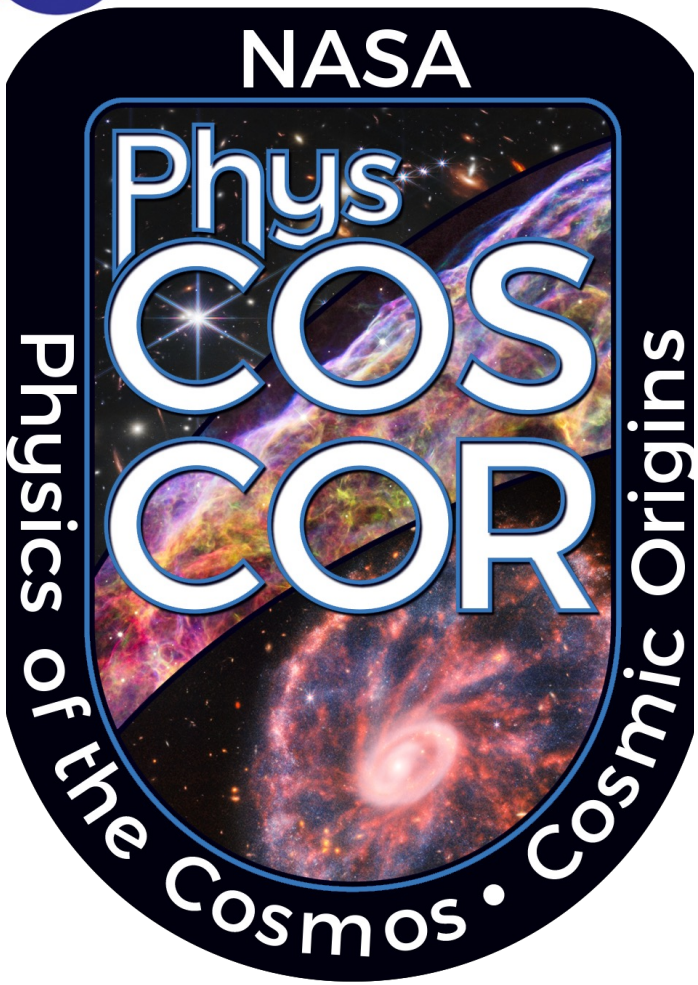

Physics of the COSMOS Program Analysis Group Session at AAS 241

Monday, 9 January 2023, 9-11 am
Room: 4C-2

- **PhysCOS news** - *Brian Humensky*
- **PhysPAG news** - *Justin Finke*
- **TDAMM Workshop White Paper** – *Suvi Gezari & Rita Sambruna*
- **Precursor Science** - *Eric Smith*
- **Community Discussion**

News from the Physics of the Cosmos Program Office

Brian Humensky and Francesca Civano

PhysCOS Chief Scientists

NASA – GSFC

Outline

- Role of the PhysCOS Program Office
- News from the Program Office
- Technology Gaps & Precursor Science Gaps
- How YOU can get involved in the Physics of the Cosmos
- PhysCOS Activities @ 241st AAS

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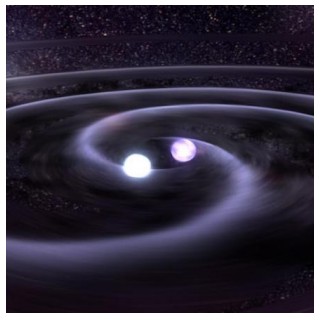
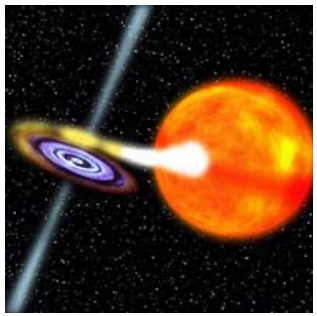
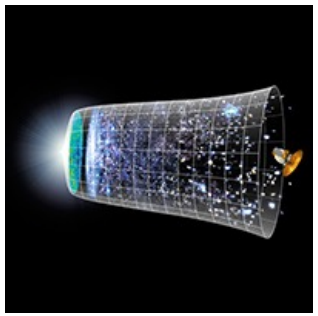
PhysCOS Program Office Purpose

