HQ	Sep 2023
5. **Operations manual** for COPAG events and presentations and SIG activities (e.g., booths at conferences)	Mar 2024
a. Best practices for engaging APAC and HQ	

Sample Community Engagement Activities Ongoing and in Planning

2025 Winter AAS

- Splinter sessions planned
- Joint PAG participation—New format since 2024 to potentially have more community engagement which will include a presentation and:
  - Panel with APD Director and PAG EC Chairs
  - Open Q&A
- Participating in the booths to engage the community

Community Townhalls

- Two virtual Town Hall so far to share information with and hear from the community

Workshops

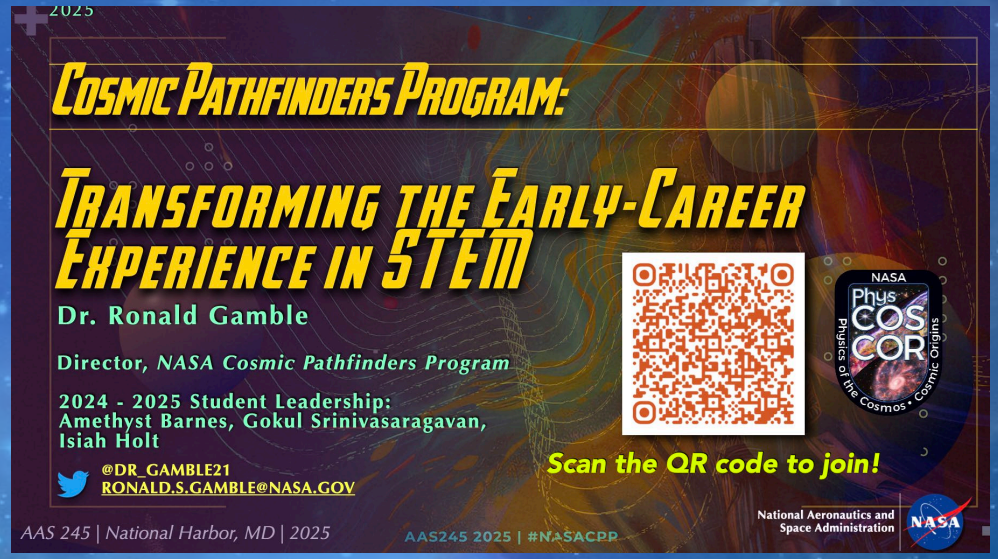
- *UV Science and Instrumentation: On the Way to HWO and Beyond, May 2024*
- *IR Workshop, Spring 2025*

Hyperwall Talks

Ron Gamble, “NASA Cosmic Pathfinders Program,” Sunday January 12, 7:00 pm

Peter Kurczynski, “Astrophysics at NASA,” Wednesday January 15, 5:30 pm

Benne Holwerda, “Overlapping Galaxy Pairs,” Thursday January 16, 12:30 pm



Cosmic Pathfinders Program

Cosmic Pathfinders is a student-focused program of online events and in-person gatherings that provides an interface to NASA astrophysics. It is motivated by an immediate need to develop the next generation of the STEM workforce in space-related fields. The program includes an ongoing series of virtual colloquia, called *Cosmic Chatter*, that addresses astrophysics research and professional development topics. The program also includes virtual hack-a-thons that offer instruction for analyzing NASA mission and archival datasets. Finally, the program sponsors in-person sessions at professional society meetings and opportunities for engagement with NASA astrophysics Program Analysis Groups.

Cosmic Pathfinders Program Goals

- Promote Open Dialogue: The program initiates discussions on prominent challenges that students face in today's STEM professional landscape.

