FLAG SAG meeting

28 August 2026

Agenda

- Brief recap of summer activities
  - June AAS splinter session
  - Call for FLAG SAG instrument working group members (https://docs.google.com/document/d/1r5yGzz_f_j47zsQ1b-YmF1fgN56-2Do8J-M_kMml0rU/edit?usp=sharing)
  - GR SIG Ad ASTRA submission (255 endorsers)
- Proposed timeline for fall activities
- Feedback on the FLAG SAG presentation for Ad ASTRA workshop. Questions on outline for FLAG SAG.

Recap of Summer Activities

- June AAS splinter session
  - Planning for Community white paper submission to ASTRA with GR SIG
  - Q&A on ASTRA with Jessica Gaskins and Shawn Domagal-Goldman
  - Request for benchmark science cases (target observations). These are to assist in understanding desired performance and to supplement FIG SAG report. Provide more input on what the desired observations could be like.
    - Cosmic Explosions: https://docs.google.com/document/d/13I354_3cJwCnFsAyIVYRMZhCMVL1yKxD2YnaQXdUiDk/edit?usp=sharing
    - Heavy Elements in the Universe: https://docs.google.com/document/d/1TEupyZwKEBTLydKOV0pE4Ea96fOOMT9b3-rj4vIlAHM/edit?usp=sharing
    - Supermassive Black Holes (see for examples): https://docs.google.com/document/d/1RuQnZ3av6LFZQve1NhJ1gFxl76WqzqCg9athHBUqlVA/edit?usp=sharing
    - Fundamental Physics: https://docs.google.com/document/d/1ry40ntJFz_bxvRfVdOqYFPid74bGiZ6sDXMT7df7o-E/edit?usp=sharing
  - Thanks to attendees!

Recap of Summer Activities

- Call for FLAG SAG instrument working group members (https://docs.google.com/document/d/1r5yGzz_f_j47zsQ1b-YmF1fgN56-2Do8J-M_kMml0rU/edit?usp=sharing)
  - Establish key metrics community wants assess instrument performance
  - Feedback on technical capabilities in FLAG SAG report
- GR SIG Ad ASTRA submission (255 endorsers!)
  - Highlighted top-level science questions and pointed to trades that should be studied
  - Thank you to all the endorsers!

Gamma-ray Observatory White Paper excerpts

Science Investigation

- **We can understand relativistic jets, how and where they emerge, how they are sustained and how they ultimately decline.**
- **We will determine the growth and formation of supermassive black holes.**
- **We can reveal the origins and mechanisms of cosmic explosions.**
- **We will understand element formation and the energetic role of Cosmic Ray outflows.**
- **We will probe extreme environments, underlying populations, and the intervening Universe.**

2. Science Table

Science Objectives	Physical Parameters	Observables	Potential Challenges
Determine the jet-launching mechanism in active galaxies	*Characterize the particle composition of blazar jets*	*Survey at 10^{-13} erg/s/cm^2 in 1 week (100 keV -10 GeV), Compton pol. deg. <10% MDP*	*Relatively low photon rates and the short timescale variability of blazars limit measurement accuracy and precision. Sensitivity should be high enough to measure polarization during a typical quiescent period for a statistically significant number of blazars.*
Observe supermassive black hole binary mergers	*Characterize masses and frequency of events using a GeV pulsar timing array*	*All-sky monitoring for Galactic disk pulsars at 100 MeV -10 GeV, <30* μs timing	*Monitoring pulsars out to the edge of the Galaxy with sufficient timing resolution to employ them as a PTA requires higher continuum sensitivity than current missions provide (Grasp/Acceptance ~ 50 m^2 x sr at 1 GeV).*
Identify the progenitor population that launches jets through localization to characterize the explosive engine of Gamma-ray Bursts	*Identify particle acceleration processes, characterize plasma morphology of explosion with temporal variability*	*All-sky monitoring keV-GeV, timing: <10 μs res., <30 μs accuracy, 10^{-8} erg cm^2 fluence limit, arcmin ang. resolution*	*Characterization of GRBs is tied to coordination between observatories. Work has now been done to create a productive and well connected followup community. The advent of AI shows promise for onboard processing of event alerts to coordinate directly between future facilities faster. Fast alerts will rely on efficient data downlink rates, which are likely to be provided by commercial vendors for future missions.*

Determine element formation and the energetic role of Cosmic Ray outflows.	*Measure-ment of nucleo-synthesis products*	*< 1% energy res. 50 keV to 10 MeV, 10 arcsec ang. res., line sensitivity of 10^{-8} ph/s/cm^2*	*May require the development of focusing optics to achieve the high angular resolution in order to characterize the morphology of plasma in individual objects. The advancement of Compton detectors in recent years addresses the detector component required for the high energy resolution.*
Testing fundamental physics	*Photon splitting in extremely magnetic environments* *Dark matter with spatial searches in new regimes*	*<5 deg. 50 keV to 10 MeV 10^{-13} erg/s/cm^2/yr, <15% MDP* *DM: < 0.1 deg. ang. res. 10 MeV - 10 TeV; <10% MDP*	*Requires higher sensitivity observations of a magnetar in the MeV. Previous missions have not been sufficiently sensitive in this band, but emerging technologies are poised to address it.* *Dark matter has not previously been directly observed and predictive models diverge. Expanding capabilities into higher sensitivity and lower energy bands will expand the accessible phase space.*

Gamma-ray Observatory white paper excerpts

- **Instrumentation Description: "***The science cases spearheaded by the gamma-ray community have distinct requirements and we are requesting at least one trade space study to optimize the instrument(s) design and mission architecture for the best scientific return within the NASA strategic portfolio*.
- "No single instrument concept can completely answer all of the questions posed above and an ASTRA study is needed to determine the optimal path forward."
- **Mission Implementation:** "The final trade is to determine the instrument or suite of instruments that leverages our current technological possibilities to best answer the questions that gamma-ray observations are uniquely equipped to answer."

Timeline for FLAG SAG Fall Activities

- September – October
  - Organize instrument working groups and hold discussions in those groups
    - **To do:** Need volunteers to help with convening the working groups
  - Continue development of report draft in parallel
  - **To do:** Coordinate with GR SIG to pick meeting times for updates in late September and October
    - Sept. 25 (target for circulating preliminary draft of report)
    - Oct. 23 or 30?
- November 13 – deadline for final inputs from working groups
- December 15 – candidate final draft of report for review in FLAG SAG
- January
  - Submit report to GR SIG
  - Present report at AAS? TBD
  - **To do:** Should we organize a splinter session at January AAS? Deadline Sept. 17.