

Community Efforts in Gamma-ray Astrophysics

Insights from the Gamma-ray Science Interest Group

The Gamma-ray SIG Chairs:

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Gamma-ray Science Interest Group

- We are a **vibrant, young community** devoted to understanding the gamma-ray sky.
- We are a **venue to discuss** science, future missions, and overall strategy.
- Some things that we do:
 - Organize sessions at APS / AAS / SPIE meetings. **Let us know if you have ideas!**
 - Organize monthly webinars to highlight science results and stimulate discussion.
 - **Please contact us** if you have a topic you'd like to see covered!
 - Launch Science Analysis Groups (SAGs) which produce studies/findings.

Recent GR SIG Activities

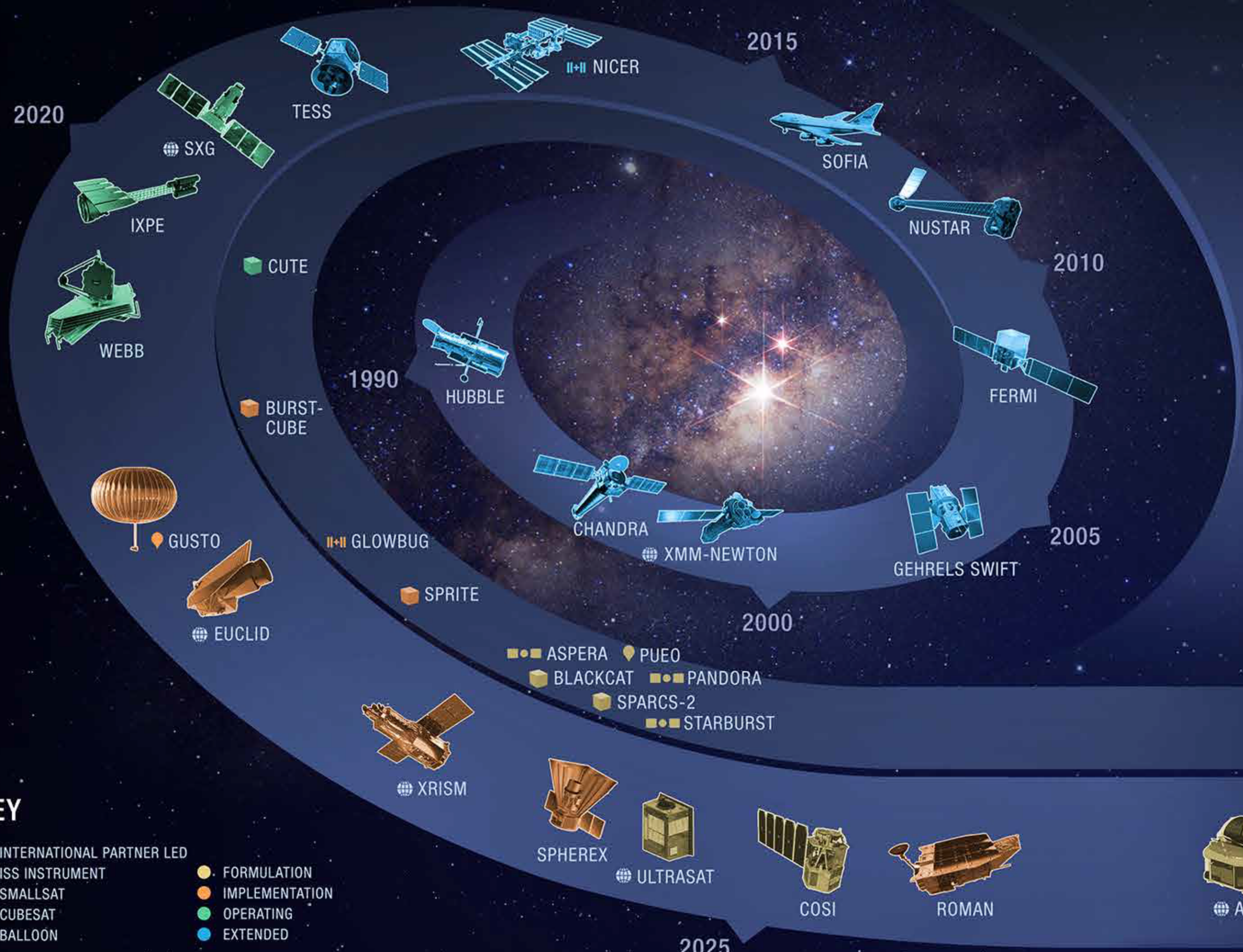
- Discussed Gamma-ray precursor science gaps.
 - There was an amazing response to these. **Thank you!**
- Had a science talk on pulsar timing arrays by Matthew Kerr (NRL).
- Had a science talk on indirect dark matter detection by Joshua Foster (MIT).
- Kicked off the Future Innovations in Gamma-ray Science Analysis Group.
 - Tiffany Lewis (Mich. Tech.) is talking right after me about this.