- Physics of the Cosmos spans the fields of high-energy astrophysics, cosmology, and fundamental physics, to explore some of the most fundamental questions regarding the physical forces and laws of the universe:




- The program office supports the community working in these fields by
  - Facilitating the PhysCOS Program Analysis Group (PhysPAG);
  - Informing members of upcoming funding and engagement opportunities;
  - Soliciting and prioritizing community-identified technology gaps; and
  - Managing funded technology projects with benefits to PhysCOS science.


https://pcos.gsfc.nasa.gov
Search NASA
Physics of the Cosmos
About PhysCOS
PhysPAG
Mission Studies
Technology
Documents
About Physics of the Cosmos
The Physics of the Cosmos (PhysCOS) Program is one of three focused programs contained within NASA's Astrophysics Division (APD), together with Cosmic Origins (COR) and the Exoplanet Exploration Program (ExEP). PhysCOS lies at the intersection of physics and astronomy. Its purpose is to explore some of the most fundamental questions regarding the physical forces and laws of the universe: the validity of Einstein's General Theory of Relativity and the nature of spacetime, the behavior of matter and energy in extreme environments, the cosmological parameters governing inflation and the evolution of the universe, and the nature of dark matter and dark energy.
Located at the Goddard Space Flight Center, the PhysCOS Program Office supports, tracks, and studies a suite of science missions and enabling technologies that focus on specific aspects of these topics. PhysCOS activities include:
Facilitating the PhysCOS Program Analysis Group (PhysPAG), which comprises standing Science Interest Groups (SIGs) engaged in particular branches of high-energy astrophysics, and shorter-term Science Analysis Groups (SAGs) convened to address related science and technology topics.
Keeping its members informed of upcoming developments and funding opportunities, both within NASA and at other agencies engaged in science and technology activities.
Soliciting, and prioritizing community-identified technology gaps that must be closed to enable or enhance future strategic Astrophysics missions with benefits to PhysCOS science. This technology gap prioritization informs APD's strategic technology development solicitation, selection, and funding.
Managing funded technology projects with benefits to PhysCOS science.
PhysCOS News
See our new Events Calendar
Program News and Announcements
Sign up for PhysCOS News and Announcements
20 December 2022
ROSES-22: D.16 Astrophysics Decadal Survey Precursor Science Final Text and Due Dates » Details.
20 December 2022
ROSES-22 D.14: Roman Mission Research and Support Participation Opportunities Final Text and Due Dates » Details.
20 December 2022
ROSES-22: F.15 High Priority Open-Source Science Final Text » Details.

Activities Supporting PhysCOS Goals & Priorities

- Managed by the PhysCOS/COR Program Office at NASA's Goddard Space Flight Center and reported to NASA Headquarters.
- Include:
  - **Mission studies** and pre-project mission oversight, insight, and support.
  - **Strategic technology** (SAT) maturation oversight, insight, and support.
  - **Community engagement**, including via the Physics of the Cosmos Program Analysis Group (PhysPAG).
- Maintaining **science cognizance** to enable more successful NASA strategic planning.

PhysCOS & the Astro2020 Report

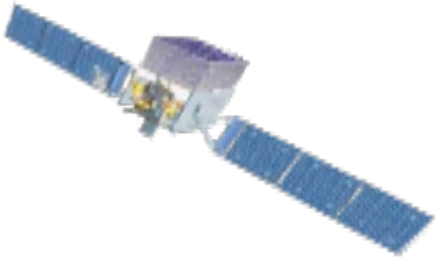
- What PhysCOS science should drive the design of the Future Great Observatories?
  - PhysPAG, SIGs and SAGs.
- Technology investments to enable X-ray Probes
- Time Domain and Multi-Messenger Astrophysics – where can & should NASA invest? *See R. Sambruna and S. Gezari talks.*
  - Studying implementation options for a General Observer Facility focused on TDAMM.
  - Science Analysis Groups spinning up to study infrastructure issues.
- State of the profession: AWESOM SAG.

