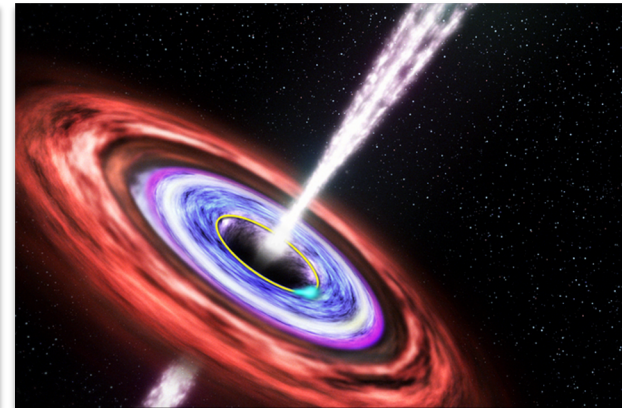
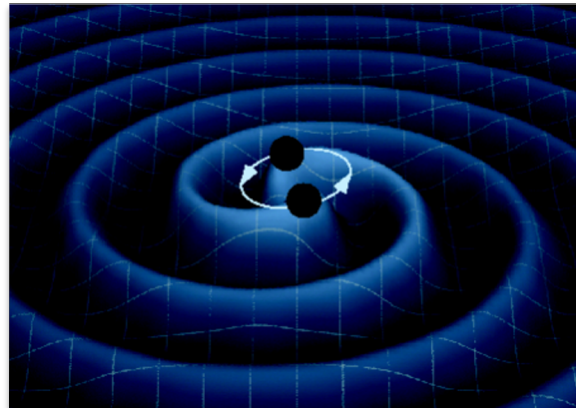
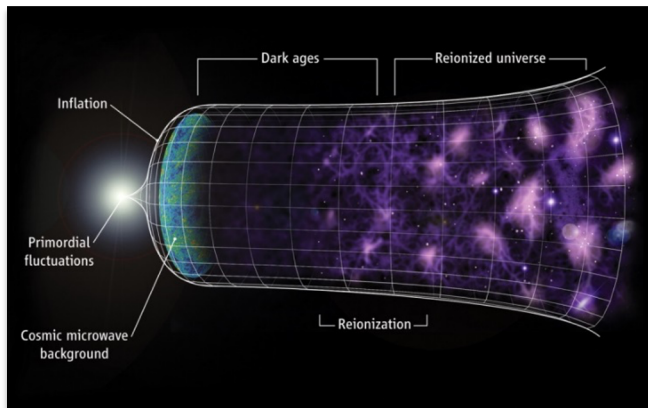
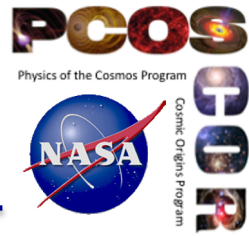


Physics of the Cosmos

Program Analysis Group Report

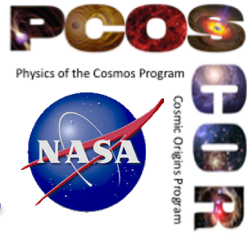


Graça Rocha

Jet Propulsion Laboratory/Caltech
Chair, Physics of the Cosmos Program Analysis Group, PhysPAG
graca.m.rocha@jpl.nasa.gov; graca@caltech.edu

Advisory Committee, APAC, Meeting, 19th October 2020

Outline



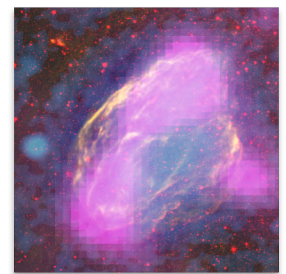
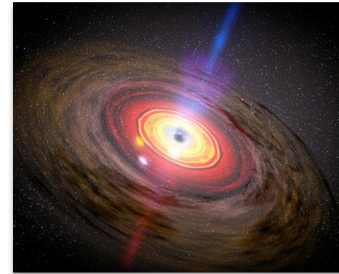
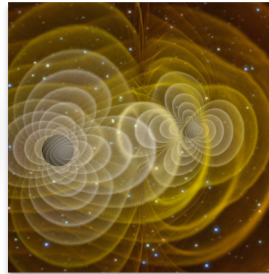
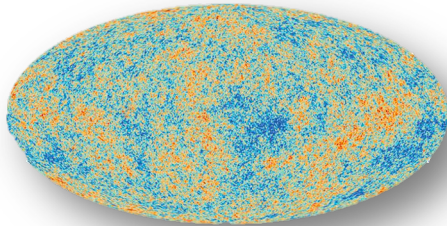
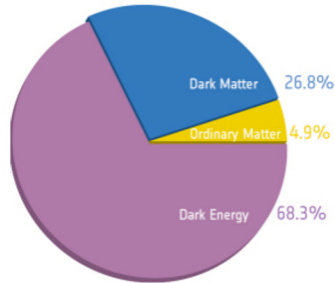
- Introduction to **PhysPAG** (reminder)
- **PhysPAG EC** Activities and Goals
- **SIG** Highlights, Activities and Goals

