Physics of the Cosmos Program Analysis Group

Exploring fundamental questions regarding the physical forces of the universe

Athina Meli
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Chair of Physics of the Cosmos Program Analysis Group Executive Committee
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APAC Meeting March 20, 2024
Physics of the Cosmos Science Objectives

- Dark Energy
- Big Bang and the Evolution of the Universe
- Dark Matter and Cosmic Structure
- General Relativity and the Nature of Spacetime
- Massive Black Holes and the Evolution of Galaxies
- Matter and Energy in the Most Extreme Environments
PhysPAG Executive Committee - 2024

Fifteen Members

R. O'Brient – JPL  
*IP SIG*

M. Errando - WU SL  
*GR SIG*

B. Grefenstette - Caltech  
*XR SIG*

A. Corsi – TTU  
*GW SIG*

D. Pooley – Trinity U.  
*XR SIG – Vice Chair*

E. Burns – LSU  
*TDAMM SIG*

C-T. Chen - USRA  
*XR SIG*

A. Meli – NC A&T  
*CR SIG & Chair*

V. Miranda – Stony Brook  
*CoS SIG*

C. Mingarelli - Yale  
*GW SIG*

R. Hounsell - UMBC  
*CoS SIG*

S. Wissel - PSU  
*CR SIG*

K. Madsen - GSFC  
*XR SIG*

J. Finke - NRL  
*GR SIG & Chair Emeritus*

J. Perkins - GSFC  
*GR SIG*
# PhysPAG Executive Committee - 2024

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<th>Name</th>
<th>Institution</th>
<th>Expertise</th>
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<td>Justin Finke</td>
<td>Naval Research Laboratory</td>
<td>GR SIG</td>
<td>Dec 2020 – Dec 2024</td>
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<tr>
<td>(Chair Emeritus)</td>
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<tr>
<td>Athina Meli (Chair)</td>
<td>North Carolina A&amp;T</td>
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<td>David Pooley (Vice Chair)</td>
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<td>Louisiana State University</td>
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<td>U Connecticut</td>
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PhysCOS Scientists

- PhysCOS Chief Scientists: Francesca Civano, Brian Humensky
- PhysCOS Support Scientist: Bernard Kelly
- Project Support Specialist: Stephanie Clark
- Headquarters: Valerie Connaughton, Sanaz Vahidinia
Science Interest Groups (SIGs)

- Inflation Probe Science Interest Group (IP SIG)
- Cosmic Structure Science Interest Group (CoS SIG)
- Cosmic Ray Science Interest Group (CR SIG)
- Gamma-ray Science Interest Group (GR SIG)
- Gravitational Wave Science Interest Group (GW SIG)
- X-ray Science Interest Group (XR SIG)
- Time domain and Multi-Messenger Science Interest Group (TDAMM SIG)
Science Analysis Groups (SAGs)

- New Great Observatories (NGO) SAG (cross-PAG)
- Astrophysics with Equity, Surmounting Obstacles to Membership: AWESOM SAG (cross-PAG)
- Time-domain and Multi-Messenger Communications (TDAMMMCOM) SAG
- Future Innovations in Gamma-ray Science (FIGS) SAG
- The Gamma-ray Transient Network Science Analysis Group (GTN SAG) (Completed)
Physics of the Cosmos Program Analysis Group (PhysPAG)

Meetings

APS Meeting April 2024
Sacramento, California & Virtual
3 – 6 April 2024

HEAD 21 21st Meeting of the High Energy Astrophysics Division
Horseshoe Bay Resort, Horseshoe Bay, Texas
7 – 12 April 2024

Recent Meetings

243rd Meeting of the American Astronomical Society
New Orleans, Louisiana
7 – 11 January 2024
  » PhysCOS & PhysPAG Meeting Schedule

National Society of Black Physicists (NSBP) Conference
Knoxville, Tennessee
9 – 12 November 2023
  » PhysCOS Welcome

SACNAS National Diversity in STEM Conference
Portland, Oregon
26 – 28 October 2023
  » PhysCOS Welcome
243rd AAS Meeting New Orleans
7-11 January 2024

• Astronomy on Tap event at the Howlin’ Wolf to open AAS.

• PhysPAG session: all day event with science presentations (~70 attendees)

• Joint PAG town hall

• Splinter sessions for Gamma-Ray & Gravitational Wave SIGs: well attended with science presentations and young audience.
2023 NSBP Annual Conference
Knoxville Tennessee
9-12 November 2023
SACNAS National Diversity in STEM Conference
Portland, Oregon
26 – 28 October 2023

NASA Science at SACNAS 2023
GW-SIG update

Co-chairs: Chiara Mingarelli, Alessandra Corsi

Presence at the January AAS meeting:
- Welcome and overview from Chiara Mingarelli, GW SIG co-chair
- Neil Cornish, “Links between LIGO and LISA science”
- Magda Siwek, “Signatures of Circumbinary Disk Physics in Massive Black Hole Binaries”
- Joe Simon, “Astrophysics with the NANOGrav 15 year data”

Currently planning discussion on:
- Topics of common interests covered by TDAMM SIG (and potentially GR-SIG)
- How to structure our talk at the 2024 April APS meeting:
  - Nominally an overview by co-chair Alessandra Corsi, but they would like to make it an opportunity for discussing new funding opportunities at NSF; LISA science (in view of LISA adoption) and LISA Preparatory Science (ROSES-2024); LIGO upcoming O4b run; results from the NSF panel on the next-generation GW detector concepts.
TDAMM SIG update