Join the GR SIG
Mailing List and be
part of the fun!



ASTROPHYSICS FLEET



PRE-FORMULATION

- MIDEX/MO 2028
- PROBE ~2030
- ATHENA EARLY 2030s
- LISA MID 2030s

VERY SMALL MISSIONS

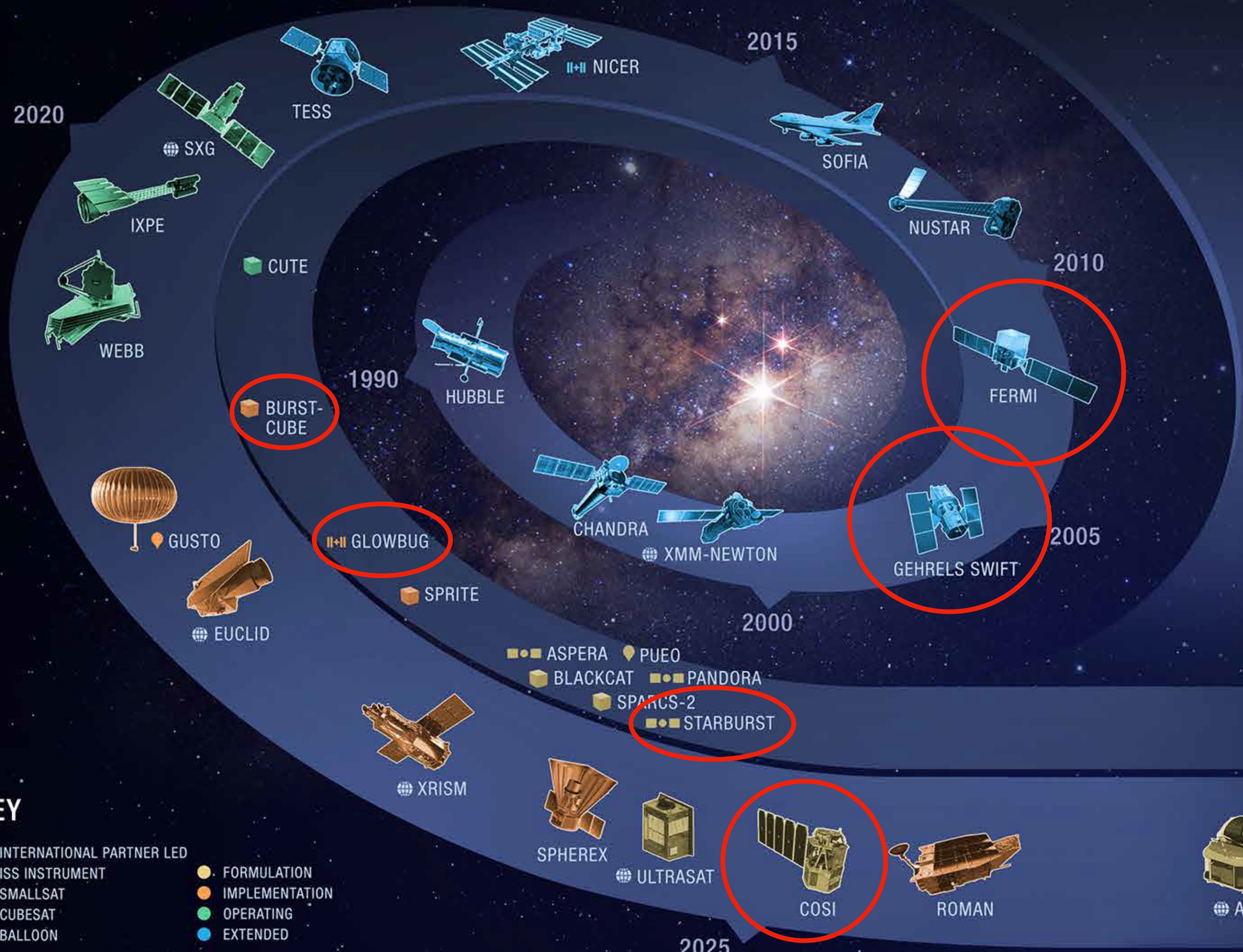
TRADITIONAL MISSIONS

KEY

