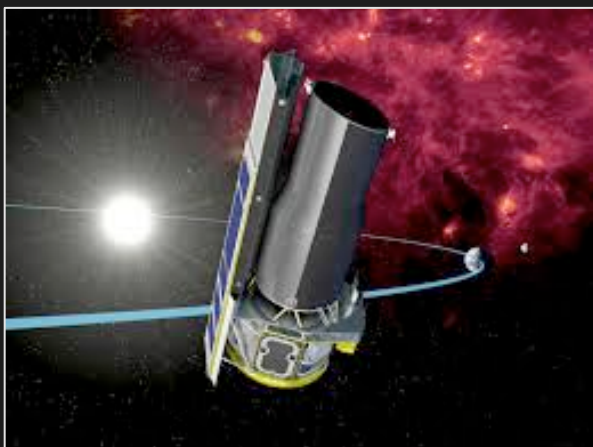


Cosmic Origins Program Analysis Group

Kenneth Sembach
(STScI)



Cosmic Origins Questions

- How did we get here?
 - How and when did galaxies form?
 - How do stars form, evolve, and eventually die?
 - How are matter and the chemical elements distributed throughout the universe?



This theme encompasses science from the origins of the cosmos to the origins of life, and therefore has many synergies with the Physics of the Cosmos and Exoplanet Exploration themes.

COPAG Tasks

- Solicit and coordinate community input into the development and execution of NASA's Cosmic Origins (COR) Program
- Analyze this input in support of the planning and prioritization of future exploration within the COR program
- Specific types of tasks include:
 - Articulating and prioritizing key science drivers for COR research
 - Evaluating capabilities of potential missions for achieving COR science goals
 - Providing input and analysis on related activities (e.g., ground-based observing, theory investigations, laboratory astrophysics, suborbital investigations, data archiving, etc) needed to achieve COR science goals
 - Identifying focus areas for technologies needed to advance COR science
- All input is provided to NASA's Astrophysics Division Director and the NASA Advisory Council's Astrophysics Subcommittee

Current COPAG Executive Committee Membership

Name	Institution	Term Expiration
Daniela Calzetti	U. Mass. Amherst	Jan 2017
Dennis Ebbets	Ball Aerospace (retired)	Jan 2017
James Green	U. Colorado	Jan 2017
Matthew Greenhouse	NASA GSFC	Jan 2018
Sally Heap	NASA GSFC	Jan 2017
Lynne Hillenbrand	Caltech	Rotating off Oct 2015
Mary Beth Kaiser	Johns Hopkins U.	Oct 2017
Joseph Lazio	NASA JPL	Oct 2017
Pamela Marcum	NASA ARC	Oct 2017
Ken Sembach - Chair	STScI	Mar 2016

10 members + ex-officio (S. Neff & D. Padgett in COR office, M. Perez & K. Sheth at HQ)

COPAG Executive Committee Members Needed

- “Dear Colleague” letter requesting nominations has been sent to the community.
 - Self-nominations are welcome.
- Expect at least 2 new members to be appointed.
- Appointments are for a period of 3 years.
- Deadline for nominations is September 4, 2015.
- Selections will be announced in early October 2015.

See <http://cor.gsfc.nasa.gov/news/ec-nominations.php>

Active COPAG Science Interest Groups (SIGs)

- **SIG #1: Far-Infrared Cosmic Origins Science and Technology Development**
 - COPAG EC Lead: Pam Marcum
 - Community Leads: David Leisawitz, Paul Goldsmith
- **SIG #2: Ultraviolet/Visible Cosmic Origins Science and Technology Development**
 - COPAG EC Lead: Mary Beth Kaiser
 - Community Lead: Paul Scowen
- **SIG #3: Cosmic Dawn Science**
 - COPAG EC Lead: Joe Lazio

Everyone interested is invited to participate.
Contact a COPAG member
or see us at the NASA booth here at the IAU.