https://cor.gsfc.nasa.gov/copag/program/cosmic-pathfinders.php

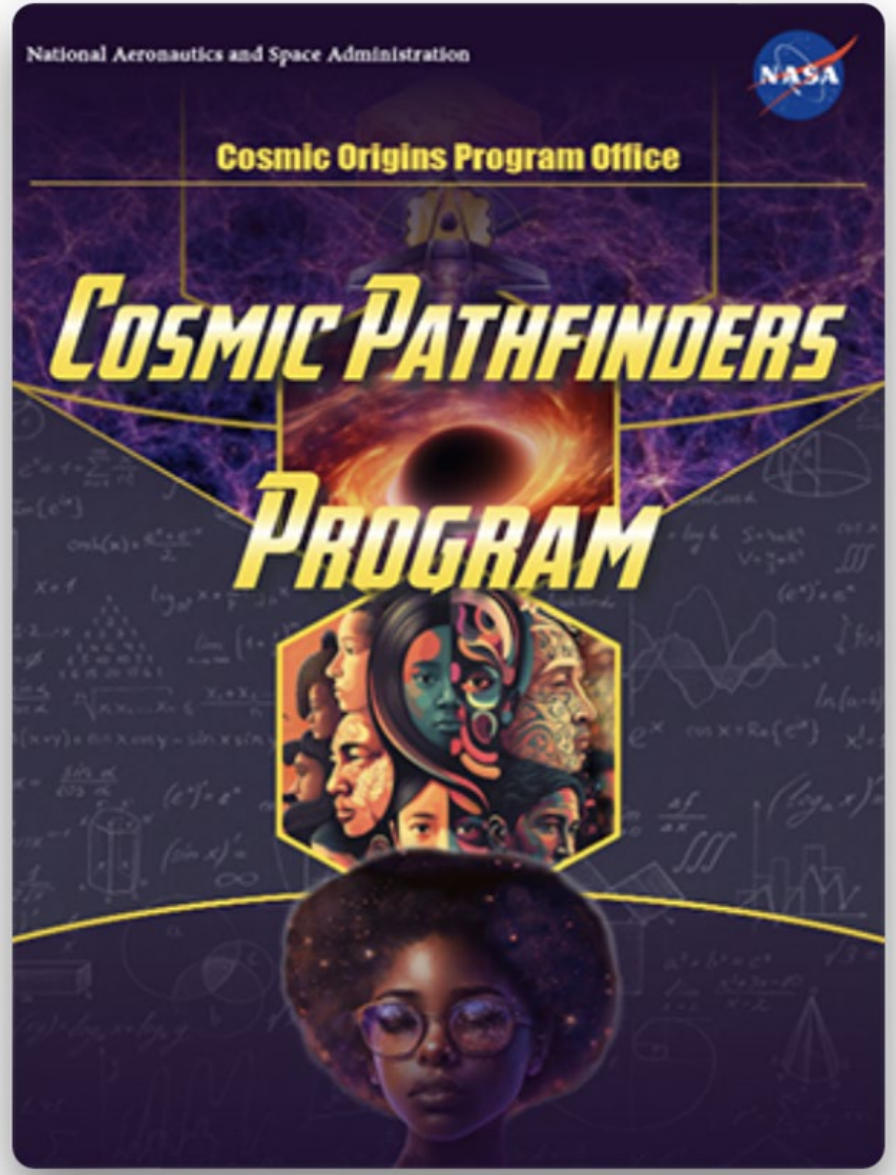


Image credit: Ronald Gamble, NASA Goddard Space Flight Center/University of Maryland, College Park

UV Working Group

Sarah Tuttle (Univ of Washington) and Mark Matsumura (NASA/GSFC) co-chairs, +33 participants from astrophysics community and NASA

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Key findings

- Science and technology case for sensitivity down to 100 nm for Habitable Worlds Observatory
- There is increasing science toward shorter wavelengths in the UV
- Technologies & contamination control make 100 nm possible for HWO, provided focused investment in the next five years

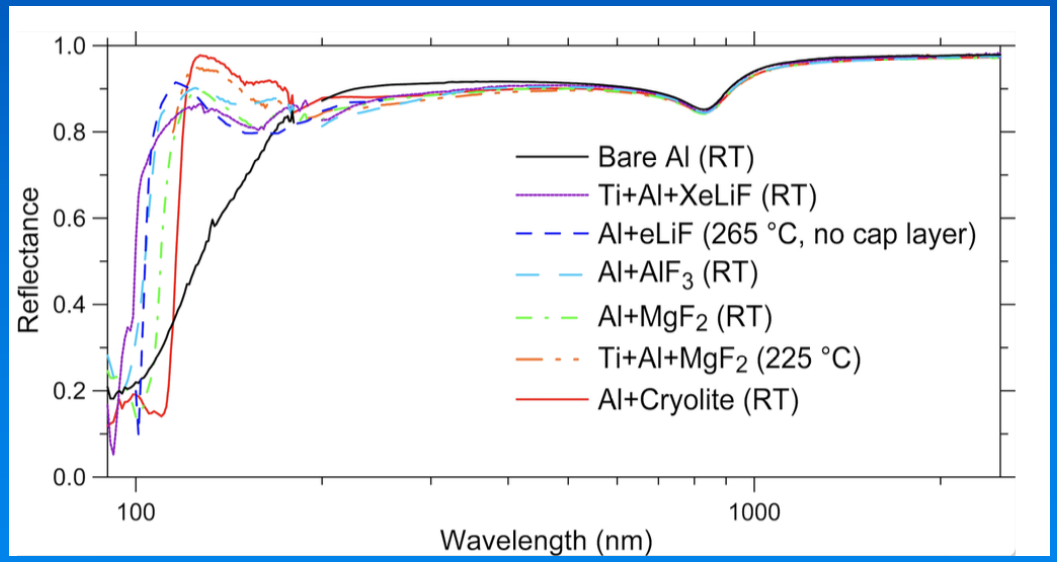
Example of community scientists working together to solve a science/technology problem and provide answers to NASA