Outline



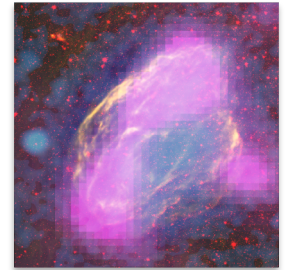
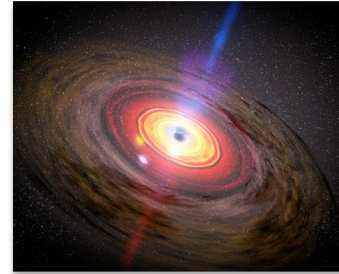
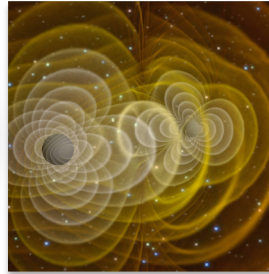
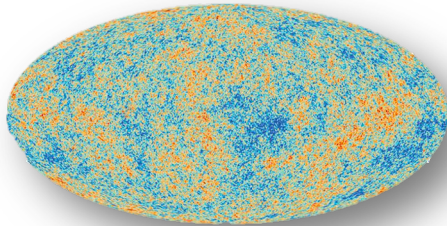
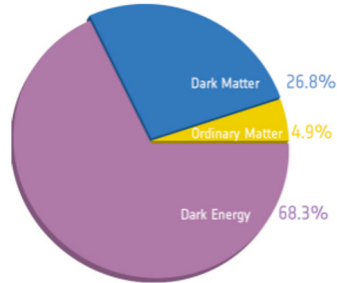
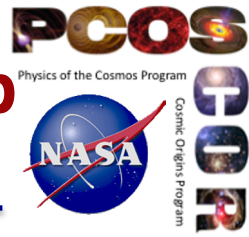
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Physics of the Cosmos Science Objectives



- Increase our knowledge of dark energy
- Precisely measure cosmological parameters governing evolution of the universe and test inflation hypothesis of Big Bang
- Test validity of Einstein's General Theory of Relativity and investigate nature of spacetime
- Understand formation and growth of massive black holes and their role in evolution of galaxies
- Explore behavior of matter and energy in its most extreme environments

Physics of the Cosmos Program Analysis Group



❑ Six Science Interest Groups (SIGs)

- Cosmic Ray (CR SIG)
- Cosmic Structure (CoS SIG)
- Gamma Ray (GR SIG)
- Gravitational Wave (GW SIG)
- Inflation Probe (IP SIG)
- X-ray (XR SIG)

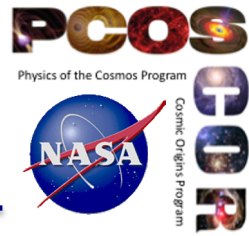
Want go get involved?

Go to:

<https://pcos.gsfc.nasa.gov/phypag/sigs-sags.php>

and subscribe to the relevant SIG emailing list

Annual call is out !



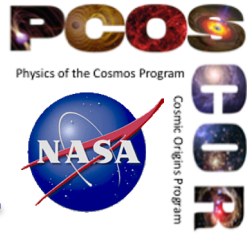
PhysPAG EC Membership

| Name | Affiliation | Area of Expertise | Term Ends |
|-------------------------------|--------------------------|-------------------|-----------|
| John Conklin (Chair Emeritus) | Univ. of Florida | GW SIG | Dec 2020 |
| Graça Rocha (Chair) | JPL/Caltech | IP SIG/CoS SIG | Dec 2020 |
| Sylvain Guiriec | George Washington Univ. | GR SIG | Dec 2020 |
| Kevin Huffenberger | Florida State Univ. | CoS SIG/IP SIG | Dec 2020 |
| James Rhoads | GSFC | CoS SIG | Dec 2020 |
| Abigail Vieregg | Univ. of Chicago | IP SIG / CR SIG | Dec 2020 |
| Nicolas Yunes | Montana State Univ. | GW SIG | Dec 2020 |
| Ryan Hickox (Vice Chair) | Dartmouth College | XR SIG | Dec 2021 |
| Marcos Santander | Univ. of Alabama | CR SIG / GR SIG | Dec 2021 |
| Jillian Bellovary | Queensborough Comm Coll. | GW SIG / XR SIG | Dec 2022 |
| Sean McWilliams | WVU | GW SIG | Dec 2022 |
| Bindu Rani | SURA, GSFC | GR SIG | Dec 2022 |
| Grant Tremblay | SAO | XR SIG | Dec 2022 |

