Physics of the Cosmos Program Analysis Group Activities

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Physics of the Cosmos (PhysCOS) Objectives

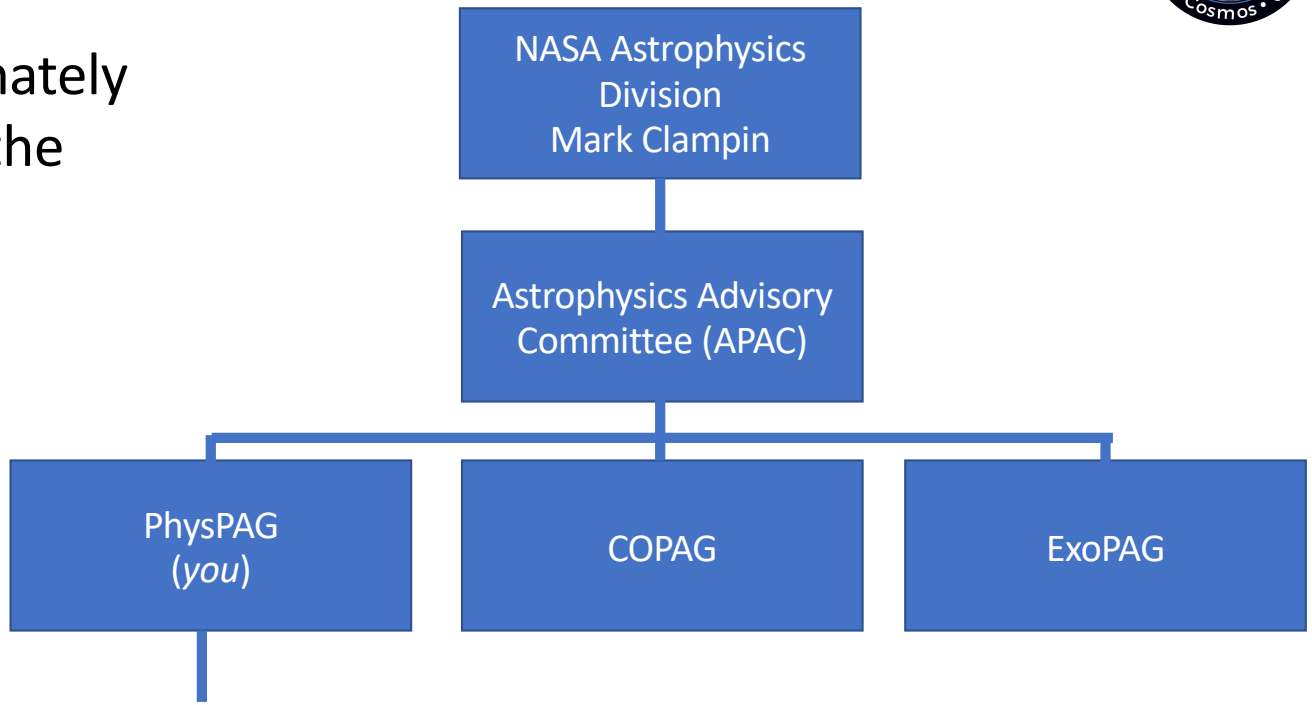
- Dark Energy
- Big Bang and the Evolution of the Universe
- General Relativity and the Nature of Spacetime
- Massive Black Holes and the Evolution of Galaxies
- Matter and Energy in the Most Extreme Environments

Physics of the Cosmo Program Analysis Group (PhysPAG)

Provide APAC and ultimately NASA with input from the scientific community.

Membership: ***you!***

Represented by ***Executive Committee***



Science Interest Groups (SIGs) – permanent discipline-specific groups
Study/Science Analysis Groups (SAGs) – created to analyze specific question. Last about a year and deliver a report.

PhysPAG Executive Committee

Name	Institution	Expertise	Term	
			Start	End
Ryan Hickox (Chair Emeritus)	Dartmouth College	XR SIG	Dec 2018	Dec 2022
Sean McWilliams	West Virginia University	GW SIG	Dec 2019	Dec 2022
Bindu Rani	American University	GR SIG	Dec 2019	Dec 2022
Grant Tremblay (Chair)	Smithsonian Astrophysical Observatory	XR SIG	Dec 2019	Dec 2022
Justin Finke (Vice Chair)	Naval Research Laboratory	GR SIG	Dec 2020	Dec 2023
Vera Gluscevic	Univ. of Southern California	CoS SIG	Dec 2020	Dec 2023
Andrew Romero-Wolf	JPL	CR SIG	Dec 2020	Dec 2023
David Pooley	Trinity University	XR SIG	Dec 2021	Dec 2024
Eric Burns	Louisiana State University	GR SIG/GW SIG	Dec 2021	Dec 2024
Kristin Madsen	NASA/GSFC	XR SIG	Dec 2021	Dec 2024
Athina Meli	North Carolina Agricultural & Technical State Univ.	CR SIG	Dec 2021	Dec 2024

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Rotating off!