- INTERNATIONAL PARTNER LED
- ISS INSTRUMENT
- SMALLSAT
- CUBESAT
- BALLOON
- FORMULATION
- IMPLEMENTATION
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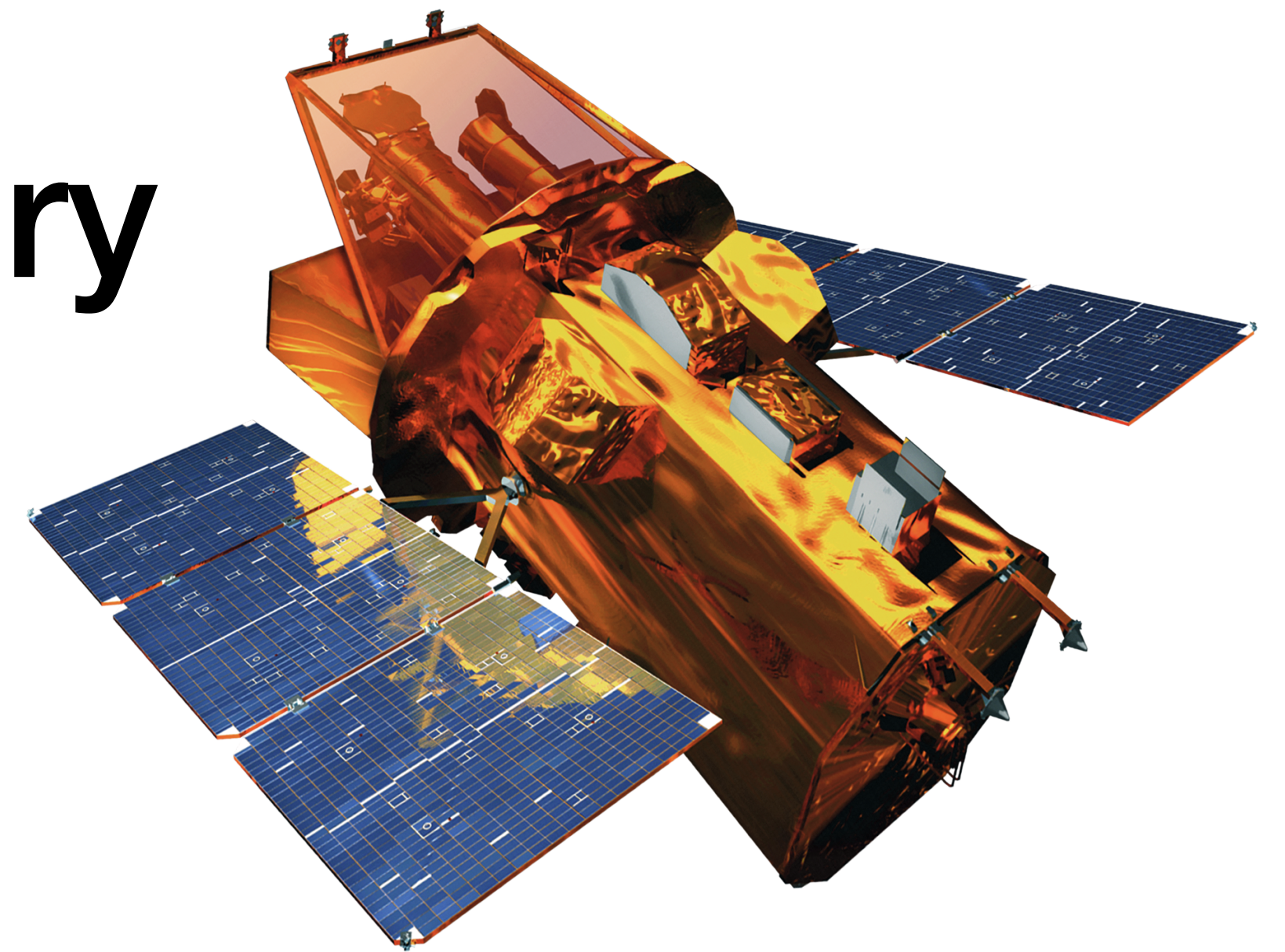
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2025

- I did a **very** scientific survey of the current operating gamma-ray missions and some of those in development and asked the following 4 questions:
 - What are you most **excited** about?
 - What **one thing** would you like the PhysCOS/APS community to learn?
 - What is **coming up** in the next year that you want to tell people about?
 - How would you like people to **get involved**?

Note: any questions about operating missions should go to the projects and/or PIs.

Neil Gehrels Swift Observatory



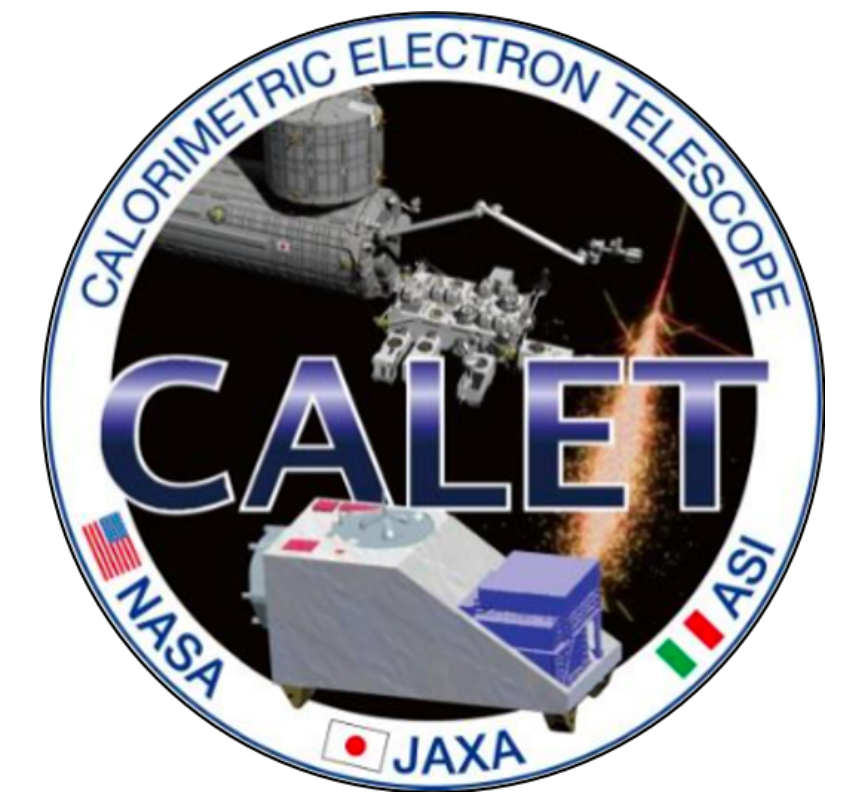
- What are you most **excited** about?
 - **20th launch anniversary!** Swift revolutionized our understanding of the universe and continues to be the a workhorse observatory. Swift opened up new, comprehensive multiwavelength/messenger avenues of exploration by collaborating many observatories. We anticipate **groundbreaking discoveries** by collaborating with XRISM and Einstein Probe.
- What **one thing** would you like the PhysCOS/APS community to learn?
 - Wha truly sets Swift apart is the **tireless dedication of our science operations team** at Penn State, along with our partners from across the globe: UCL MSSL and the University of Leicester in the UK, and SSC/ASI INAF OA-Brera in Italy. Their unwavering commitment ensures that Swift remains not just an observatory, but a dynamic and indispensable tool for the entire astronomy community.
- What is **coming up** in the next year that you want to tell people about?
 - **Our 20th-anniversary celebration!** But that's not all to look forward to – we're also eagerly anticipating the start of the 4th LIGO-Virgo Observing run, SVOM's launch and first light of the Rubin Observatory that promise to expand our understanding of the cosmos.
- How would you like people to **get involved**?
 - Want to be a part of the excitement? Getting Swift data has never been easier! Submit a request for a **Target of Opportunity** or a Swift **Guest Investigator Proposal** through the NASA ROSES Solicitation. And if you have groundbreaking research that you'd like to share with the world, don't hesitate to reach out – Contact *Brad Cenko and Bindu Rani* to **initiate a press release**.

Fermi Gamma-ray Space Telescope



- What are you most **excited** about?
 - At 15 years Fermi **continues to reveal surprises**. We are excited about Fermi's continued role as an engine for astrophysical discovery. From flaring magnetars, gamma-ray bursts, and novae to tracking activity from supermassive black holes and pulsars, to pursuing the gravitational wave background and probing the Galactic center, there is more science to do with Fermi and more opportunity to do it than ever before.
- What **one thing** would you like the PhysCOS/APS community to learn?
 - Fermi gamma rays are **public immediately upon processing**, and we're always looking for ways to make the growing all-sky data archive even more useable.
- What is **coming up** in the next year that you want to tell people about?
 - The **11th International Fermi Symposium** will be held in College Park, MD Sep 9-13, 2024. Abstract submission is open now through May 1. <https://tinyurl.com/y6kv5e96>
- How would you like people to **get involved**?
 - Join the **fermi-news email list**, participate in the GI program, attend the Symposium, send your students/postdocs to the **Fermi Summer School**. Find out what Fermi data says about your favorite source.

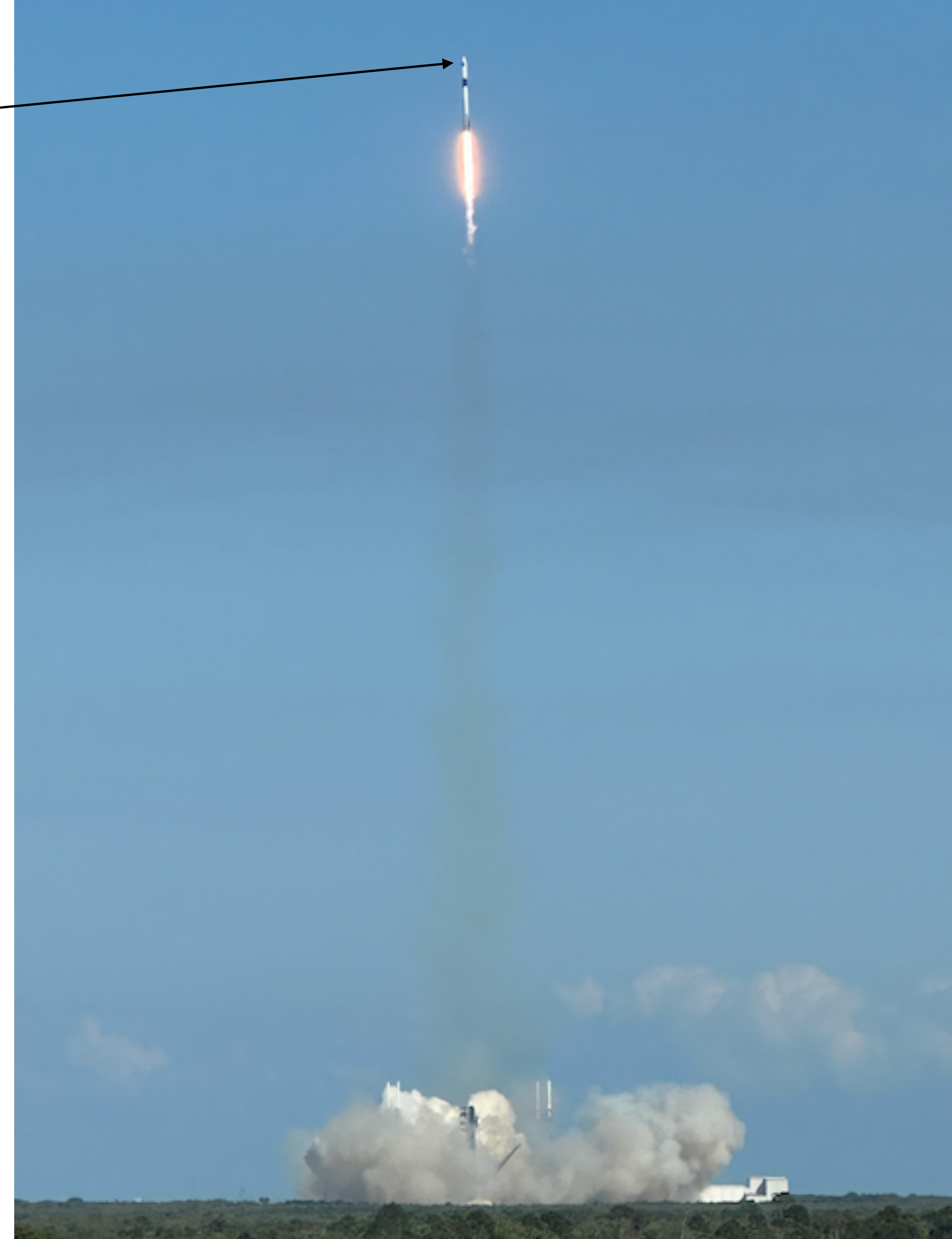
Calorimetric Electron Telescope



- What are you most **excited** about?
 - Searching for **EM counterparts to gravitational wave events** from the LIGO/Virgo/KAGRA teams. Exploring with students the possibilities for **combined analysis of CALET and Fermi-LAT data**, which share an observation period of over 8 years (and growing!).
- What **one thing** would you like the PhysCOS/APS community to learn?
 - Efforts to archive CALET **data products for public use**. Data from CGBM have been archived on the DARTS system at ISAS/JAXA and is in the process of being added to HEASARC at GSFC. These datasets are receiving an update currently and **should be available soon!** Count rate data from the calorimeter are also being archived and have been used in several space weather publications in recent years. Also keep a look out for **press releases** on EurekAlert! from CALET for exciting results of gamma-ray and cosmic-ray analyses!