*New Roles

*New members as of January 2020

Outline



- Introduction to PhysPAG (reminder)
- **PhysPAG EC** Activities and Goals
- SIG Highlights, Activities and Goals

PhysPAG EC activities

□ **Monthly Telecons** to discuss goals and plans of action such as:

- Addressing suggestions from APAC meeting March 2020
 - Cross-PAG activities and coordination
- Improve access for (researchers at) under-served institutions
- Assess Usability/Accessibility of data analysis tools and data representation

These discussions have been impacted by the current crisis

PhysPAG EC activities - Cross-PAG activities

☐ Discuss suggestions from APAC meeting March 2020

More formal organization for the entire day before the first day of the winter AAS meeting, including cross-PAG activities and technology development.

- PhysPAG chair contacted COPAG, EXOPAG chairs and the PCOS, COR, and ExEP Program and Chief Scientists to express the willingness to coordinate sessions and technology development at the winter AAS meeting
- After a few exchanges of emails GR organized a Webex meeting to discuss and plan this cross-PAG coordination
- The cross-PAG coordination meeting took place on 11th of Sept.

PhysPAG EC activities - Cross-PAG activities

- Cross-PAG coordination telecon – we converged to three cross-PAG activities:

1. Cross-cutting Technology

- Joint Technology Session at winter AAS meeting with emphasis on technology development that could be cross-cutting

2. Data analysis frameworks and transferability

3. NASA Science at Under-Served Institutions

- Engagement in NASA astrophysics research from under-represented groups

Cross-PAG activities

1. Cross-cutting Technology

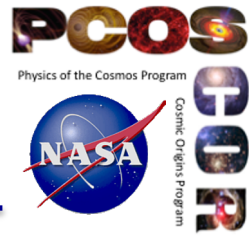


1. Joint Technology Session with emphasis on **Technology development** that could be **cross-cutting**

- Preferred format: **A discussion panel** - integrated after the Joint-PAG session on Friday 8th Jan, 2020, and in coordination with the three program offices. Format: four-hour block on Friday 8 January, with Paul Hertz for the Joint-PAG session, first 1.5 hours and Joint Cross-Cutting Technology session for the second 1.5 hours.
- Discussion around the question **“How can we create a whole greater than the sum of the parts by exploring synergies in technology development across the Astrophysics Division?”**
- Include communication of needs and technology progress; discussion on the technology gaps in different PAGs (based on the biennial report); discussion of whether it would be useful for technology developers to include a number of different fields in their projects / SAT proposals, for example.

Cross-PAG activities

1. Cross-cutting Technology



Saturday, 8th of January – a 4 hour block

| |
|--|
| Joint –PAG session (1.5 hours) |
| Cross-PAG session on Technology development that could be cross-cutting – Discussion Panel (1.5 hours) |

❖ Current activities carried out by the PAG chairs

(Rocha, Meixner and Meyer):

- Contacting coordinators, Thai Pham for PCOS & COR and Nick Siegler for ExEP; as well as Sarah Tuttle the chair of the technology interest group (TIG) on the COPAG and John Conklin the PhysPAG chair Emeritus
- Start assembling/inviting panel members

Cross-PAG activities

2. Data Analysis frameworks

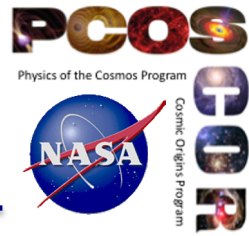


2. Data analysis frameworks and transferability

- Consensus that a one-hour session may be limited in utility while the creation of a SAG could be useful
- Possibility of a new Cross-PAG SAG on Data Analysis Frameworks
- However, we would like to learn more about the ongoing NASA's Data Science effort.

