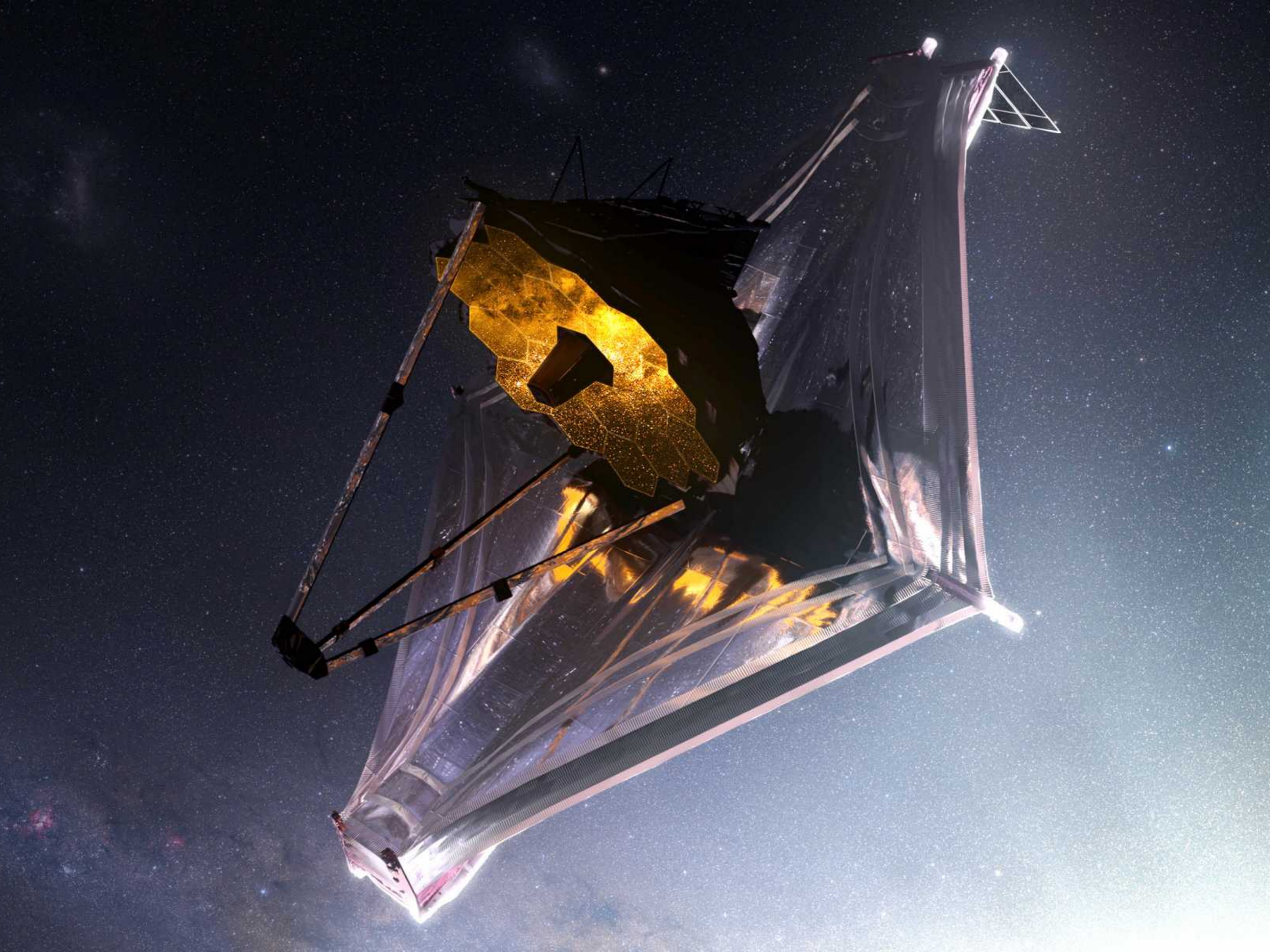


Proposal Writing & Final Projects



Eric Bellm
ASTR 597A, Winter 2023
University of Washington

Why do we have proposals?





how economics shapes science

paula stephan



*"O.K., let's slowly lower in the grant
money."*

Todd Bearson
Arlington, Mass.