PhysPAG Executive Committee

Join the PhysPAG Executive Committee!

Deadline is ***January 20, 2023***!

Anyone at a US institution, no limitations on citizenship.

Details for nominations at https://pcos.gsfc.nasa.gov/news/Extended_Deadline_for_PhysPAG_EC.php

Science Interest Groups

Inflation Probe Science Interest Group (IPSIG)*
Cosmic Structure Science Interest Group (CoSSIG)
Cosmic Ray Science Interest Group (CRSIG)
Gamma-ray Science Interest Group (GRSIG)
Gravitational Wave Science Interest Group (GWSIG)
X-ray Science Interest Group (XRSIG)

Time domain and Multi-Messenger Science Interest Group (TDAMMSIG) – ***Coming soon!*** Joint with COPAG and ExoPAG.

Possible new cross-PAG SIGs on each new Great Observatory (IROUV, X-ray, FIR)

Gravitational Wave Science Interest Group

Gravitational Wave Science Interest Group (GW SIG)

Monday, 9 January 2023
Room: 211
| 2:00pm–3:30pm Pacific | 3:00pm–4:30pm Mountain | 4:00pm–5:30pm Central | 5:00pm–6:30pm Eastern |

Presentation	Speaker
LISA Science Talk	Ira Thorpe
LISA Programmatic Talk	Kelly Holley-Bocklemann
NANOGrav update Talk	Michael Lam

Gamma-ray Science Interest Group

- emphasis on successful practices for mission proposals and avenues for technology advancement

Gamma Ray Science Interest Group (GR SIG)

Tuesday, 10 January 2023
Room: 303
| 9:00am–11:00am Pacific | 10:00am–12:00pm Mountain | 11:00am–1:00pm Central | 12:00pm–2:00pm Eastern |

Speaker	Title	Duration
Eric Burns	Introduction	5 minutes
Mark McConnell	LEAP	(remotely) 15+5
Michelle Hui	MoonBEAM	15+5
Carolyn Kierans	Wallops Flight Facility	15+5
Discussion		

- GRB 221009A: Brightest of All Time (BOAT)

X-ray Science Interest Group

X-Ray Science Interest Group (XR SIG)

Tuesday, 10 January 2023
Room: 303
| 2:00pm–3:30pm Pacific | 3:00pm–4:30pm Mountain | 4:00pm–5:30pm Central | 5:00pm–6:30pm Eastern |

Time PST	Topic	Speaker	Duration
2:00–2:05pm	Brief Welcome from XRSIG Co-Chairs	Ryan Hickox, Grant Tremblay, Kristin Madsen, Dave Pooley	5min
2:05–2:20pm	STAR-X MIDEX Phase A	Ann Hornschemeier	15 min (12 + 3min)
2:20–2:35pm	LEM Probe Concept	Ralph Kraft	15 min (12 + 3min)
2:35–2:50pm	AXIS Probe Concept	Chris Reynolds or Erin Kara	15 min (12 + 3min)
2:50–3:05pm	HEX-P Probe Concept	Kristin Madsen or Daniel Stern	15 min (12 + 3min)
3:05–3:20pm	Arcus Probe Concept	Laura Brenneman or Randall Smith	15 min (12 + 3min)
3:20–3:35pm	STROBE-X Probe Concept	Paul Ray	15 min (12 + 3min)

Astro2020 Decadal Review

"[T]he survey forwards several crucial programs to support early-career entrants, with a strong emphasis on broadening access, *removing barriers to participation, and creating an environment that eschews harassment and discrimination*"

"In space, achieving the community's most ambitious and visionary ideas in a sustainable way . . . requires a re-imagining of the ways in which large missions are planned, developed, and implemented. *The Great Observatories Mission and Technology Maturation Program* would provide significant early investments in the co-maturation of mission concepts and technologies"

"In space, the highest-priority sustaining activity is a *space-based time-domain and multi-messenger program*"

Study (Science) Analysis Groups

"[T]he survey forwards several crucial programs to support early-career entrants, with a strong emphasis on broadening access, *removing barriers to participation, and creating an environment that eschews harassment and discrimination*"
Astrophysics With Equity: Shedding Obstacles to Membership (AWESOM)

"In space, achieving the community's most ambitious and visionary ideas in a sustainable way . . . requires a re-imagining of the ways in which large missions are planned, developed, and implemented. *The Great Observatories Mission and Technology Maturation Program* would provide significant early investments in the co-maturation of mission concepts and technologies"
New Great Observatories Science Analysis Group (NGOSAG)

"In space, the highest-priority sustaining activity is a *space-based time-domain and multi-messenger program*"
Gamma-ray Transient Network Science Analysis Group (GTNSAG)

Other ideas? Let us know!