Responding to the Charge: Preparing for the 2020 Decadal Survey

- Bi-weekly COPAG Executive Committee telecons
- Recent and upcoming activities
 - COPAG representation at the ExoPAG12 meeting in Chicago (June 13-14)
 - COPAG representation at the HEAD meeting in Chicago (July 1)
 - COPAG SIG#1 (Far-IR) workshop in Pasadena (June 3-5)
 - COPAG SIG#2 (UV/Vis) workshop in Greenbelt (June 23-24)
 - COPAG virtual town hall planned for August 20
 - Future flagship session at AIAA Space 2105 Conference in Pasadena (August 31)

Responding to the Charge: Preparing for the 2020 Decadal Survey

- COPAG community white paper solicitation
 - There was a wide range of inputs received on science needs, technology, mission drivers.
 - All responses are posted on COPAG website:
<http://cor.gsfc.nasa.gov/copag/>
 - All responses have been made available to ExoPAG and PhysPAG and will be referenced in the COPAG report.
 - Many white papers have common science themes or mission considerations applicable to multiple flagships (e.g., UVOIR and X-ray Surveyor science, UVOIR Surveyor & HabEX mission, UVOIR and Far-IR Surveyor science and architectures).

Responding to the Charge: Preparing for the 2020 Decadal Survey

- COPAG also received the AURA report “From Cosmic Births to Living Earths”, which is a community-based two year study on future space-based options for UV and optical astronomy to advance understanding of the origin and evolution of the cosmos and the life within it.
 - Study chaired by Julianne Dalcanton (U. Washington) and Sara Seager (MIT)
 - See <http://www.hdstvision.org>

COPAG Findings

- COPAG supports the joint PAG findings described earlier today.
 - There is support within the Cosmic Origins community for all four of the notional flagship missions.
- Cosmic origins science will require access to flagship-class space missions to make major advancements over present or planned facilities.
- Flagship-class space missions will be required for NASA space science to remain competitive with ground-based ELTs at optical/IR wavelengths in the 2020s and 2030s.
- The cosmic origins science community is eager to work with the exoplanet community on a future UVOIR flagship that will serve the science needs of both communities.

Backup Slides
Flagship Mission Call for White Papers
(see <http://cor.gsfc.nasa.gov/copag/>)

Flagship Mission RFI: White Papers (1/3)

- Science Cases for Ultraviolet Polarimetry in the 21st Century
- Mapping Turbulent Energy Dissipation Through Shocked Molecular Hydrogen in the Universe
- Are Flagships the Best Way to Advance Astrophysics?
- The Dusty Co-evolution of Black Holes and Galaxies: A Science Case for a Large FIR Space Telescope
- Actuated Carbon Fiber Reinforced Polymer Mirror Development
- Astrophysics Enabled by Extreme Contrast Ratio Technologies
- A FIR-Survey of TNOs and Related Bodies
- Unlocking the Secrets of Planet Formation with Hydrogen Deuteride
- Cryogenic Telescope for Far-Infrared Astrophysics: A Vision for NASA in the 2020 Decade
- Imaging Polarimetry for ExoPlanet Science & Astrophysics
- Dust in Distant Galaxies - Overcoming Confusion Noise with a 5m FIR Facility
- Far-Infrared Spectral Line Studies of the Epoch of Reionization
- A Joint Exoplanet & UVOIR Surveyor
- The Earliest Epoch of Star-formation in the Very Young Universe
- Characterizing the Habitable Zones of Exoplanetary Systems with a Large UV/Visible/NIR Space Observatory
- The Bulk Composition of Exo-Planets
- Flagship Missions for the Decadal Review

Flagship Mission RFI: White Papers (2/3)

- Life Finder Telescope
- Galaxy Evolution Spectroscopic Surveyor (GESS)
- Precision Ages for Milky Way Star Clusters
- Importance of Design Reference Missions for Developing the Next Large Mission Concepts
- An Evolvable Space Telescope for the Far Infrared Surveyor Mission
- Exoplanet Environment Monitor
- Definitive Determination of Galaxy Luminosity Functions at Energies Above the Hydrogen Ionization Edge, Covering 11 Billion Years of Evolution
- Probing Transient Structures in the Universe
- An Evolvable Space Telescope for Future UV/Opt/IR Astronomical Missions
- A Rotating Synthetic Aperture Space Telescope for Future UV/Opt/IR Astronomical Missions
- UVOIR Surveyor: The need for high resolution, wide field, deep multi-wavelength imaging and IFU spectroscopy
- The First Stars and the First Metals
- The Origin of the Elements Heavier than Iron
- HabX2: a 2020 mission concept for flagship science at modest cost
- Listening to the Cosmic Dawn
- A Large-Aperture UVOIR Space Telescope

Flagship Mission RFI: White Papers (3/3)

- A Large-Aperture UVOIR Space Telescope
- Galaxy Fueling and Quenching: A Science Case for Future UV MOS Capability
- UV/Optical/IR Surveyor: The Crucial Role of High Spatial Resolution, High Sensitivity UV Observations to Galaxy Evolution Studies