What kinds of proposals are there?

What makes a good proposal?

**How can you learn
to write better proposals?**



For Researchers

[Overview](#)[FAQ](#)[Solicitations](#)[SMD Bridge Program](#)[ROSES Blog](#)[NAC Science Committee](#)[NASA Postdoc Program](#)[More ▾](#)

Funding Opportunities and Announcements

[Jump down to Announcements](#)

Funding Opportunities

ROSES-2022

- The 2022 version of Research Opportunities in Space and Earth Science (ROSES-2022) was posted at <https://solicitation.nasaprs.com/ROSES2022> on February 14, 2022.
- Table 2 with all program elements organized by due date was posted at <https://solicitation.nasaprs.com/ROSES2022table2>
- Table 3 with all program elements organized by subject matter was posted at <https://solicitation.nasaprs.com/ROSES2022table3>
- The FAQ on what's new in ROSES-2022 was posted at <https://science.nasa.gov/researchers/sara/faqs/#1> and links to slides and a recording of a What's new in ROSES talk may be found in [the Library](#) under "Links".
- We have a few ways for proposers to keep up to date with changes to ROSES after release. You are encouraged to:
 - Subscribe to the SMD NSPIRES mailing lists (by logging in at <https://nspires.nasaprs.com> and checking the appropriate boxes under Account Management and Email Subscriptions),
 - Bookmark the ROSES-2022 blog for clarifications, corrections and amendments at <https://science.nasa.gov/researchers/sara/grant-solicitations/roses-2022/> and
 - Subscribe to the relevant ROSES-2022 due date Google calendars. Instructions have been posted at <https://science.nasa.gov/researchers/sara/library-and-useful-links> or you may follow this link to download the PDF [How to Subscribe to](#)

For Researchers

- > [Advisory Committees](#)
- > [Announcement of Opportunity](#)
- > [Community Town Hall Meetings](#)
- > [DMP FAQ](#)
- > [Dual-Anonymous Peer Review](#)
- > [Solicitations and Announcements](#)
- > [Grant Stats](#)
- > [How To Guide](#)
- > [Library and Useful Links](#)
- > [NASA Workforce Study](#)
- > [New PI Resources](#)
- > [No Due Date Programs](#)
- > [Program Officers List](#)
- > [ROSES Blog](#)
- > [ROSES Budget Redaction](#)
- > [ROSES FAQ](#)
- > [Volunteer to Review](#)

ROSES-2022
TABLE 2: SOLICITED RESEARCH PROGRAMS
(In (Step-2) Proposal Due Date Order) [1]

APPENDIX	PROGRAM	NOI or Step-1 Due Date [2]	(Step-2) Proposal Due Date
A.1	Earth Science Research Overview	N/A	N/A
B.1	Heliophysics Research Program Overview	N/A	N/A
C.1	Planetary Science Research Program Overview	N/A	N/A
D.1	Astrophysics Research Program Overview	N/A	N/A
E.1	Biological and Physical Sciences Research Overview	N/A	N/A
F.1	Cross Division Research Overview	N/A	N/A
A.52	Earth System Science for Building Coastal Resilience	04/07/2022	05/17/2022
D.2	Astrophysics Data Analysis	04/01/2022	05/19/2022
A.8	Physical Oceanography	04/22/2022	05/25/2022
F.3	Exoplanets Research	03/31/2022 (Step-1)	05/26/2022 (Step-2)
A.33	ECOSTRESS Science and Applications Team	05/04/2022	06/01/2022
A.27	Making Earth System Data Records for Use in Research Environments	04/26/2022	06/02/2022
C.17	Planetary Science Enabling Facilities	04/08/2022 (Step-1)	06/03/2022 (Step-2)
B.7	Space Weather Science Application Research-to-Operations-to-Research	04/12/2022 (Step-1)	06/14/2022 (Step-2)
A.23	Earth Surface and Interior	04/13/2022	06/15/2022
C.19	Development and Advancement of Lunar Instrumentation	04/13/2022 (Step-1)	06/15/2022 (Step-2)
C.21	Yearly Opportunities for Research in Planetary Defense	04/21/2022 (Step-1)	06/16/2022 (Step-2)
A.36	Earth Science Applications: Agriculture	05/05/2022	06/17/2022
F.17	Economic, Social, and Policy Analyses of Orbital Debris and Space Sustainability	N/A	06/17/2022
B.11	Heliophysics Flight Opportunities for Research and Technology	N/A	06/22/2022
C.10	Cassini Data Analysis Program	05/05/2022 (Step-1)	07/07/2022 (Step-2)
A.2	Land-Cover/Land-Use Change	04/14/2022 (Step-1)	07/14/2022 (Step-2)