AWESOM SAG

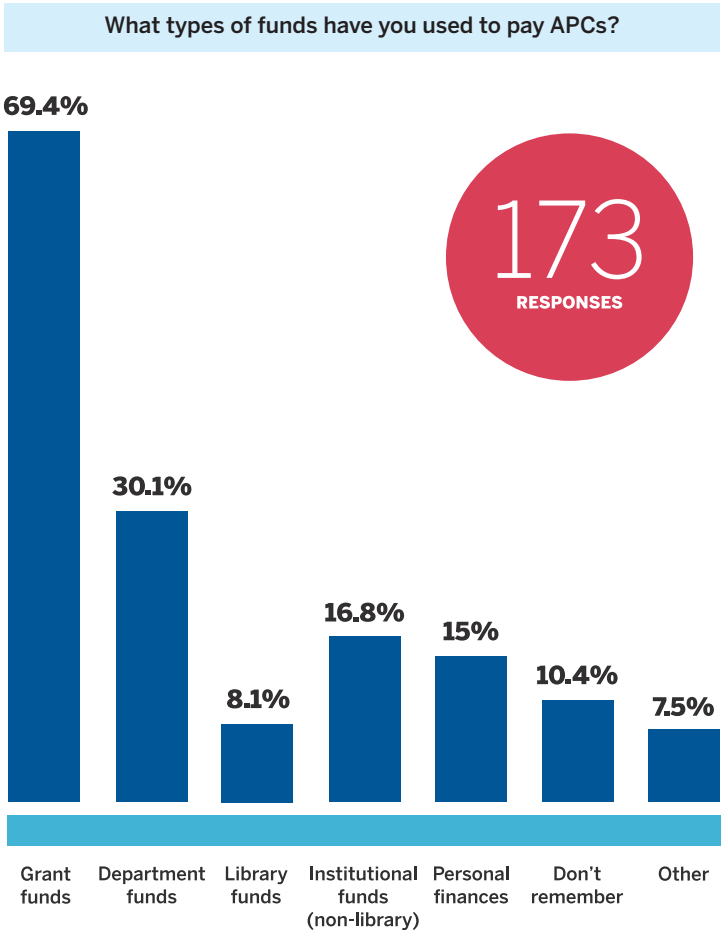
- Cross-PAG between PhysPAG, COPAG, and ExoPAG
- Chaired by Ryan Hickox
- Related to Astro2020 Sec. N.6.5, “Inequities in career advancement and access to the tools of the Profession must be addressed so that the entire workforce is engaged.”
- Focusing on expanding institutions and members who contribute to NASA astrophysics, and increasing engagement with research and training programs
- “The goal . . . is to analyze how existing NASA programs and potential new initiatives can increase engagement with research and training programs, and to make available opportunities clearer, more consistent, and easier to access”
- Session Wednesday, Jan. 9th, 9-11 am
- Website:
  https://pcos.gsfc.nasa.gov/sags/awesom/awesom.php
  Sign up to join!

Publication Costs

US is moving to open access publishing, but may have some downsides

AAAS Survey : Across all areas of science, 15% of publication charges paid with personal finances

“Compared with men, women were more than 2.5 times as likely not to attend workshops and conferences so that they could pay [article processing charges]”



New Great Observatories SAG

- Cross-PAG between PhysPAG, COPAG, and ExoPAG
- Co-chaired by Grant Tremblay, Janice Lee, and Ilaria Pascucci
- Inspired by science provided by original Great Observatories operating contemporaneously
- Focusing on science that can be accomplished by having three great observatories (IROUV, X-ray, far-IR) operating contemporaneously
- Session Wednesday, Jan. 11th, 1-3 pm
- Websites:
  https://www.greatobservatories.org/sag
  https://pcos.gsfc.nasa.gov/sags/ngosag/ngo-sag.php
- Sign up to join!