(some) Current Missions

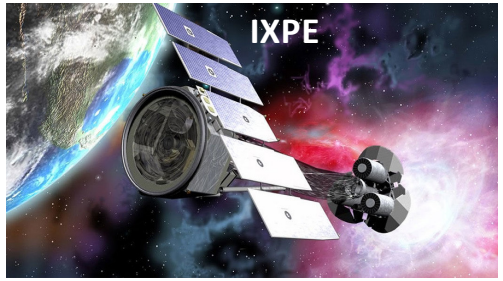
Chandra X-ray Observatory

X-ray Multi Mirror-Newton

Fermi Gamma-ray Space Telescope



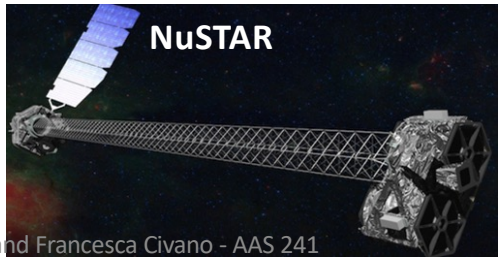
HELIX

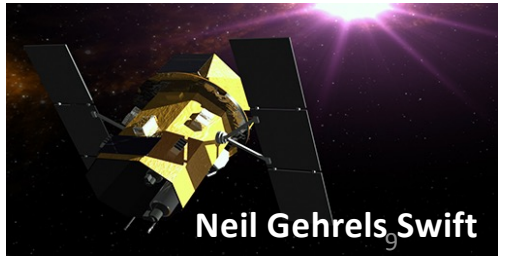


From all platforms!

- ☆ Satellites
- ☆ The ISS
- ☆ Balloons
- ☆ Sounding Rockets

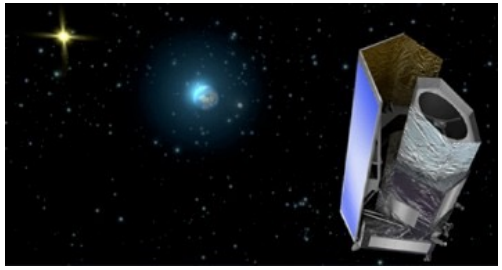
tREXS



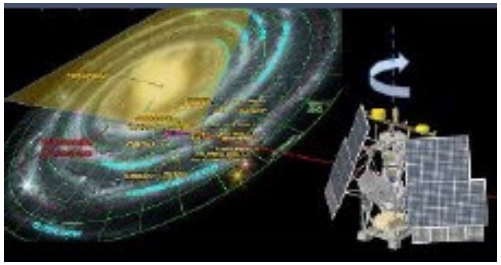


(some) Future Missions

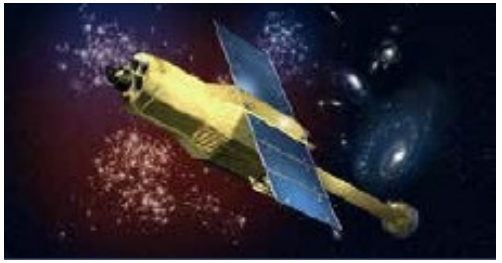
Euclid
ESA-led Mission



Galactic/Extragalactic ULDB
Spectroscopic terahertz
Observatory (GUSTO)



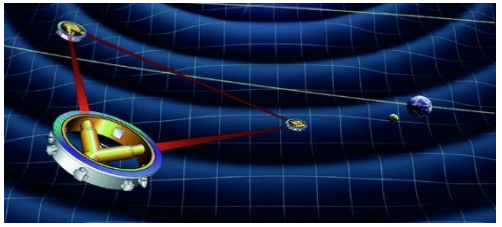
XRISM
JAXA-led Mission



Missions in Pre-formulation:

Athena
ESA-led Mission

LISA
ESA-led Mission



From all platforms!