D.2 ASTROPHYSICS DATA ANALYSIS

NOTICE: Corrected March 16, 2022. Vestigial text inconsistent with DAPR has been deleted from the penultimate paragraph in Section 1.2, where deleted text now appears as strikethrough. The due dates are unchanged: Notices of intent are requested by April 1, 2022, and proposals are due May 19, 2022.

1. Scope of Program

Over the years, NASA has invested heavily in the development and execution of an extensive array of space astrophysics missions. The magnitude and scope of the archival data from those missions enables science that transcends traditional wavelength regimes and allows researchers to answer questions that would be difficult, if not impossible, to address through an individual observing program. To capitalize on this invaluable asset and enhance the scientific return on NASA mission investments, this Astrophysics Data Analysis Program (ADAP) program in ROSES provides support for investigations whose focus is on the analysis of archival data from NASA space astrophysics missions.

1.1 Special Considerations for ADAP Proposers

- For the first time, data from NASA's Imaging X-ray Polarimetry Explorer (IXPE) will be available in the public domain and eligible for support under the ADAP. Launched 9 December 2021, IXPE is a NASA Small-Explorer Mission, in partnership with the Italian space agency (Agenzia Spaziale Italiano, ASI). IXPE data and data products will be publicly available at NASA's HEASARC (<https://heasarc.gsfc.nasa.gov/docs/heasarc/missions/ixpe.html>) within one week of completion of each observation. These include Level-1 (with electron-track images) and Level-2 event files; attitude, orbital position, and other relevant engineering data; and updates to the master observing list. Prospective proposers are reminded that only data products available in the public domain at the ADAP 2022 proposal submission deadline are eligible for support under this solicitation (see Section 1.3).
- Proposals submitted to this program will be evaluated using the dual-anonymous peer review process introduced under ROSES-2020. In this process, not only are proposers unaware of the identity of the members on the review panel, but the reviewers will be unaware of the identities of the proposing team during the merit evaluation of the proposal (see Section 2, below). The overarching objective of dual-anonymous peer review is to reduce unconscious bias in the evaluation of the merit of a proposal.



- 1. Topic X is important and interesting.**
- 2. But.**
- 3. This is how we will address "But."**

<https://www.discovermagazine.com/the-sciences/unsolicited-advice-x-how-to-frame-a-winning-proposal>



"proposals live or die not on the beauty of your prose, but on the structure of your argument. If the reviewer does not believe that you've made the case for importance, feasibility, and efficiency, you're done."

<https://www.discovermagazine.com/the-sciences/unsolicited-advice-xiii-how-to-craft-a-well-argued-proposal>



List:

1. Selling Points

2. Potential Weaknesses to Shore Up

and get early feedback!

<https://www.discovermagazine.com/the-sciences/unsolicited-advice-xiii-how-to-craft-a-well-argued-proposal>



Merit Review Criteria

When evaluating NSF proposals, reviewers should consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits would accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers are asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.



> Inclusion

Increasing and including the participation of women, persons with disabilities and underrepresented minorities in STEM.



> STEM education

Improving education and educator development — at any level — in science, technology, engineering and mathematics.



> Public engagement

Increasing public scientific literacy and public engagement with STEM.



> Societal well-being

Improving the well-being of individuals in society.



> STEM workforce

Developing a more diverse, globally competitive STEM workforce.



> Partnerships

Building partnerships between academia, industry and others.



> National security

Improving national security.



> Economic competitiveness

Increasing the economic competitiveness of the U.S.



> Infrastructure

Enhancing infrastructure for research and education.