Gamma-ray Transient Network SAG

- Co-Chaired by Eric Burns and Michael Coughlin
- Kevin Hurley's passing has put future of IPN in doubt
- Focusing on updating, improving, and extending the gamma-ray Interplanetary Network (IPN)
  - What TDAMM sources rely on IPN?
  - Where can IPN be improved?
  - Are there benefits to extending IPN beyond current instruments?
- Website: https://pcos.gsfc.nasa.gov/sags/gtn-sag.php
  Sign up to join!

Funding Opportunities

D.2	Astrophysics Data Analysis (ADAP)**	04/01/2022	05/19/2022
D.3	Astrophysics Research and Analysis (APRA)	11/04/2022*	12/15/2022
D.4	Astrophysics Theory Program (ATP)	*-- Not solicted this year --*	
D.7	Strategic Astrophysics Technology (SAT)	11/04/2022*	12/15/2022
D.12	Theoretical and Computational Astrophysics Networks (TCAN)	10/04/2022	11/04/2022
D.13	Astrophysics Pioneers	01/27/2023*	03/16/2023
D.14	Nancy Grace Roman Space Telescope Research and Support Participation Opportunities	01/20/2023	03/21/2023
D.15	LISA Preparatory Science	12/16/2022*	03/16/2023
D.16	Astrophysics Decadal Survey Precursor Science	01/20/2023*	03/24/2023
D.17	X-ray Imaging and Spectroscopy Mission Guest Scientist	N/A	07/21/2022
D.18	Extreme Precision Radial Velocity (EPRV) Foundation Science	02/16/2023*	04/26/2023
F. 15	High Priority Open-Source Science	N/A	03/29/2023

Astrophysics Theory Program

- Astro2020 recommended additional funding and selecting proposals every year
- No funding has emerged, still funded every other year.
- Considering augmenting with a theory program focusing on early career scientists in collaboration with NSF and DOE
- Let us know what you think!

Precursor Science Proposals

- Mandatory NoI due January 20th
- Full proposal due March 24th
- Science that needs to be done to go into planning next Great Observatories
- https://science.nasa.gov/researchers/solicitations/roses-2022/amendment-76-d16-astrophysics-decadal-survey-precursor-science-final-text-and-due-dates
- see talk coming up by Eric Smith!

NASA Pioneers

- Mandatory NoI due January 27th
- full proposals due March 16th
- SmallSats/CubeSats, Lunar Payloads, Balloon Payloads, ISS-attached payloads
- $20 million
- https://pcos.gsfc.nasa.gov/news/ROSES-22_D.13_Revised_Text.php

NASA Probe Announcement of Opportunity

- Expected July 2023!

- Mission themes based on Astro2020
  - A far infrared imaging or spectroscopy mission
  - An X-ray probe ~~to complement ESA's Athena Observatory~~

- 2-step competitive process
- Launch likely in 2032

Future Meetings

- HEAD Meeting – Waikōloa, Hawaii, 26-30 March
  - Talks on TDAMMSIG, XRSIG, proposed X-ray probes, and more!

- APS Meeting – in person in Minneapolis, MN (15-18 April), and virtual (24-26 April)
  - PhysPAG/PhysCOS events still being planned

Summary

- Exciting time for astronomy and the PhysPAG
  - NASA needs input from the community for implementing Astro2020

- Get involved!
  - PhysPAG EC members want to hear your input! See NASA booth 702
  - Join a SAG (AWESOM, GTNSAG, NGOSAG) or suggest a new one!
  - Consider joining the EC!

Extras

Study (Science) Analysis Groups

Astrophysics With Equity: Shedding Obstacles to Membership (AWESOM)

New Great Observatories Science Analysis Group (NGOSAG)

Gamma-ray Transient Network Science Analysis Group (GTNSAG)

Other ideas? Let us know!

Technology Gaps

- Clear and well-defined
- TRL < 6
- Focused on Astro2020 priorities. Great Observatories, Probes, and multi-messenger astrophysics.
- Informs proposal solicitations (SAT, APRA, etc.)
- More info: https://apd440.gsfc.nasa.gov/tech_gaps.html .
- Most recently reviewed in 2022.

Precursor Science/ PhysCOS Science Gaps

- Produce Science Gap List similar to Technology Gap List
- ExoPAG produces an annual Science Gap list
- Starting point: Precursor Science topics (see upcoming talk by Eric Smith)

Gamma-ray Science Interest Group

- Explorer MoOs selected for concept studies
  - MoonBEAM, GRB detector in cislunar orbit. PI: C. M. Hui (MSFC)
  - LEAP, γ-ray polarization mission on ISS. PI: M McConnell (UNH)

- GRB 221009A: Brightest of All Time (BOAT)