- ☆ Satellites
- ☆ The ISS
- ☆ Balloons
- ☆ Sounding Rockets

PhysCOS: Who We Are

HQ Program Executive: Shahid Habib
HQ Program Scientist: Valerie Connaughton
HQ Dep. Program Scientist: Sanaz Vahadinia


Francesca Civano


Brian Humensky


Bernard Kelly


Stephanie Clark

Program Management
Program Manager: Barbara Grofic
Deputy Program Manager: Cathy Barclay
Program Business Manager: Tracy Felton-Robinson
Administrative Assistant: Susan Wright


Barbara Grofic


Cathy Barclay

Resources Management Group
Deputy Program Business Manager: Patricia Smith
Programmatic Officer: Patricia Butler*
Resource Analyst: Jessie Hughes*
Resource Analyst: Ryan Bradley*

Procurement Support:
Dean Patterson

Program Support
IPTL: Colleen Ponton*
PSM: Mary Morrow*

Program Technology & Systems Engineering
Program Systems Engineer: Dr. Mark Matsumura^
Technology Development Manager: Rachel Rivera
Chief Technologist: Jason Derleth (detail)
Program Technologist: Dr. Opher Ganel*


Mark Matsumura


Rachel Rivera

Program Science
PhysCOS Chief Scientists: Dr. Francesca Civano, Dr. Brian Humensky
COR Chief Scientist: Dr. Peter Kurczynski
PhysCOS/COR Sup.Scientists: Bernard Kelly, Ron Gamble**
PhysCOS/COR Science PSM: Stephanie Clark*

Strategic Studies & Implementation

ULTRASat Study
Project Manager: Barbara Grofic
Deputy Project Manager: Cathy Barclay
Project Scientist: Dr. James Rhoads
System Engineer: Dr. Mark Matsumura

LISA Study
Study Manager: Terry Doiron
Study Scientist: Dr. Ira Thorpe
System Engineer: Norman Rioux^

Decadal Studies
TDAMM Study
Study Managers: Dr. Chris Roberts
Study Scientists: Dr. Brian Humensky
Study Systems Engs: Dr. Mark Matsumura
Study Technologist: Jason Derleth

^Independent Technical Authority
*Contractor

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- Role of the PhysCOS Program Office
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Meeting and Conference Support

- Time-Domain and Multi-Messenger Astrophysics (TDAMM) Workshop (Aug 2022). *See R. Sambruna and S. Gezari talks.*
- 1st and 2nd Precursor Science Workshops (April and Oct 2022)
  - Developed summary ***Precursor Science gap list*** to support ROSES call, in collaboration with CSs from COR and ExEP. *See E. Smith talk.*
- Partnered with GSFC Code 660 to have sponsorship and booth presence at :
  - **The Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) National Diversity in STEM (NDiSTEM)** conference (Oct 2022)
  - **The National Society of Black Physicists (NSBP)** conference (Nov 2022)

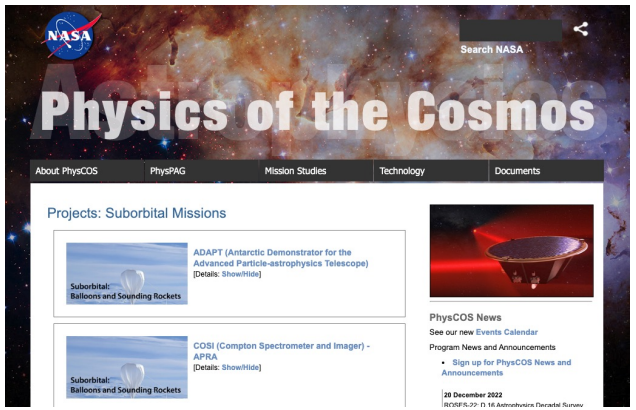
A new Acronym: PhysCOS

- The PCOS acronym was used since the beginning of the program (~2010).
- PCOS is associated with *Polycystic Ovary Syndrome*, a difficult syndrome that impacts many millions worldwide (at least 1.5M new cases per year and broadly undiagnosed).
- Change to **PhysCOS** (to parallel PhysPAG) was requested at July 2022 APAC, and approved at October 2022 APAC by M. Clampin.
- Not practical to retroactively change the name in existing documents and infrastructure, but we are using the new acronym going forward, including e.g. in NASA's forthcoming IT infrastructure overhaul, creation of the new PhysCOS website, new logo, etc.