Cross-PAG activities

2. Data Analysis frameworks



❖ Current activities carried out by the PAG chairs

(Rocha, Meixner and Meyer):

- Contact the current POC for the Data Science efforts at NASA HQ Patricia Knezek (Jeffrey Hayes, on leave for an year)
- Assess the usefulness or relevance of a new cross-PAG SAG on data analysis frameworks for the data science efforts at NASA HQ
 - Is there a specific analysis the PAGs could do that would be useful to NASA HQ and so help motivate a SAG?

3. NASA Science for Under-Served Groups

- A *Cross-PAG initiative* including EC members from PhysPAG, ExoPAG, and COPAG has been convened to address issues of **equity and inclusion in NASA astrophysics research** with a focus on groups that have been previously under-represented.
- This group has so far engaged in two productive telecons in the past month with plans for more meetings.
- Lead: Ryan Hickox, Team: Natasha Batalha, Jillian Bellovary, Janice Lee, Michael Meyer, Graça Rocha, Kim Weaver, Zaven Arzoumanian (with more contributions welcome)

Cross-PAG activities

3. Nasa Science for Under-Served Groups



3. NASA Science for Under-Served Groups

Motivation:

- Among PIs *proposing* for grants, Black, Indigenous and People of Color (BIPOC) scientists are under-represented relative to the full STEM workforce (<https://www.nsf.gov/nsb/publications/2020/nsb202013.pdf>)
- Female PIs are under-represented on major projects (e.g., Explorer missions: <https://arxiv.org/pdf/1909.10314.pdf>)
- To understand and learn what challenges colleagues at traditionally under-served institutions (including some Minority Serving Institutions) face to engage in research; and to understand the impact of current NASA programs/opportunities such as **MUREP** and **MIRO**

Cross-PAG activities

3. Nasa Science for Under-Served Groups



3. NASA Science at Under-Resourced Institutions

Plan:

This Cross-PAG initiative aims to **analyze barriers to participation**, via for example through a survey of colleagues in consultation with experts in survey design and analysis.

We anticipate that this group will **prepare a charter for a SAG** in the coming months, and aims to include broad community involvement.

We will have a Cross-PAG session on '[Enhancing participation of Minority Serving Institutions, MSIs, in NASA Space Science](#)' at the AAS meeting on Monday, 11th of January, 6:50 pm ET.

Outline



- Introduction to PhysPAG (reminder)
- PhysPAG EC Activities and Goals
- **SIG** Highlights, Activities and Goals

Science Interest Group highlights

- ☐ All SIGs will have splinter sessions at the winter AAS meeting, Jan 2021

| | | | |
|--|-----------|-------|------|
| NASA PCOS PhysPAG | Monday | 12:00 | 1:30 |
| NASA Gravitational Wave SIG | Thursday | 12 | 1:30 |
| NASA CR / GR / GW SIG | Tuesday | 12 | 1:30 |
| NASA Inflation Probe SIG | Wednesday | 12 | 1:30 |
| NASA X-Ray SIG | Wednesday | 6:50 | 8:20 |
| Enhancing Participation of Minority Serving Institutions in NASA Space Science | Monday | 6:50 | 8:20 |
| NASA Cosmic Structure SIG | Thursday | 4:10 | 5:40 |

Science Interest Group highlights

- ☐ All SIGs will have splinter sessions at the winter AAS meeting

| | |
|--|---|
| PCOS PhysPAG | NASA's Physics of the Cosmos (PCOS) program covers science from gravitational waves to cosmology to high energy astrophysics. [...] |
| GW SIG | Status, future plans, highlights, and concerns of the Gravitational Wave Science Interest Group |
| CR / GR / GW SIGs (w MMA theme) | A session on the status of MultiMessenger astrophysics (MMA) from the point of view of the Gamma-ray, Cosmic Ray and Gravitational wave Science Interest Groups. |
| IP SIG | The IPSIG session will present topics related to the Inflation Probe study PICO, complementarity of space- and ground-based observations, and new data analysis tools and software development. |
| XR SIG | Status, future plans, highlights, and concerns of the X-Ray Science Interest Group |
| Cross-PAG session: NASA Science at Under-Resourced Institutions | Enhancing participation of Minority Serving Institutions, MSIs, in NASA Space Science |

PhysPAG/SIG Meetings and Activities

- **AAS Winter January 2021**

- PCOS & PhysPAG Town Hall
- SIGS splinter sessions – All SIGs

- **APS April 2021**

- PCOS & PhysPAG Town Hall
- SIGS splinter sessions - GW SIG, CoS SIG, GR SIG, CR SIG, IP SIG