Five Review Elements

The following elements should be considered in the review for **both criteria**:

1. What is the potential for the proposed activity to:
 - a. advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - b. benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or institution to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home institution or through collaborations) to carry out the proposed activities?

https://www.nsf.gov/bfa/dias/policy/merit_review/overview.pdf

General Proposal Evaluation Criteria

NASA asks that you consider 3 factors in your evaluation of proposals

1. Intrinsic Scientific/Technical Merit
2. Relevance to NASA
3. Cost Realism/Reasonableness

1. Intrinsic Scientific/Technical Merit.

Evaluation of Intrinsic Merit includes the consideration of the following:

- The overall scientific quality of the proposed project, including the scientific rationale and the expected significance and/or impact of the proposed work;
- The overall technical quality of the proposed work, including the quality of the management plan and project timeline, as well as the effectiveness and resilience of the proposed approach for achieving the goals of the investigation;
- The sufficiency and appropriateness of the Data Management Plan.

Notice - no longer includes qualifications of the team and the facilities/resources they bring to the table.

But does include evaluation of the (required) DMP.

Evaluation is against the state-of-the-art. Review panels are cautioned not to compare the merits of one proposal against those of another when conducting their evaluations.



General Proposal Evaluation Criteria

2. Relevance to NASA.

Evaluation of NASA Relevance involves consideration of the potential contributions of the proposed investigation to:

- the scientific productivity of NASA's current and past space flight missions; and
- specific objectives and goals identified in the appendix D.2 of the ROSES 2022 NRA.

3. Cost Realism/Reasonableness.

Evaluation of the Cost Realism of a proposal involves consideration of whether the proposed work effort and other direct costs are commensurate with the requirements of the proposed investigation.

- Personnel costs should be assessed in terms of work effort, not in terms of dollar cost. Consequently, such information is redacted in the NSPIRES cover page, and should not be included in the anonymized proposal document.
- Proposals are still required to include a Summary of Work Effort and explanatory budget justification in the anonymized proposal document to enable this evaluation.



A Snapshot of the NASA Review Panel

Overall Goals & Process of NASA Reviews

- The goal of any NASA review is to fund the best, most relevant science that we can afford.
- Panel reviews are considered along with programmatic factors as NASA Program Officers develop selection recommendations for presentation to the selecting official, Astrophysics Division Chief Scientist Eric Smith, who makes the final selection decisions.

Your Panel's Job

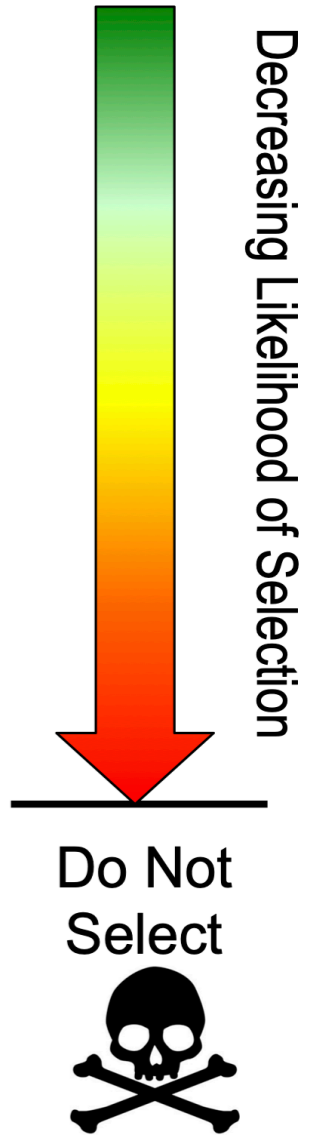
- Create a written panel evaluation for each proposal assigned to your panel by the end of the final day.
- Assign an adjectival rating to each proposal and create a rank-ordered list of all proposals.
- Review the E&R documents for the highest-rated proposal and validate the qualifications of the proposing teams
- Debrief the ADAP Program Officer on the results of the panel (Panel Chair)

