



Physics
of the Cosmos

Drivers of Future Gamma-ray Astrophysics



Future Innovations of Gamma rays Science Analysis Group

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



Introduction

- Gamma-ray astronomy has benefitted from a continuous set of missions capable of studying a broad range of astrophysical objects including persistent and transient phenomena, leading to remarkable discoveries that have revolutionized astrophysics.
- Many of the current major missions are reaching the end of their extended operational phases and, at this time, only few comparable future missions have found support.
- Ideal time to reassess the community's future priorities and to provide recommendations to NASA based on the community's vision of gamma-ray astronomy towards 2040.



Primary Question

- **What science has not or cannot be done with existing or funded space-based gamma-ray instrumentation? i.e beyond Fermi and COSI, in the fleet environment of the 2030s and 2040s.**
 - ▶ The space-based gamma-ray regime is bounded in energy at ~ 100 keV by the X-ray regime, and at ~ 100 s GeV by the ground-based gamma-ray regime.
 - ▶ Connections with other wavelengths and messengers. Additional stakeholders for gamma-ray astronomy.



Topics of Interest

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.



Timeline

- Kickoff today, please **sign up and share your thoughts!**
- Virtual:
 - monthly meetings on specific topics
 - **slack channels** for more in-depth discussions
- In-person opportunities:
 - APS April meeting in Sacramento, CA
 - AAS HEAD meeting in Horseshoe Bay, TX
 - Workshop TBD

FIG SAG

Future Innovations in Gamma Rays

We will explore gamma-ray science priorities, necessary capabilities, new technologies, and theory needs to inspire work toward 2040.

Get involved and stay informed:
<https://forms.gle/VBijBgapMRwJm9dU6>



Chairs:

Chris Fryer & Michelle Hui,
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