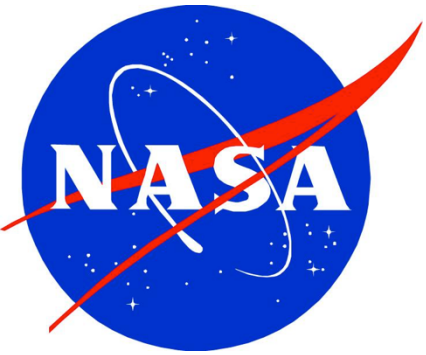
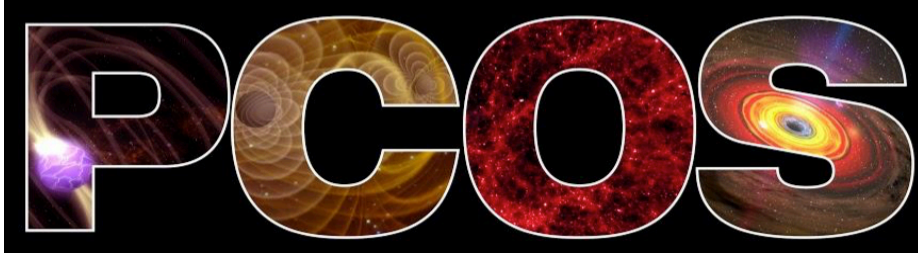




NASA Headquarters + PCOS Activities

Terri Brandt
PCOS Chief Scientist

American Physical Society Meeting
14 Apr 2018

Activities are managed by the PCOS Program Office at NASA's Goddard Space Flight Center and reported to NASA Headquarters.
They include:

- Mission concept studies oversight
- Strategic technology maturation oversight (SAT)
- Community engagement, including via the Physics of the Cosmos Program Analysis Group (PhysPAG)

The PCOS Program Office hosts

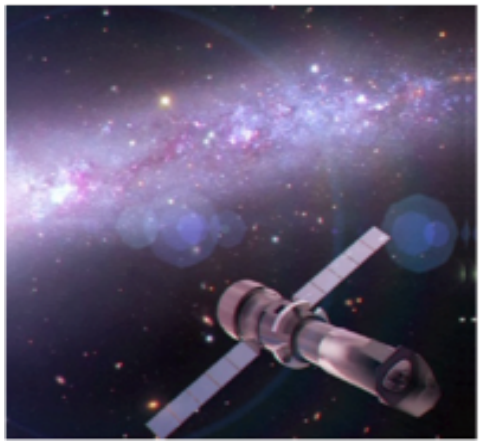
- Athena Study Office
- LISA Study Office

and oversees

- science and
- technology activities

for NASA's contribution to these ESA-led missions.

Athena



- Athena is an ESA flagship X-ray mission slated for launch in the late 2020s
- Two instruments provided by member states:
  - calorimeter (X-IFU) and
  - wide-field imager (WFI)
- NASA is contributing to both X-IFU and WFI and is discussing observatory contributions.
- Athena is currently in phase A: ESA is finalizing the preliminary design in collaboration with
  - instrument teams and
  - several industry spacecraft prime contractors.
- ***Get involved! Join an Athena Science Working Group***, organized by theme: Hot Universe, Energetic Universe, and Observatory

- *For more info: http://www.the-athena-x-ray-observatory.eu/*

LISA

- LISA is an ESA-led space gravitational wave observatory.
- NASA is a likely junior partner w possible technology contributions under development including:
  - Laser
  - Telescope
  - Phasemeter
  - Microthrusters
  - Charge management system
- NASA LISA Study Team (Kelly Holley-Bockelmann, Chair) is preparing science white papers for the Decadal Survey.
  - ***Broader astrophysics community involvement is welcome!***

- Talk to Kelly Holley-Bockelmann, Terri Brandt, and John Conklin at this meeting!
- *For more info: https://lisa.nasa.gov/L3Study.html*

LISA Preparatory Science

LISA Preparatory Science (LPS):

- New program element of ROSES-2018, issued February 15, 2018.
- Supports US investigators' analysis and interpretation of simulated LISA data (not separately funded hardware work)
- Sign up to be a reviewer!
- Propose next year!

Proposals to the LPS Program may request support for:

- Performing high-fidelity simulations of the expected waveforms for LISA sources;
- Developing data analysis and statistical techniques useful for the extraction of scientific measurements from LISA data (e.g., parameter estimators, etc.);
- Developing prototype data analysis tools, including innovative approaches to instrument simulation, that take into account the anticipated LISA mission performance;
- Evaluating the capability of LISA data to enable astrophysics investigations;
- Conducting astrophysics investigations that prepare for the analysis and interpretation of LISA data.

NASA Astrophysics Decadal Survey Preparations

NASA-sponsored Decadal Mission Studies:

To provide more developed input to the decadal committee.

- **Large mission studies:**
  - Lynx X-ray Observatory
  - Origins Space Telescope (OST)
  - Large UV/Optical/IR Surveyor (LUVOIR)
  - Habitable Exoplanet Imaging Study (HabEx)
- **Probe Studies:**
  - 10 mission concept studies for intermediate cost (< $1B) missions,
  - competitively selected PI-led studies in 2017 for an 18-month deeper study
  - 8 concepts selected for study in Design Lab (IDL/MDL or Team-X): PICO, GEP, STROBE-X, CETUS, TAP, AXIS, CDIM, POEMMA.
  - 2 concepts partially selected as proof of concept: EarthFinder, Starshade Rendezvous
  - NASA will sponsor an Independent Cost Assessment by SOMA at LaRC.
  - The final reports, due to NASA HQ by 31 Dec 2018, will be submitted to the Decadal Committee for prioritization, together with the four Large Studies.