Ultraviolet Technology To Prepare For The Habitable Worlds Observatory

Sarah Tuttle (co-chair)[a,*], Mark Matsumura (co-chair)[b], David R. Ardila[c], Pin Chen[c], Michael Davis[d], Camden Ertley[d], Emily Farr[e], Brian Fleming[e], Kevin France[e], Cynthia Froning[d], Fabien Grisé[f], Erika Hamden[g], John Hennessy[c], Keri Hoadley[h], Stephan R. McCandliss[i], Drew M. Miles[c], Shouleh Nikzad[c,j], Manuel Quijada[b], Isu Ravi[i], Luis Rodriguez de Marcos[k], Paul Scowen[b], Oswald Siegmund[l], Carlos J. Vargas[g], Dmitry Vorobiev[e], Emily M. Witt[e], Ultraviolet Technology Working Group[j]
[a]University of Washington, Department of Astronomy, Seattle, WA, USA
[b]Goddard Space Flight Center, Greenbelt, MD, USA

UV White Paper: Tuttle et al 2024 arXiv:2408.07242

Reflectance of various UV coatings under development



Reflectance down to 100 nm can be achieved with next generation UV coatings. Image: Tuttle, S. et al 2024, arxiv:2408.07242v1

Inaugural Virtual Town Hall-July 10, 2024

- **Town halls are one of the ways we are reaching to the community for engagement, two-way communication, capturing community concerns, and sharing information.**
- **First town hall was held virtually 9-10 am Pacific on July 10, 2024, co-chaired by Shouleh & Sabrina:**
  - **Opening Remarks–**Shouleh Nikzad
  - **Overview of program office –**Swara Ravindranath
  - **HQ overview, stats on the last SAT/APRA, next calls**—Pat Knezek
  - **EC, SIG/STIGs intros and how PAGs and SIGs fit in the ecosystems**–EC members and SIG/STIG leads
  - **HWO Update**–John O'Meara
  - **Cosmic Pathfinders Presentation**–Ron Gamble
  - ***Q&A***—Moderated by Sanchayeeta Borthakur
  - **Closing Remarks**–Sabrina Stierwalt

Second Virtual Town Hall-October 30, 2024

Second town hall was held virtually 9-10 am Pacific on October 30, 2024, Webinar format, Question Submitted and Upvoted

