Technology Investment

Future Innovations in Gamma-ray Science

Chairs: Michelle Hui, Chris Fryer,
Paolo Coppi, Milena Crnogorčević,
Tiffany Lewis, **Marcos Santander**,
Zorawar Wadiasingh

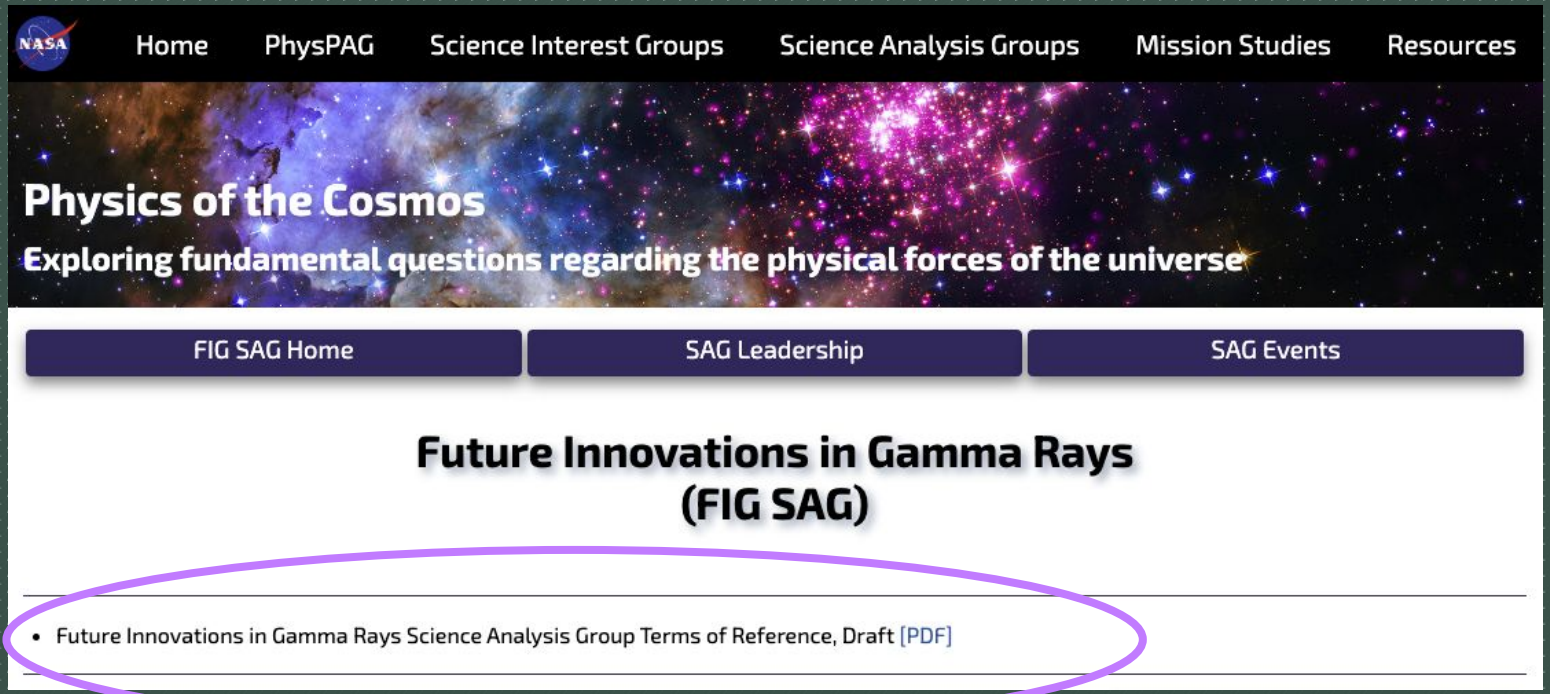
FIG SAG Virtual Meeting # 3
Thur 23 May, 1-2:30pm ET

Agenda

- Welcome & Introduction to FIG SAG
- Denis Bernard, Polarimetry with pair production
- Jaspreet Randhawa, Recent advances in Time Projection Chambers and implications for space-based gamma-ray detection
- Andreas Zoglauer – Machine learning in the calibration/reconstruction/analysis pipeline of the next generation of gamma-ray telescopes
- Peter Bloser – Diamond Scattering Detectors

Please note that the general meeting is recorded.