Other Items

- Upcoming **NEW** Proposal Calls:
  - Roman Mission Research & Support – March 21st
  - Precursor Science - March 24th
  - ULTRASAT Participating Scientists – March 31st

- Website updates:
  - New page for suborbitals and balloons
  - Making docs and mailing list link easy to find
  - Your feedback welcome



Other Items

- HEAD newsletter
- Regular news blasts
- Upcoming student / postdoc opportunities
  - NASA Postdoctoral Program – March 1st
  - https://npp.orau.org/
  - Future Investigators in NASA Earth and Space Science and Technology (FINESST) - February 7th
  - NASA Internships – Summer term – March 1st
    - intern.nasa.gov

- Inclusion Plan Best Practices Workshop (Nov 1-2, 2022) presentations and recordings posted.
  - https://www.hou.usra.edu/meetings/inclusionplan2022/

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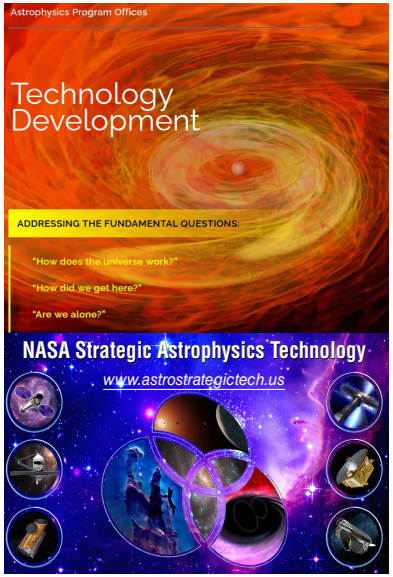
Strategic Technology Development

- The Program Office monitors and manages the PhysCOS and COR Strategic Astrophysics Technology (SAT) and direct-funded technologies
- Astro2020 related technology development (FGOs, Probes)
- Conduct Technological Readiness Level (TRL) assessments