COPAG-EC overview–Shouleh Nikzad

A Conversation with Nicky Fox—Moderated by Pat Knezek

Selected Probes Summary—Pat Knezek

UV White Paper-HWO Technology Presentation—Sara Tuttle

Q&A—Moderated by Sabrina Stierwalt

Upcoming Events, Invitation to EC, Closing—Sabrina Stierwalt

UV Science and Instrumentation Workshop

- The ***UV Science and Instrument: On the Way to HWO and Beyond*** was held at *JPL's von Karman auditorium May 7-9*. Optional tour of JPL offered, ~15 early career participants took part in the tour.
- Opening remarks were made by Dr. Mark Clampin, NASA Astrophysics Director followed by a short Q&A period. Welcoming remarks were made by JPL Director, Dr. Laurie Leshin and JPL Astrophysics Director, Dr. Todd Gaier.
- Participants with diverse backgrounds, demographics, and institutions including GSFC, JPL, CU-Boulder's LASP, SwRI, UA, ASU, STScI, JHU, IPAC, Caltech, U of Toronto, UW, UC Berkeley, …
- Total participants:183, 50 virtual *7 in-person Roman Technology Fellows!*
- Oral sessions, followed by panels. Posters and poster flash talks. Ample time for breaks provided opportunities for further discussions.
- Draft report created. JATIS Special Issue approved and call is out.
- The community was engaged: DEIA, science, balanced portfolio, mission and instrument concepts from CubeSats to HWO.…
- NASA has supported UV science, instruments, and technologies over the years. A great deal of progress has been made even since the LUVOIR and HabEx studies. This enables potential for great contributions in all classes of missions especially in HWO.

UV Science UV Science & Instrumentation Workshop

On the Way to HWO and Beyond

CALL FOR PAPERS--JATIS SPECIAL ISSUE

Ultraviolet Science & Instrumentation: On the Way to Habitable Worlds Observatory and Beyond

Target Publication Date
April-June 2025

Submission Date Deadline
New Deadline being negotiated and discussed, 2025

Scope

This special section of JATIS focuses on addressing the opportunities and challenges involved in doing science through ultraviolet observations, the gaps and capabilities of ultraviolet instrumentation and technologies, and the mission concepts necessary for achieving science objectives, in a variety of platforms, from CubeSats to the next astrophysics flagship: the Habitable Worlds Observatory.

Areas of interest for this special section include:

- Enabling technologies (detectors, reflective coatings, gratings, filters, μ-shutters, etc.)
- Modeling, simulations, and data analysis techniques and results
- UV Instrumentation, including reviews*
- UV Science Cases for HWO & other classes of missions (see website, need to make connection to instrumentation)
- Mission concepts: all classes and in all stages of development and deployment

How can I get involved?

- Visit the Cosmic Origins website

  https://cor.gsfc.nasa.gov

  https://cor.gsfc.nasa.gov/copag/

- Join the Cosmic Origins email distribution list

  COR-News-join@lists.nasa.gov with Subject="join"

- Join a Science Interest Group

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

Join the COPAG

Membership has its privileges!

COR News email distributions provide bi-weekly updates about Cosmic Origins and NASA Astrophysics

Question?

Extra Slides

How can I get involved?

Habitable Worlds Observatory

https://submissions.mirasmart.com/[illegible]/EventDetail.aspx?evt=246

Update

AAS 243 Winter Meeting 1/4/24, 3:39 PM

Wednesday, January 10, 2024

Session Title

The Habitable Worlds [illegible]ities for Engagement

Session Type

Splinters

Room

R08 / R09

Summary

Through the new Great Observatory Mission & Technology Maturation Program (GOMAP), NASA is preparing for the upcoming Habitable Worlds Observatory (HWO), a large UV/optical/IR space telescope recommended by the 2020 Decadal Survey on Astronomy and Astrophysics. HWO will conduct a variety of transformative astrophysics observations, including examination of the lifecycle of galaxies, studying the diversity of worlds in and beyond our Solar System, and searching for signs of life by directly imaging and obtaining spectra of roughly 25 habitable zone planets. At this splinter session, we will review the goals and progress of the recently formed Science, Technology, Architecture Review Team (START) and Technical Assessment Group (TAG), highlighting opportunities for community members to contribute to the project via working group membership, meeting attendance, papers, proposals, and other activities. We will also invite any other HWO teams or groups to share their progress/results, including technology roadmap teams, Science Assessment Groups, and research teams funded to conduct HWO-relevant work. The session will also feature an extended discussion session.

UV Working Group: Science and Technology White Paper

Co-Chairs: Sarah Tuttle (UW, Seattle) & Mark Matsamura (GSFC)

Goal: Create a foundational document to capture UV driving science, current status of UV technology crucial to HWO development, and specify areas needed to focus development to reach notional requirements. Capture key technical advancements in one location to encourage broad engagement in pathfinding missions

- Working Group initiated in July

- Meeting Participation
  - Exoplanet/UV Science Mini Workshop in March 2023
  - July 2023 Science w/HWO Meeting at STSci – multiple presentations & Tech Day Participation
  - Presentation at CGM meeting in September 2023
  - Presentation at *UV Science and Instrumentation Workshop: On the Way to HWO and Beyond*
  - Presentation at NASA HQ and Goddard Space Flight Center