Welcome & Introduction to FIG SAG



https://pcos.gsfc.nasa.gov/sags/figsag.php

FIG SAG Terms of Reference

1. Gamma-ray Science Priorities: Identify opportunities uniquely afforded by gamma-ray observations.
2. Gamma-ray Mission Capabilities: Which science objectives are only done or best done by space-based gamma-ray missions, considering the current missions in extended operation and funded missions in development.
3. Technology Investment: What new technologies/methodologies exist and what is needed to achieve the science priorities.
4. Theory and Analysis Needs: What advances do we need to make in theory and analysis to achieve the science priorities.
5. Synergies with Other Programs: How do these goals tie to the broader astrophysics and physics community. What are the timelines to align with current priorities in multi-messenger astronomy.

Scheduled Meetings

May 23 (now)	Technology Investment
Feb 29	Done: Gamma-ray Science Priorities
March 22	Done: Theory/Modeling/Analysis/Fundamental Physics Needs
June 24 – 28	FIG SAG Workshop at Michigan Tech
TBD	Gamma-ray Mission Capabilities
TBD	Synergies with Other Programs and Agencies
TBD	Broadening the Gamma-ray Science to the Whole Astrophysics community

What are we doing?

- Build consensus around the science case, methods, and technologies needed to strategically advance gamma-ray missions over the next 2-3 decades.
- Define gamma-ray science in terms of intrinsic value rather than relation to other subfields.
- Simplify and streamline our ask for policymakers and the public
- Today we're focusing on the technology needed to advance gamma-ray science.

Deliverables:

- The overall deliverable from this SAG is a report to APAC. We want to provide the science case, including a Science Traceability Matrix to outline what the science needs in order to continue and grow into the future.

1	2	3	4	5
Science Goals	Science Objectives	Scientific Measurement Requirements		Instrument Requirements
		Observables	Physical Parameters	

Technical Performance and Technologies

- From slack poll on driving technical requirement for your favorite science topic:
  1. Angular resolution (e.g. distinguish diffuse background and large-scale structures)
  2. Polarization (e.g. hadronic vs leptonic, sources of CR, AGN corona emission etc.)
  3. Timing resolution (e.g. rapid variability and short-lived transients)
  4. Energy resolution (e.g. nuclear lines for heavy element origins)
  - Multi-mission analysis and cross-calibration
- Outlined from the previous gamma-ray report *Recommended Priorities for NASA's Gamma Ray Astronomy Program 1996-2010*
  - Imaging Techniques
  - Detector Technologies
  - Computational Capabilities

Discussion Guidelines

- Be mindful of time and interruptions.
- Be mindful of your positionality.
- Be a respectful listener.
- Commit to learning, not debating.
- Recognize that intent ≠ impact.

Adapted from BANG! Seminars at University of Maryland College Park, Department of Astronomy.

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Continuing the Conversation

- Latest developments and new ideas in technique, technologies in detector and computational.
  - Several more talks coming at the MTU workshop in June.
  - Inputs and future presentations are welcomed for report writing.
- What new experiments from other fields, e.g. nuclear and particle physics, where we can leverage technology needed for space-based gamma-ray observations?
- What is missing from this conversation?

Upcoming Events

- FIG SAG in-person workshop
  - Michigan Tech, 24 – 28 June 2024
- In the meantime, keep the conversation going on slack and make sure you're signed up for the listserv for updates. https://pcos.gsfc.nasa.gov/sags/figsag/figsag-email-list.php