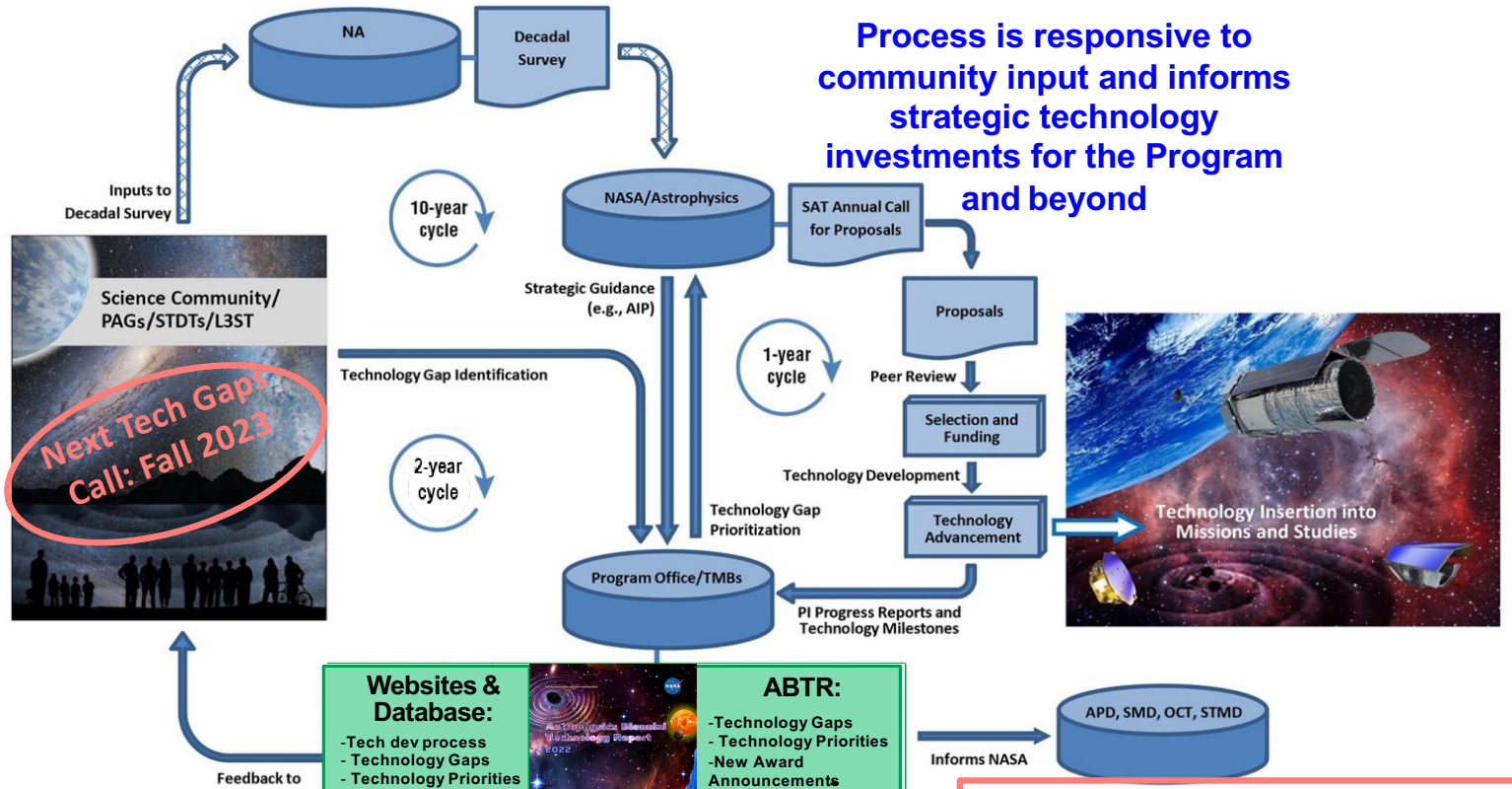
- PhysCOS/COR Technology Website https://apd440.gsfc.nasa.gov/technology.html
  - Updated with 2022 SPIE and AAS papers
- AstroTech Database http://www.AstroStrategicTech.us/
  - Published Annual Reports 2022
- Astrophysics Biennial Technology Report (ABTR) 2022



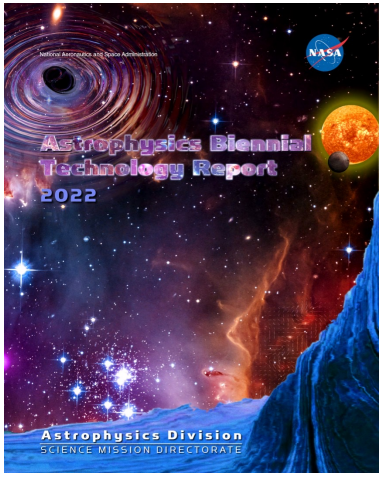
Astrophysics Biennial Technology Report

https://apd440.gsfc.nasa.gov/technology.html

Process is responsive to community input and informs strategic technology investments for the Program and beyond



https://apd440.gsfc.nasa.gov/images/tech/2022_ABTR.pdf



Next Report: Spring 2024.
Watch for call in Fall 2023 for tech gap proposals.

Precursor Science

Science investigations that will inform mission architectures and trades with the goal of reducing mission design and development cost, scope, and risk where possible.

- Two workshops during 2022 (April and October 2022) *(see E. Smith presentation):*
  - Community effort to work on science gaps for the three Future Great Observatory concepts identified in the Astro2020 Decadal Survey Report.
  - Community science gap lists are available on workshop website.
  - Chief Scientists of Program Offices distilled a set of science gaps from community draft; NASA HQ revised list for ROSES Call on Precursor Science.
- Five Astro science gaps are related to the HWO and X-ray FGOs concept... **there are more gaps and we can do better!**

Defining Science Gaps

GOAL: produce a detailed science gap list for PhysCOS related science

- Physics of the Cosmos has a very broad scope!