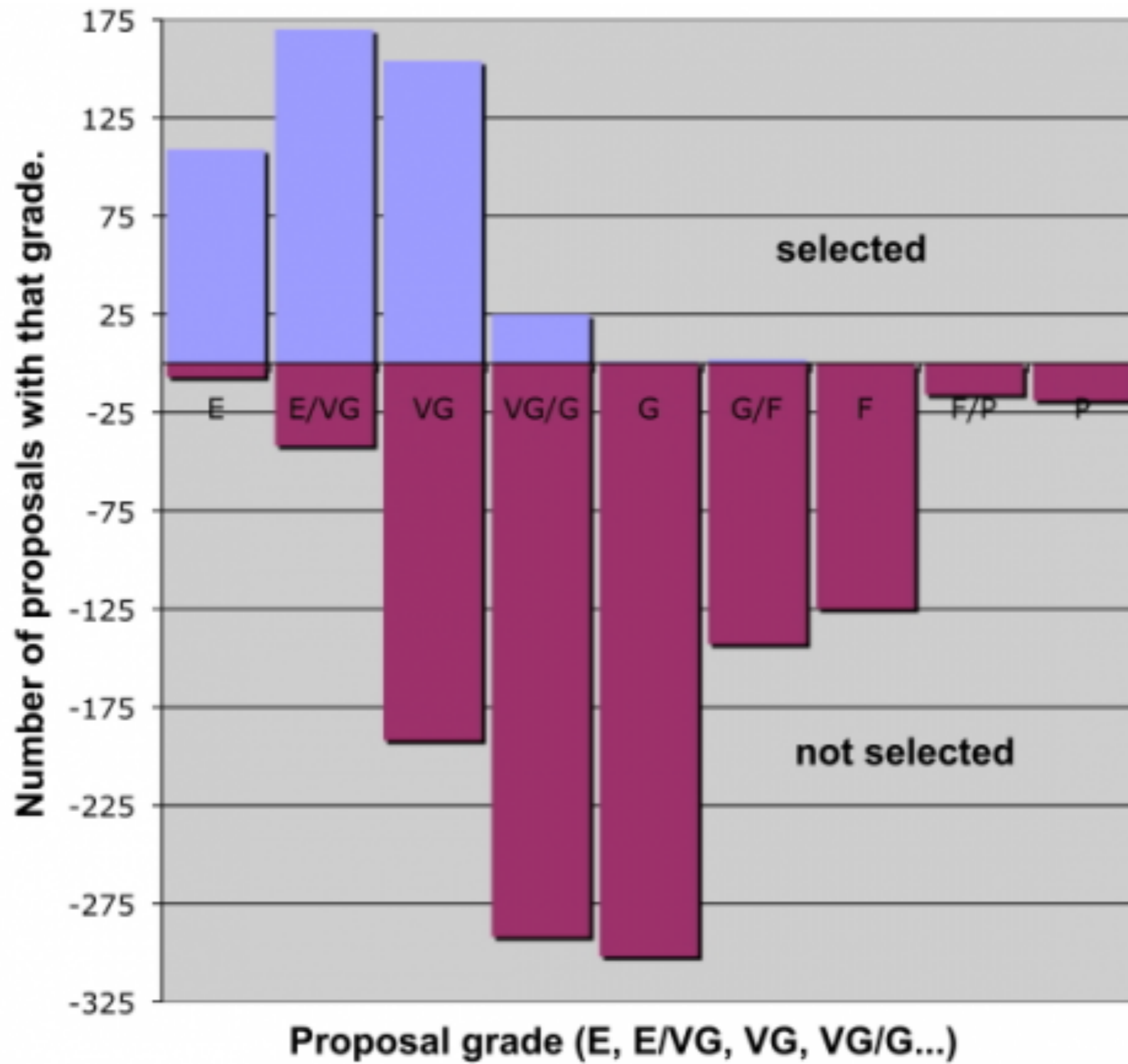
Differences from other proposal reviews and funding agencies

- Proposers only receive the final panel evaluation, not the individual reviews.
- No triage is performed; all proposals are discussed.
- Proposals are not required to have a training or Public Outreach component; the inclusion of such a component might be cited as a minor strength, but the lack thereof is not a weakness.

The Adjectival Rating Scale

Adjectival Rating	Basis for Adjectival Rating	Relationship of Adjectival Rating to Potential for Selection
Excellent	A thorough and compelling proposal of exceptional merit that fully responds to the NRA objectives as documented by numerous or significant strengths and a lack of major weaknesses.	Top priority for selection in the absence of any issues of funding availability or programmatic priorities.
Very Good	A competent proposal of high merit that fully responds to the objectives of the NRA, whose strengths fully outbalance any weaknesses, and none of whose weaknesses constitute a fatal flaw.	High priority for selection in the absence of any issues of funding availability or programmatic priorities.
Good	A competent proposal that represents a credible response to the NRA, whose strengths and weaknesses essentially balance.	Low priority, but may be selected as funds permit based on programmatic priorities.
Fair	A proposal that provides a nominal response to the NRA but whose weaknesses outweigh any strengths.	Not selectable regardless of the availability of funds or programmatic priorities.
Poor	A seriously flawed proposal having one or more major weaknesses that constitute a fatal flaw.	Not selectable regardless of the availability of funds or programmatic priorities.

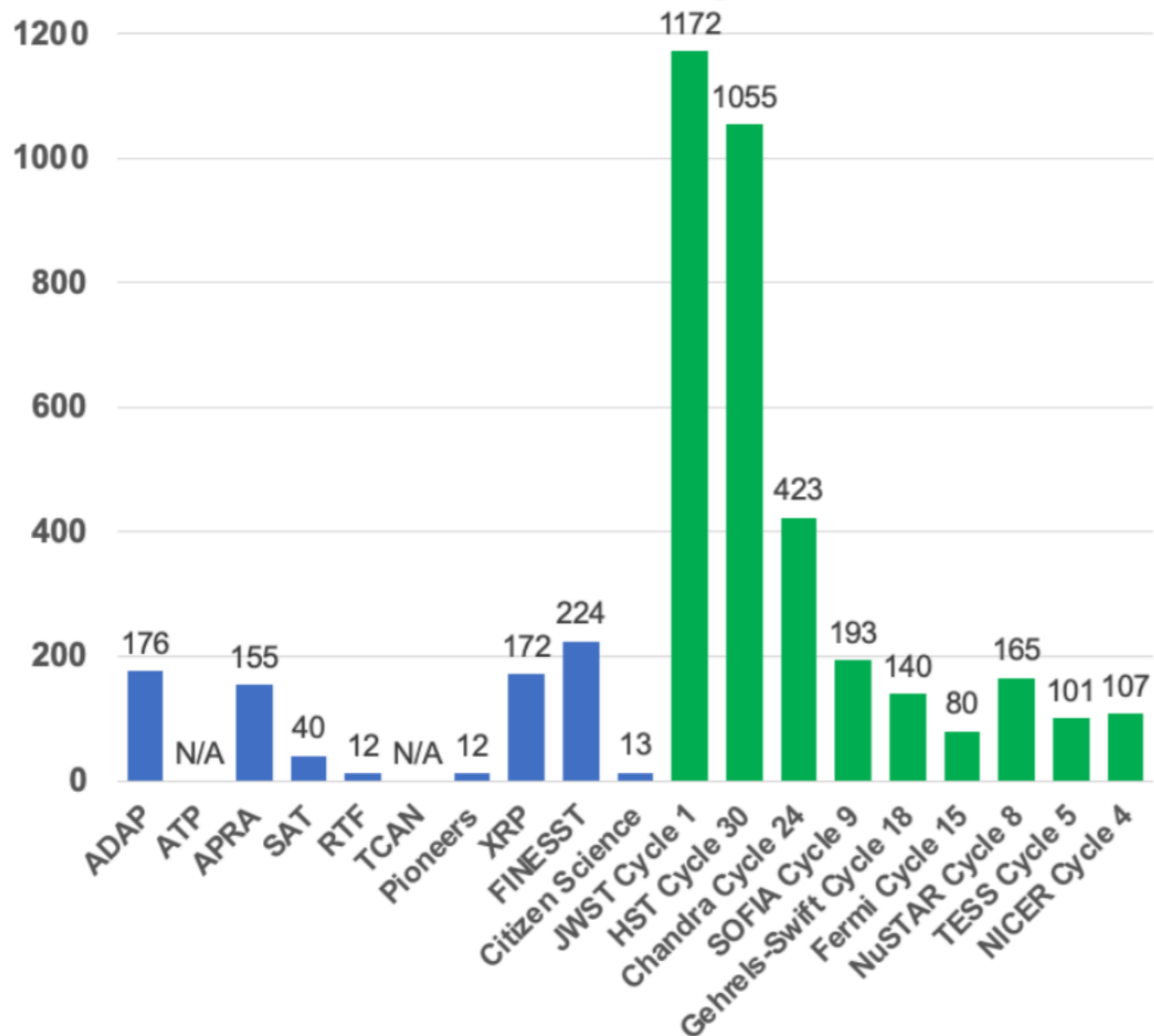




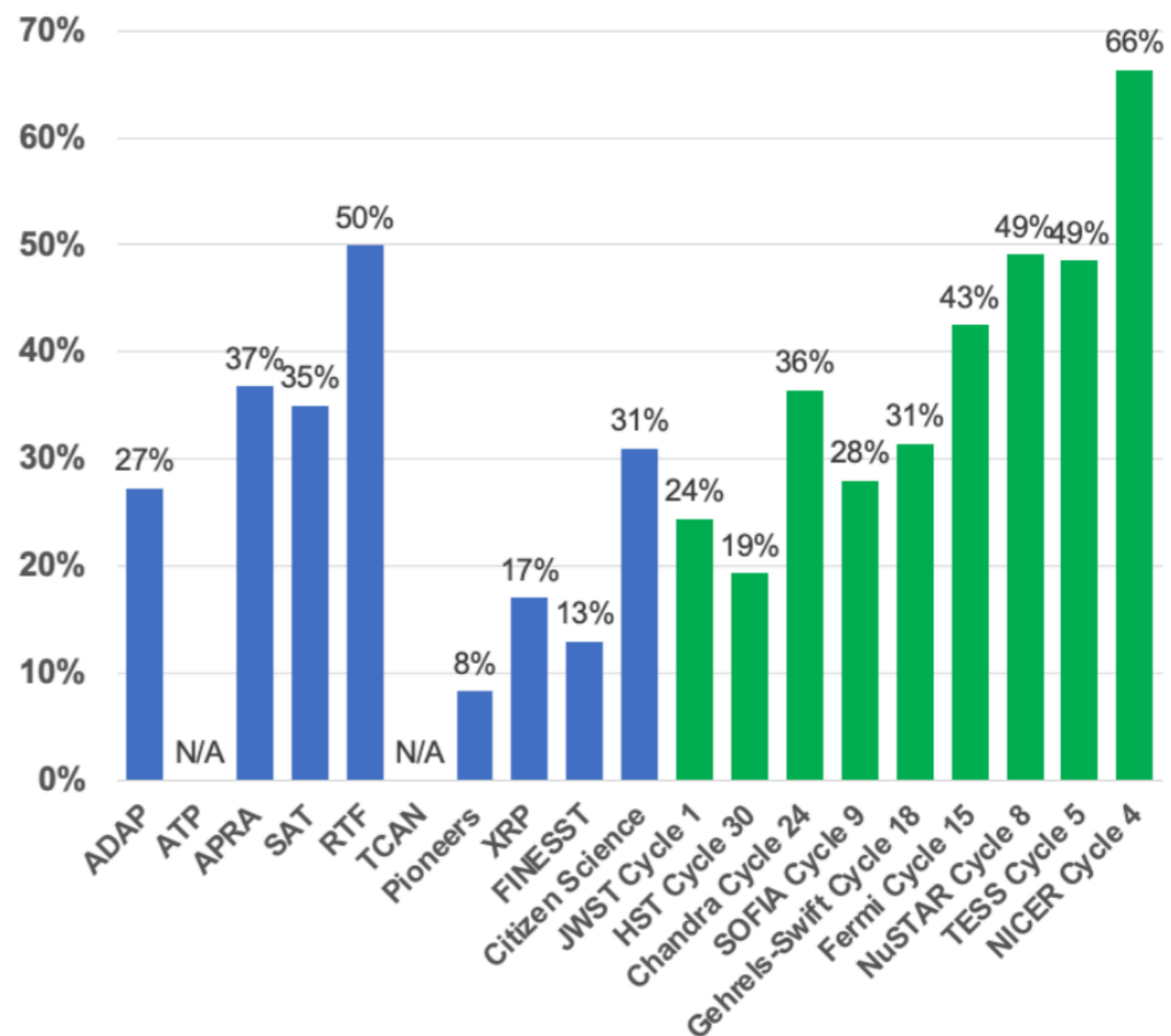
Astrophysics R&A Selection Rates

September 2021-2022

Number of Proposals



Selection Rates



R&A: 804 proposals

GO/GI: 3,436 proposals


Total: 4,240 proposals

R&A: 22% (19% last year)

GO/GI: 28%

Average: 27%

**Funding Rate by State and Organization
from FY 2013 to 2022
for Direct For Mathematical and Phys**

Org (Drill to Next Level)	FY	Number of Proposals	Number of Awards	Funding Rate	Average Decision Time (months)	Mean Award Duration (years)	Median Annual Size
 MPS	2022	7,192	2,415	34%	6.08	3.02	\$126,358
	2021	8,114	2,422	30%	6.00	3.16	\$131,880
	2020	8,620	2,560	30%	6.11	3.14	\$117,394
	2019	8,045	2,415	30%	6.81	3.51	\$98,611
	2018	8,804	2,594	29%	6.10	3.67	\$87,466
	2017	8,848	2,334	26%	5.82	3.72	\$83,509
	2016	9,201	2,434	26%	5.94	3.74	\$84,336
	2015	9,130	2,590	28%	6.07	3.62	\$87,936
	2014	8,856	2,345	26%	6.25	3.57	\$83,114
	2013	8,903	2,201	25%	6.10	3.61	\$82,500
AST	2022	949	214	23%	6.33	2.95	\$160,780
	2021	934	232	25%	6.39	2.92	\$164,468
	2020	943	228	24%	6.08	2.89	\$153,022
	2019	899	215	24%	6.41	3.69	\$122,377
	2018	833	206	25%	5.94	4.11	\$103,478
	2017	876	177	20%	5.55	4.02	\$100,445
	2016	987	222	22%	5.74	4.38	\$106,016
	2015	1,041	216	21%	6.26	3.94	\$101,453
	2014	1,071	204	19%	5.63	3.92	\$100,082
	2013	1,118	185	17%	5.98	4.06	\$102,130



VERA C. RUBIN
OBSERVATORY

Goals

Our course goal is to prepare you for early science with LSST.

Background knowledge

Technical skills

Personal contacts

The goal of the final project is to encourage you to *get specific*.

You've only really got time to lead one major project early in LSST. What should it be?

We're offering two options for final projects.

Data Analysis

Write a ~5 page ApJL-style paper analyzing DP0.2 or the simulated solar system catalog.

Proposal for Early Science

Write a ~5 page proposal to support the science question you want to answer with commissioning and the first year or two of Rubin data.

Suggestions

Be ambitious!

What is the highest-impact science question you could pursue early in LSST?

Be strategic!

Where do your skills and resources give you an advantage?

Be introspective!

How do these intersect with your own interests and goals?

Be prepared!

How can you start validating this project today?

How can you get ideas?

Read the Science Book as well as newer papers from precursor surveys (HSC, DES, ZTF, etc.)

Brainstorm with classmates, your instructors, the guest speakers...

Outline the selling points and potential weaknesses and get feedback!

To determine what kind of proposal to write, identify the blockers.

Imagine you have an RSP full of LSST data!

How do you find the objects you care about?

Once you find them, what do you need in order to write a good paper?

Optical spectra? JWST time? \Rightarrow observing proposal

Massive MCMC runs or image reprocessing? \Rightarrow HPC proposal

Independence to do the analysis? \Rightarrow fellowship/grant proposal

Identify a concrete proposal call

(e.g., NOIRLab TAC, NASA GO programs; ACCESS CI; NSF GRFP, AAPF, AAG; DOE fellowships)

Your last homework will be to peer-review each others' proposals, TAC-style.

You'll provide comments on the strengths and weaknesses of two elements:

1. Scientific Merit
2. Technical Feasibility

and rate each Excellent/Very Good/Good/Fair/Poor.

Scores and comments will be provided anonymously to each other but won't affect the proposer's grade.

We will grade your reviews based on their quality and helpfulness.