- What is **coming up** in the next year that you want to tell people about?
 - CALET recently approved by JAXA for **continuing operation to 2030!** We have submitted an APRA proposal for four more years of funding for the US team and anticipate looking for **interested students** to work with the 9+ years of data that will be available.
- How would you like people to get involved?
 - Contact *Nick Cannady (GSFC)* and/or *Michela Negro (LSU)* regarding the calorimeter or *Mike Cherry (LSU)* regarding CGBM to explore possible projects/collaboration.

BurstCube

- What are you most **excited** about?
 - We **launched** March 21 and are expecting to be deployed from the ISS this month.
- What **one thing** would you like the PhysCOS/APS community to learn?
 - We can do great science, develop technology, and train scientists/engineers using CubeSats.
- What is **coming up** in the next year that you want to tell people about?
 - We will overlap with O4 and hope to get a joint detection of a GRB with a GW section.
- How would you like people to get involved?
 - All of our data will be available as soon as we can. You can access all of our software here: <https://gitlab.com/burstcube/bc-tools>



StarBurst



- What are you most **excited** about?
 - Potential **simultaneous operations of StarBurst, COSI, and LIGO/Virgo** in the 2027-2030 timeframe -> joint multimessenger detections!
- What **one thing** would you like the PhysCOS/APS community to learn?
 - StarBurst is **on schedule** for science operations during the LIGO/Virgo O5 run. We are developing modern data visualization and retrieval infrastructure that will significantly lower the barrier for entry for community use of StarBurst data.
- What is **coming up** in the next year that you want to tell people about?
 - Our first set of **data challenges** and a beta version of the StarBurst data portal ready by the middle of 2025.
- How would you like people to **get involved**?
 - **Spread the word** about the StarBurst mission beyond the gamma-ray community and emphasize that the data access tools we are developing are geared towards getting scientists from **a broad range of communities** involved.

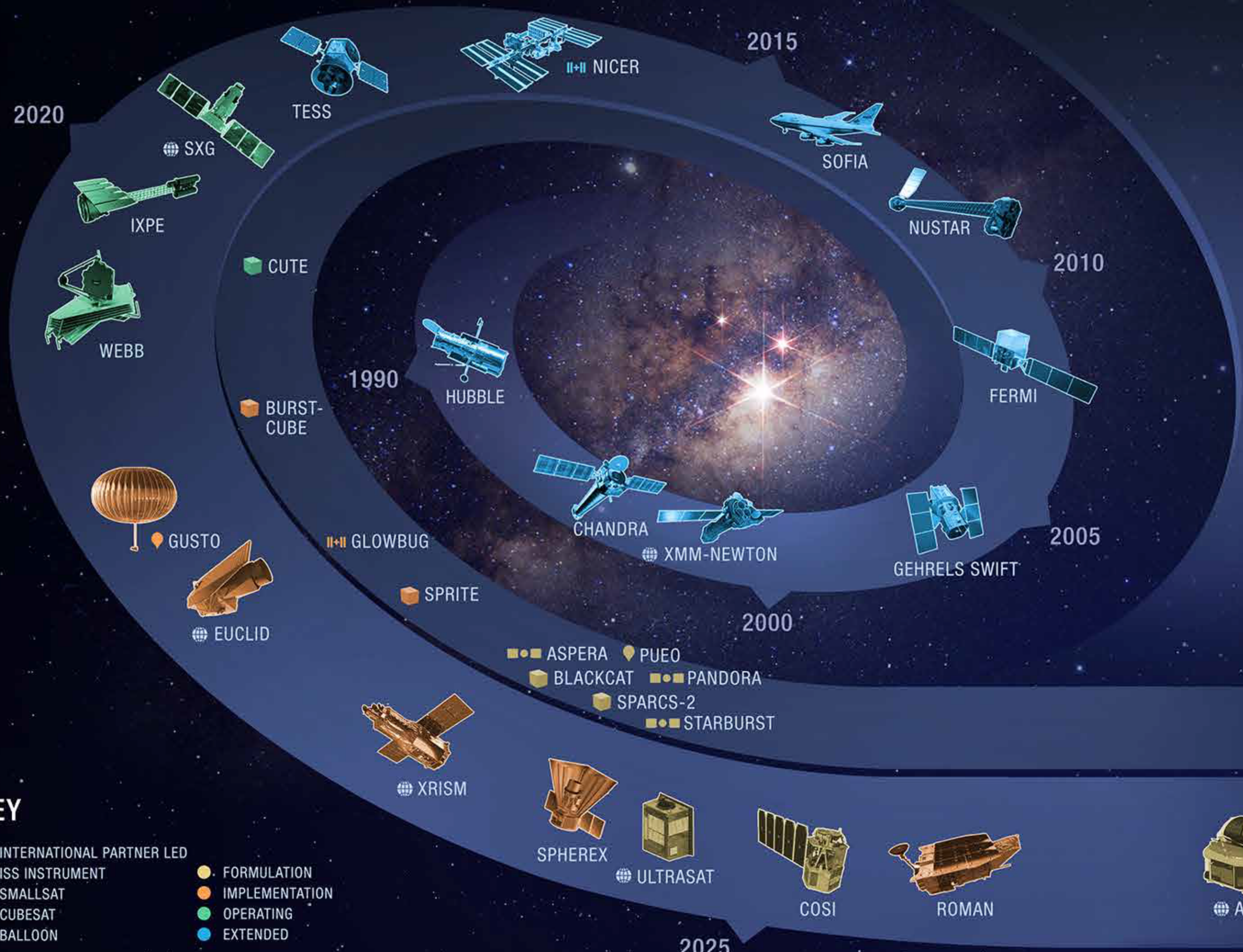
The Compton Spectrometer and Imager



- What are you most **excited** about?
 - Opening up the **MeV energy band** for the astrophysics community
 - **Growth** of the science team (85 members as of March 2024) and growing excitement.
 - **Seeing the Milky Way** in the light of different nuclear and annihilation lines
- What one thing would you like the PhysCOS/APS community to learn?
 - COSI just **passed Preliminary Design Review**, and the team is excited about final design, fabrication, and launch in 2027.
- What is **coming up** in the next year that you want to tell people about?
 - **Building and testing** the engineering model cryostat and starting to **fabricate** flight components.
- How would you like people to **get involved**?
 - **Public Data Challenges** for people to learn about COSI science and COSI software (<https://github.com/cositools/cosi-data-challenge-2> and <https://cosi.ssl.berkeley.edu/>)