  --> Figuring out how to include discussion of science gaps relevant to entire field: X-rays, CMB, gamma rays, cosmic rays, gravitational waves, dark matter, dark energy

- Like technology gaps, science gaps need review and update – but some still formulating for the first time
- Anticipate developing a process similar to the Technology Gaps process and following the "lessons learned" by ExEP – for example:
  - Call for “one-pager” science gap
  - Review by SIGs and by PhysPAG EC
  - Publish the list on PhysCOS website
  - Continuously update the list and add new science gaps

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How YOU can get involved

- Join our mailing list: PCOS-News-join@lists.nasa.gov with Subject="join"
- Join the Science Groups:

Science Interest Groups (SIGs)

- Inflation Probe
- Gravitational Wave
- Gamma Ray
- X-ray
- Cosmic Structure
- Cosmic Ray

Science Analysis Groups (SAGs)

- NEW AWESOM
- NEW Gamma Ray Transient Network

Cross-PAG

- NEW New Great Observatories

- Potential upcoming cross-PAG SIGs: Habitable World Observatory (?) and Time-Domain and Multi- Messenger Astrophysics (?)
- Join the PhysPAG Executive committee

Currently Recruiting new EC members

SUBJECT: CALL FOR NOMINATIONS TO THE EXECUTIVE COMMITTEE OF THE PHYSICS OF THE COSMOS PROGRAM ANALYSIS GROUP (PHYSPAG)

Dear Colleagues:

The Astrophysics Division of NASA's Science Mission Directorate is pleased to issue this open call for nominations, including self-nominations, to serve on the Executive Committee of NASA's Physics of the Cosmos Program Analysis Group, or PhysPAG (http://pcos.gsfc.nasa.gov/physpag/). In the coming months, NASA anticipates making multiple new appointments to the PhysPAG Executive Committee (EC) in order to replace several current members who will be rotating off the committee. Appointments will be for a nominal period of three calendar years for each selected candidate.

Full DCL here:

- **How:**
  - Ask any of the current PhysPAG EC members or stop at the PhysCOS table at the NASA SMD booth
  - Send nominations to: PhysPAG-ECNominations@bigbang.gsfc.nasa.gov
- **Extended Deadline:** January 20th, 2023

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PhysCOS Activities @ 241st AAS

Sunday	Monday	Tuesday	Wednesday	Thursday
PhysCOS Table at NASA SMD booth				
	PhysPAG 9-11am Room: 4C-2	GR SIG 9-11am Room: 303	AWESOM SAG 9-11am Room: 303	
		LISA 10:11:30am Room: 602-3	ULTRASAT 9:30-11:30am Room: 401	
	GW SIG 2-3:30pm Room: 211	Stars&Galaxies* 1.30-3:30pm Room: 204	GO SAG 1-3pm Room: 303	
	GOMAP 2-3:30pm Room 4C-3	XR SIG 2-3:30pm Room: 303		
Joint PAG 3-5pm Room: 4C-3			Roman Technology 6-7:30pm Room: 305	

*COR session which includes Science Gaps discussion

Summary

- **YOU are the PhysPAG**, and the PhysCOS Program Office exists to enable and support your science
- Join the Science Interest Groups (SIGs) that are in your area, talk to your PhysPAG EC members, talk to the Program Office staff, go to the SIG sessions – let us know how we can support your work
- Watch for announcements about funding opportunities & engagement opportunities through the PhysCOS mailing list:
  - Particularly for Precursor Science and the new Science Analysis Groups (SAGs)
  - PCOS-News-join@lists.nasa.gov with Subject="join"
  - Recruiting new PhysPAG EC members: send applications / nominations to: PhysPAG-ECNominations@bigbang.gsfc.nasa.gov
  - **Extended Deadline:** January 20th, 2023

Full DCL here: