IXPE General Observer (GO) Program Cycle 1

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Overview

- IXPE extended past prime mission
- IXPE General Observer (GO) program
- General Observer Facility (GOF) at NASA GSFC
- GOF website: https://heasarcdev.gsfc.nasa.gov/docs/ixpe/

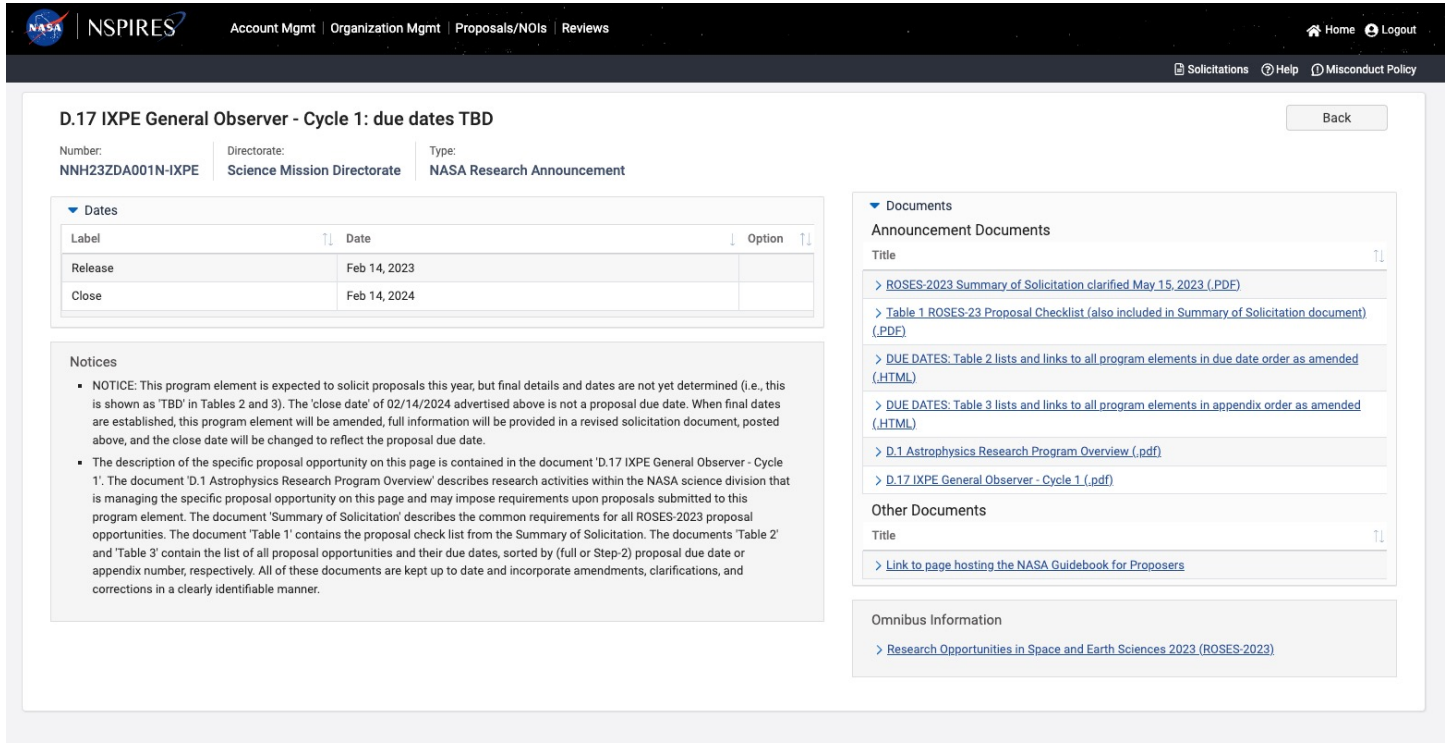
IXPE Imaging X-Ray Polarimetry Explorer

Timeline

Event	Date
Proposal submission opens	June 2023
Non-mandatory NOI due	September 18th, 2023
Phase I submission deadline	October 18th, 2023
Results/ Phase II	January 2024
Cycle 1 GO observations start	February 2024

Notice of Intent

- Non-mandatory
- Helps GOF estimate number of proposals
- Strongly encouraged
- Submission through NSPIRES
- Sept 18th deadline!



Cycle 1 Highlights

- Approximately 11 Msec observing time
- ~4 Msec for large proposals
- 300 ks joint NICER time
- Funding available (~$3M)
- Anticipate awarding ~30-40 proposals
- Regular, Large and Theory proposals
- ToO proposals also solicited
- Can request up to 6 months exclusive-use

Regular Proposals

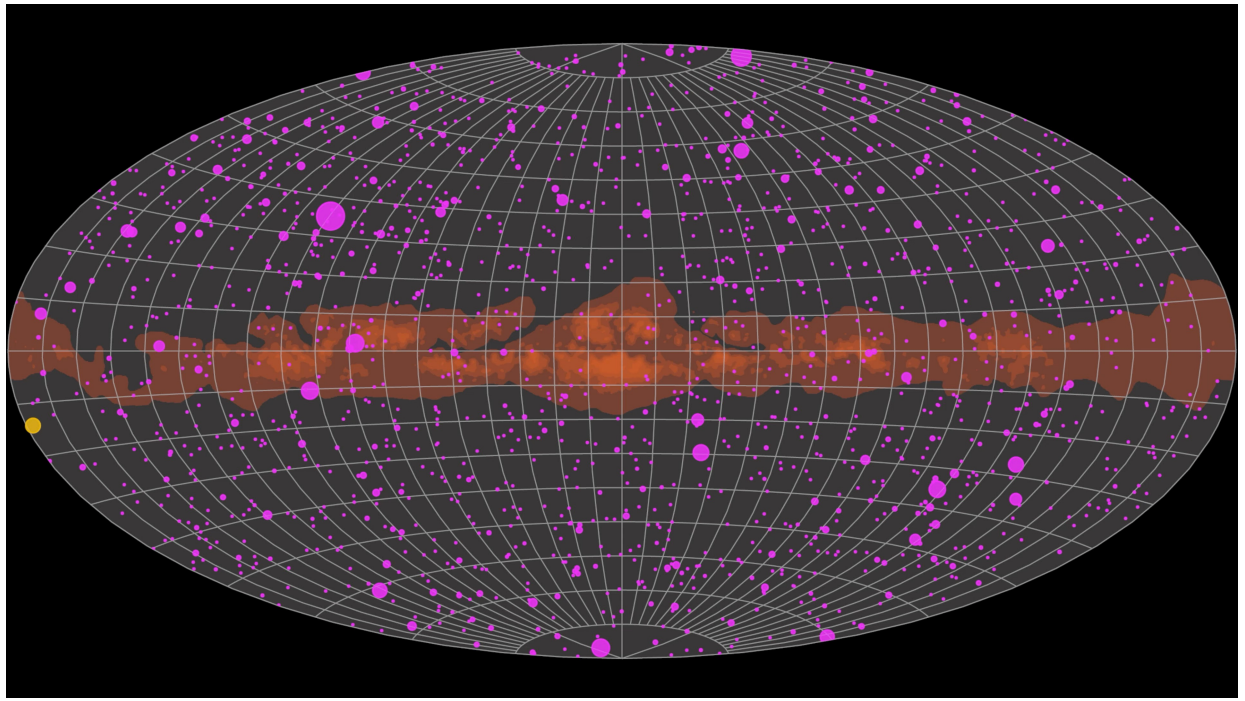
- Phase dependent and time constrained observations allowed
- Can request up to 5 observations of a target
- Maximum of 6 targets can be listed

Large program proposals

- ~4 Msec for large program (LP)
- All proposals requesting over 1.5 Msec considered large
- No exclusive use period for LP

Targets of Opportunity

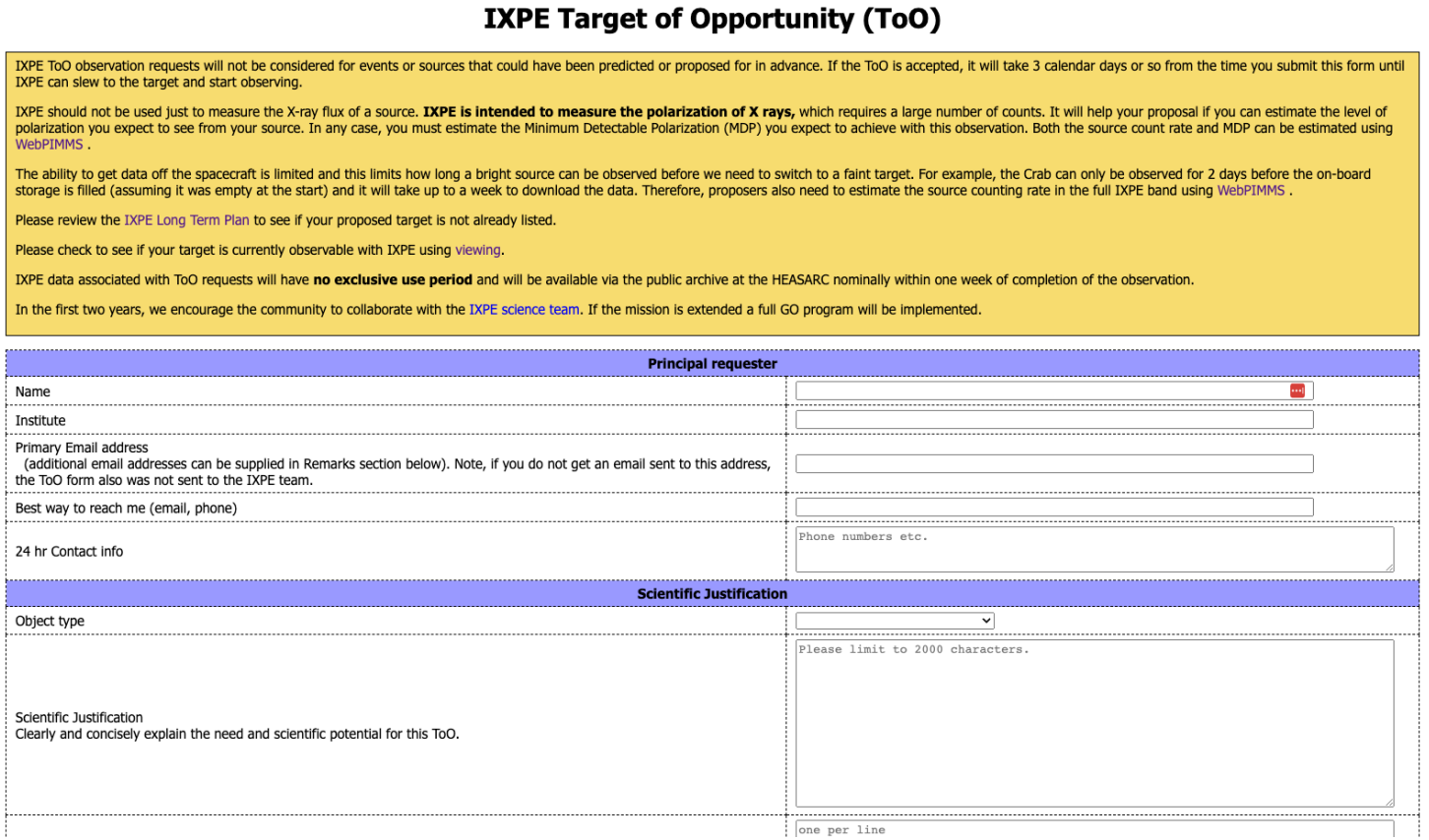
- ToO proposals for known targets
- Maximum of 6 potential targets
- Multiple triggers allowed per proposal (max 5)
- Max. exposure for individual ToO trigger – 1.5 Msec



Credit: NASA's Marshall Space Flight Center/Daniel Kocevski

Targets of Opportunity

- Unanticipated ToOs
- Through DDT time
- ToO form on IXPE project website at MSFC at https://ixpe.msfc.nasa.gov/for_scientists/too.html



IXPE Target of Opportunity (ToO)

IXPE ToO observation requests will not be considered for events or sources that could have been predicted or proposed for in advance. If the ToO is accepted, it will take 3 calendar days or so from the time you submit this form until IXPE can slew to the target and start observing.

IXPE should not be used just to measure the X-ray flux of a source. **IXPE is intended to measure the polarization of X rays,** which requires a large number of counts. It will help your proposal if you can estimate the level of polarization you expect to see from your source. In any case, you must estimate the Minimum Detectable Polarization (MDP) you expect to achieve with this observation. Both the source count rate and MDP can be estimated using WebPIMMS .

The ability to get data off the spacecraft is limited and this limits how long a bright source can be observed before we need to switch to a faint target. For example, the Crab can only be observed for 2 days before the on-board storage is filled (assuming it was empty at the start) and it will take up to a week to download the data. Therefore, proposers also need to estimate the source counting rate in the full IXPE band using WebPIMMS .

Please review the IXPE Long Term Plan to see if your proposed target is not already listed.

Please check to see if your target is currently observable with IXPE using viewing.

IXPE data associated with ToO requests will have **no exclusive use period** and will be available via the public archive at the HEASARC nominally within one week of completion of the observation.

In the first two years, we encourage the community to collaborate with the IXPE science team. If the mission is extended a full GO program will be implemented.

Principal requester	
Name	
Institute	
Primary Email address (additional email addresses can be supplied in Remarks section below). Note, if you do not get an email sent to this address, the ToO form also was not sent to the IXPE team.	
Best way to reach me (email, phone)	
24 hr Contact info	Phone numbers etc.
Scientific Justification	
Object type	
Scientific Justification Clearly and concisely explain the need and scientific potential for this ToO.	Please limit to 2000 characters.
	one per line

What counts as a trigger?

- ToO observations might need one or multiple triggers
- Example 1: Once triggered, request observations on Days 2, 5 and 10
  - This requires one trigger (and 3 observations)
  - In such cases, details need to be well characterized
- Example 2: PI will trigger one observation in hard state and one in soft state
  - This requires two triggers
  - Each trigger requires a new ToO form

Theory Proposals

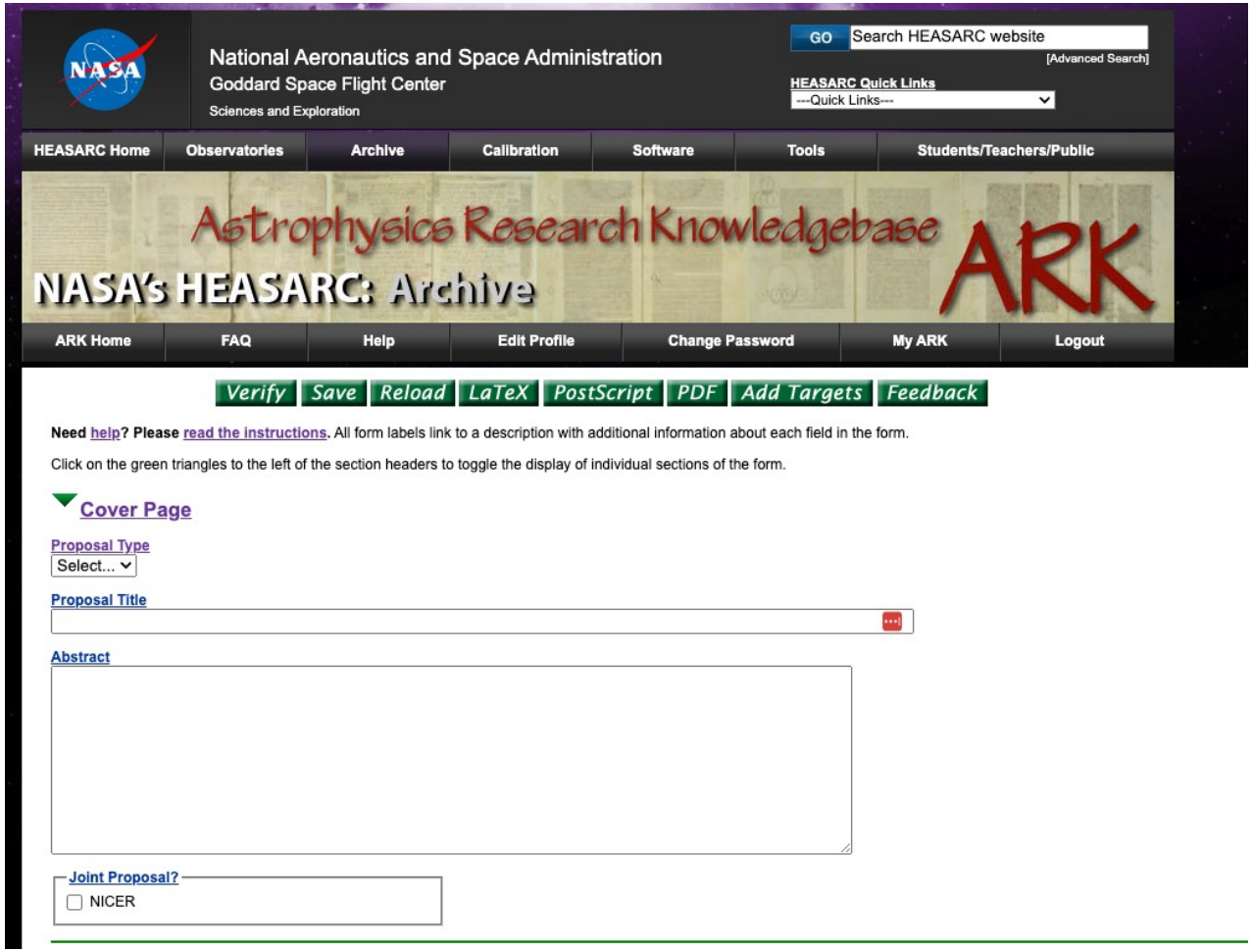
- Proposals for theoretical investigations are also solicited
- Aid in the interpretation of IXPE results
- Advance the science return of IXPE
- One year period of performance

Constraints and designations

- Accepted proposals are ranked Category A or C
- Category A guaranteed
- Category C executed on best effort basis
  - Funding available if C targets observed
- Time constrained and joint proposals need to be designated Category A
- Multi-cycle proposals not solicited

Proposal Requirements

- Phase I proposal – submission through ARK/RPS
  - Scientific/Technical Justification
    - 4-page limit (incl. figures & tables)
  - 5 pages for large proposal and joint NICER proposals
  - References do not count against page limit, can use an extra page.
  - Expertise and resources document



Technical Justification

- Must estimate MDP
  - Use measured polarization from similar sources from IXPE publications
  - Use a theory that predicts polarization
- Justify any time constraints
  - Make sure time constraints do not conflict with visibility windows

Dual Anonymous

- Scientific justification anonymized
- Expertise & Resources – not anonymized
  - Only seen by panel after ranking

Proposal Budget

- Phase II (budgets) - through NSPIRES
  - PIs will be emailed invitation to submit budgets
- Details of fair share amount will be included with invitation

Help Desk

- For questions about IXPE, datasets or the GO program, visit the help desk on the GOF website: https://heasarcdev.gsfc.nasa.gov/docs/ixpe/

- We are looking for volunteers for the review panels!
  - Please email Kavitha.arur@nasa.gov if you are interested.

Special Considerations for IXPE proposals

How is IXPE different?

- Need lots of counts to measure polarization
- Two main ways to get these counts:
  - Long observation of a faint source
    - Observations >=1 Msec are welcomed and encouraged!
  - Shorter observation of a bright source
    - Duration of observation will be limited by the telemetry constraints
    - Observation will be broken up by looks at faint sources

Telemetry Limits

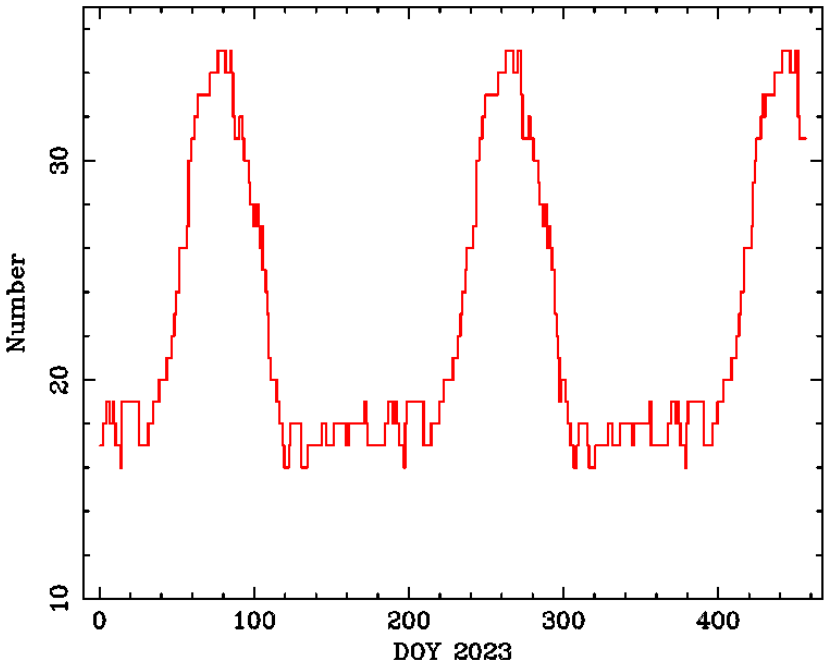
- Since IXPE takes a picture of every charge cloud produced
  - This produces more data (average is 1.6 kb/event) per photon than other X-ray missions
  - Limited on-board storage (4 GB total)
  - The equatorial orbit limits number of ground stations
    - One main (Malindi)
    - One backup (Singapore)
- This puts a restriction on how long we can observe a bright source
  - Roughly 75 ksec for the Crab
- Thus, long observations of bright sources must be broken up with observations of dimmer sources to get the telemetry down
  - Otherwise, we risk data loss

Proposal considerations

- What happens if you ask for 150 ksec on a 1-Crab source
  - The Science Operations Center (SOC) will split the observation in two “segments”
  - The SOC will make every attempt to put both segments in the same 6-month observing window
  - The data will be released when all segments complete
    - Note, if the observations cannot be completed in one window then the data will be released when the 6-month observing window closes
- If you ask for two 75 ksec observations, then
  - You will get the data from each observation when it completes

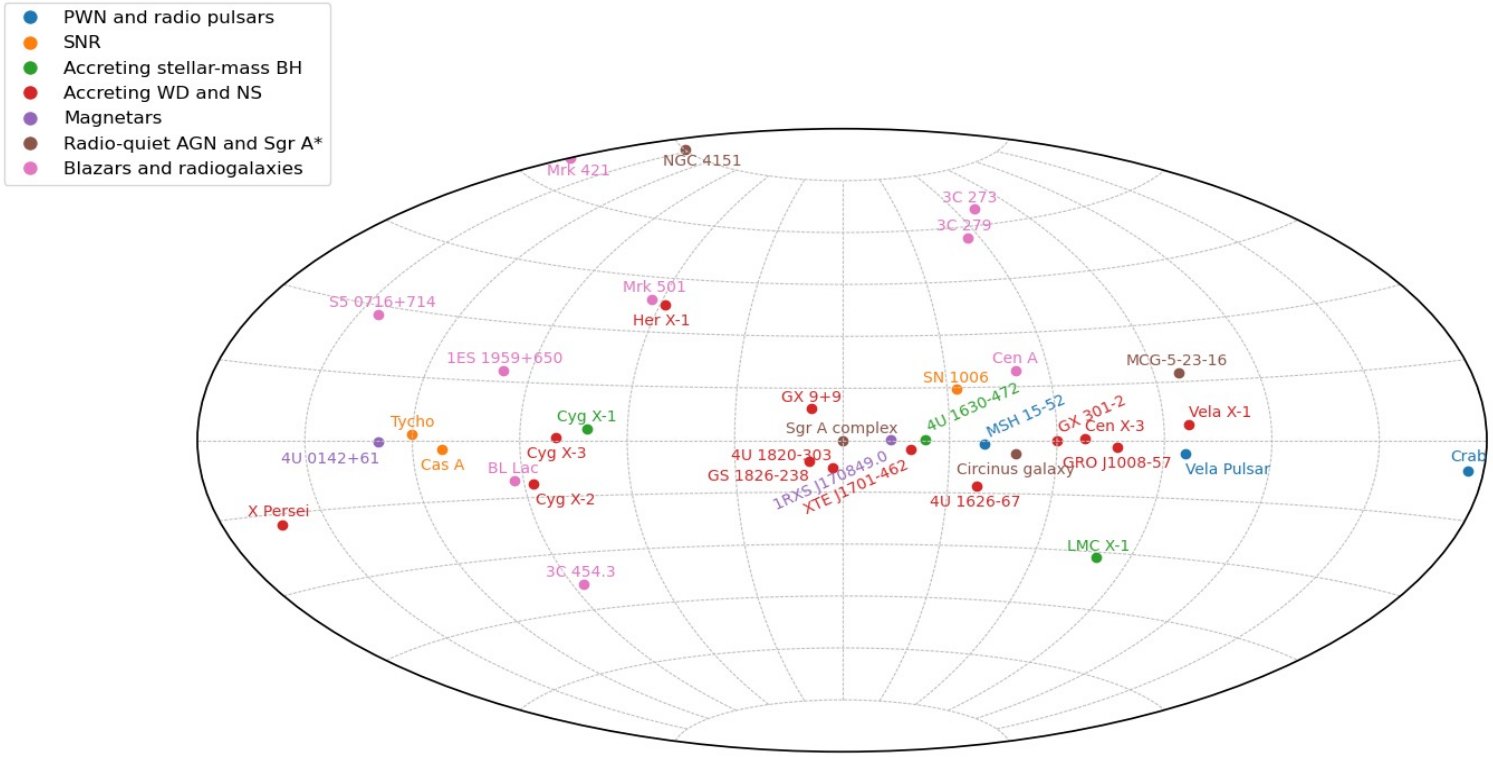
Visibility Windows

- IXPE can only look 90 +/- 25 degrees from the Sun
- This restricts when targets can be observed
- Figure shows the number of year 2 targets that can be observed on any given day
  - We plan to flatten this curve in GO program



Visibility Windows

- The Galactic Center is a very popular place for IXPE targets
- Much competition for the Feb-01 to May-01 window
- May-01 to Aug-01 have had less competition
- Cycle repeats every 6 months



Thank you!