- *More info: https://science.nasa.gov/astrophysics/2020-decadal-survey-planning*

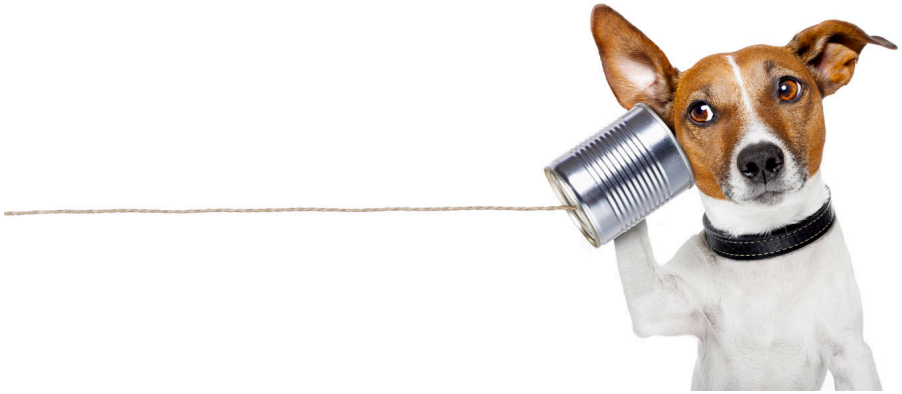
NASA Astrophysics Decadal Survey Preparations

(Large) Mission Study

- **Lynx is only mission study with high energy observation capability:** Unique power to directly observe the dawn of supermassive black holes, reveal the drivers of galaxy formation, and trace stellar activity, including effects on planet habitability
- **Science and Technology Definition Team** (STDT): defined 3 driving science pillars and submitted interim term report at the end of March 2018.
- **Science working groups** (SWGs) identify outstanding science questions, develop a compelling science case, and aid the STDT with producing a mission concept that best addresses these questions. They *welcome members* both internal and external to the X-ray community, at all career stages, and from domestic and foreign institutions.
- **Optics working group** (OWG) assists the STDT in demonstrating a credible and feasible path exists to fabricate an X-ray telescope to support the Lynx science goals. The OWG *seeks expert assistance* from academia, industry, and research institutions in identifying potential approaches for creating the X-ray mirrors and related technologies.
- **Instrument working group** (IWG) assists the STDT in defining the science instruments required for a compelling and executable mission. The IWG helps the STDT translate science goals into technical instrument requirements, provides the STDT information and metrics needed to make scientific tradeoff decisions, and supports the STDT in assessing technology readiness and preparing technology development plans and roadmaps.
- *More info: https://wwwastro.msfc.nasa.gov/lynx/*

PhysPAG Science Interest Groups

- PhysPAG Executive Committee members chair 6 Science Interest Groups
  - **X-ray SIG** (XR SIG)
  - **Gamma-ray SIG** (GR SIG)
  - **Cosmic Ray SIG** (CR SIG)
  - **Gravitational Wave SIG** (GW SIG)
  - **Cosmic Structure SIG** (CoS SIG)
  - **Inflation Probe SIG** (IP SIG)
- SIGs serve as **forums for soliciting, discussing, and coordinating community input**.



We're listening!

For more info: https://pcos.gsfc.nasa.gov/physpag/physpag-sigs.php

PhysPAG SIGs' Decadal Activities

Gravitational Wave SIG (GW SIG)

- Chairs: John Conklin, Kelly Holley-Bockelmann, and Nico Yunes
- Working with GW community, like ***You!***, and NASA LISA Science Team to develop science white papers in coordination with ESA LISA mission
- Contact chairs to contribute! (https://pcos.gsfc.nasa.gov/sigs/gwsig.php)
- **Sat 14 Apr 1.30-3p, A226**

Cosmic Ray SIG (CR SIG)

- Chairs: Jim Beatty, Igor Moskalenko, and Abigail Vieregg
- Assisting community with white paper organization
- **Tues 17 Apr 10.45a-12p, B232-233**

Gamma-ray SIG (GR SIG)

- Chairs: Sylvain Guiriec, Henric Krawczynski, and John Tomsick
- Organizing community science white papers, coordinated with mission white papers
- Input welcome! Contact SIG chairs: https://pcos.gsfc.nasa.gov/sigs/grsig.php
- **Tues 17 Apr 1.30-3p, B230-231**

Inflation Probe SIG (IP SIG)

- Chairs: Kevin Huffenberger, Graça Rocha, and Abigail Vieregg
- Assisting community with white paper organization
- Input welcome! Contact SIG chairs: https://pcos.gsfc.nasa.gov/sigs/ipsig.php
- **Tues 17 Apr 1.30-3p, B232-233**

PhysPAG SIGs' Decadal Activities

Cosmic Structure SIG (CoS SIG)

- Chairs: Kevin Huffenberger, James Rhoads, and Graça Rocha
- Contact the chairs if you have suggestions for Decadal activities: https://pcos.gsfc.nasa.gov/sigs/cossig.php

X-ray SIG (XR SIG)

- Chairs: Ralph Kraft, John Tomsick
- Assisting community in organizing white papers
- Input welcome!
- https://pcos.gsfc.nasa.gov/sigs/xrsig.php

Get Involved!

Participate

- In a **SIG**
- In the **MMA SAG**
- In a review panel:
  - Sign up here: https://science.nasa.gov/researchers/volunteer-review-panels

Contribute

- To Lynx via the existing SWGs, OWG, and IWG
- To a probe mission study by contacting the PI
- To a white paper!

Sign up for our mailing list!

https://pcos.gsfc.nasa.gov/pcosnews-mailing-list.php

Backup

Strategic Technology Development