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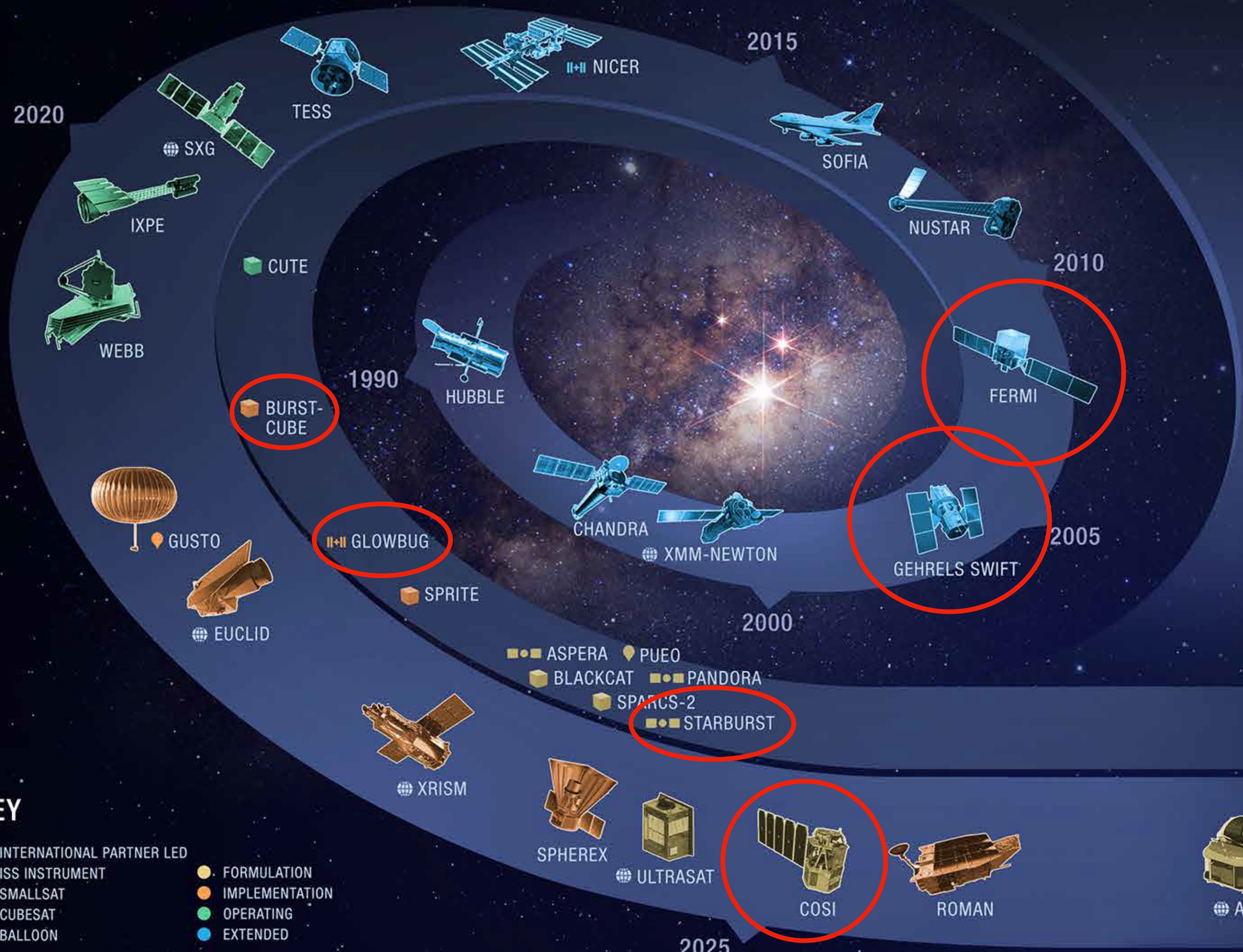
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