• Co-chairs: Eric Burns, Rebekah Hounsell, Brad Cenko (COPAG), Ian Crossfield (EXOPAG)
• Cross-PAG SIG, currently 147 members on mailing list
• First in-person meeting at the Winter AAS meeting
• First virtual meeting (Mar. 1) with 72 attendees
  • Opening talk by Fiona Harrison on the Decadal and TDAMM
  • Broad discussion between Fiona and members
    • Identified the key need for NASA to build the Decadal-recommended standing committee to provide TDAMM priority recommendations this decade
    • Emphasis on the Decadal priorities, with TDAMM as the top sustaining activity (noting the separate recommendation pipe for GOMAP and (what is now) HWO)
• Working through next steps and plans for future meetings.
CoS SIG update

• Co-chairs: Rebekah Hounsell, Vivian Miranda (welcome)

• Last Virtual Meeting: January 4th with Dr. Leonidas Moustakas - “A Euclid Dark Energy Mission Overview”

• In person meeting at AAS 243 - 3 speakers:
  • Jordan Mirocha: Astrophysics and cosmology with SPHEREx
  • Remy Gerras: Updates on Simons Observatory
  • Dan Scolnic: Cosmological Measurements with Roman from Type Ia Supernovae

• Next Virtual Meeting: Planned for March with a talk by Dr. Maria Vincenzi about the DES 5 years results.
Gamma-ray SIG update

• Co-chairs: Manel Errando, Justin Finke, Jeremy Perkins (welcome)
• Continue regular webinar series (Nov 17, Feb 16).
  • Discussed Fermi as a gravitational wave detector, PhysPAG science gaps, FIG SAG updates
• Session planned at HEAD meeting in April
  • Talks on magnetar flares, neutrino-gamma-ray connection, FIG SAG update
• Science Gaps
  • 17 science gaps related to GR SIG submitted
CR – SIG update

• Co-chairs: Athina Meli, *Stephanie Wissel (welcome)*

• Chairs meet regularly (with the PhysCOS staff)

⇒ Immediate plans

• Collect and expand members of the CR Sig list (140 members currently).
  • Email leaders of relevant collaborations - invite them to invite their members to join the email list.

• Organize more virtual meetings of the CR SIG (Sept 2024 AMS/Helix)
  • Include a programmatic overview and discussion session on the overall goals of the SIG including where the field is going in the next 5-10 years, the next topics in CRs and neutrinos
  • Determine the goal / mandate of the CR SIG collectively within the different groups
  • Plan the science drivers for Astro2030
  • Would there be a probe study to begin now relevant for Astro2030?

• Aiming to plan a session at the ICRC 2025 (Geneva)

• Co-Chair/EC chair (Meli) to attend and present at 2024 HEAD Meeting
Future In Gamma-rays SIG (FIG SAG) update

- Co-chairs: Chris Fryer (co-lead), Michelle Hui (co-lead), Paolo Coppi, Milena Crnogorčević, Tiffany Lewis, Marcos Santander, and Zorawar Wadiasingh

- Focused on answering question: *what science has not or cannot be done with existing or funded space-based gamma-ray instrumentation?*

- Kickoff meeting at January 2024 AAS

- First virtual meeting February 29 > 100 attendees from astrophysics and particle physics communities

- Session at HEAD meeting in April
• Co-chairs: Chien-Ting Chen, Kristin Madsen, David Pooley, Brian Grefenstette (welcome)
• Late 2023: Online townhall for the Precursor Science Gap discussion
• AAS 243: XRSIG session included XRISM and Athena updates, and a Precursor Science Gap discussion.
• Upcoming 21st HEAD meeting XRSIG Session:
  • CfA director Lisa Kewley to address the HEAD community in support for Chandra
  • Determine community interest in a SAG to address post-Chandra era
  • Soliciting X-ray science talks for early career scientists or non-probe mission concepts
Existential threat to X-ray Astronomy

• Chandra GO budget cut by 30% this year.

• This comes after 24 years of no increases in GO funds.

• The X-ray community has been struggling, and now it is in danger. Chandra GO is one of the main sources of support for X-ray astronomy in the US.

• The proposed FY25 and beyond cuts to Chandra will reduce funding to the X-ray community to a level that will make it nearly impossible to attract new members to the field.

• The community feels strongly that the Chandra GO program must be restored to previous levels.
PhysPAG future activities

- Recently the EC Chair suggested the idea of establishing a yearly “PhysCOS Workshop” targeting
  - young researchers
  - HBCUs
  - Focus on building connections between the diverse areas of PhysCOS science (wide-ranging interests and goals <-> commonalities)

→ Working through next steps and plans

- Next year’s PhysPAG retreat to be hosted in NCA&T or Trinity University for a wider community outreach
PhysPAG EC Strategic Retreat Meeting 2024

Date: May 15th and 16th
Location: Goddard HQ

• Goals
  • Planning SIG and PAG activities for the year, including a new workshop
  • Discussing ideas for SAGs that would be useful
  • Building connections between PhysPAG and Roman
  • Building connections between EC members