

PHY 517 / AST 443: Observational Techniques in Astronomy

Lecture 6:

Proposals Time Allocation Committee

Telescope time / data analysis proposals

- writing (successful) proposals is an essential part of being a researcher
- ... at the latest, when you need to apply for funding
- observational astronomers need to submit proposals for telescope time
- can also submit proposals for funding to analyze existing data

Example: Hubble Space Telescope

- proposal deadline once per year (~April)
- typically ~1000 proposals: time, archival, theory
- ~20% success rate
- open to anyone

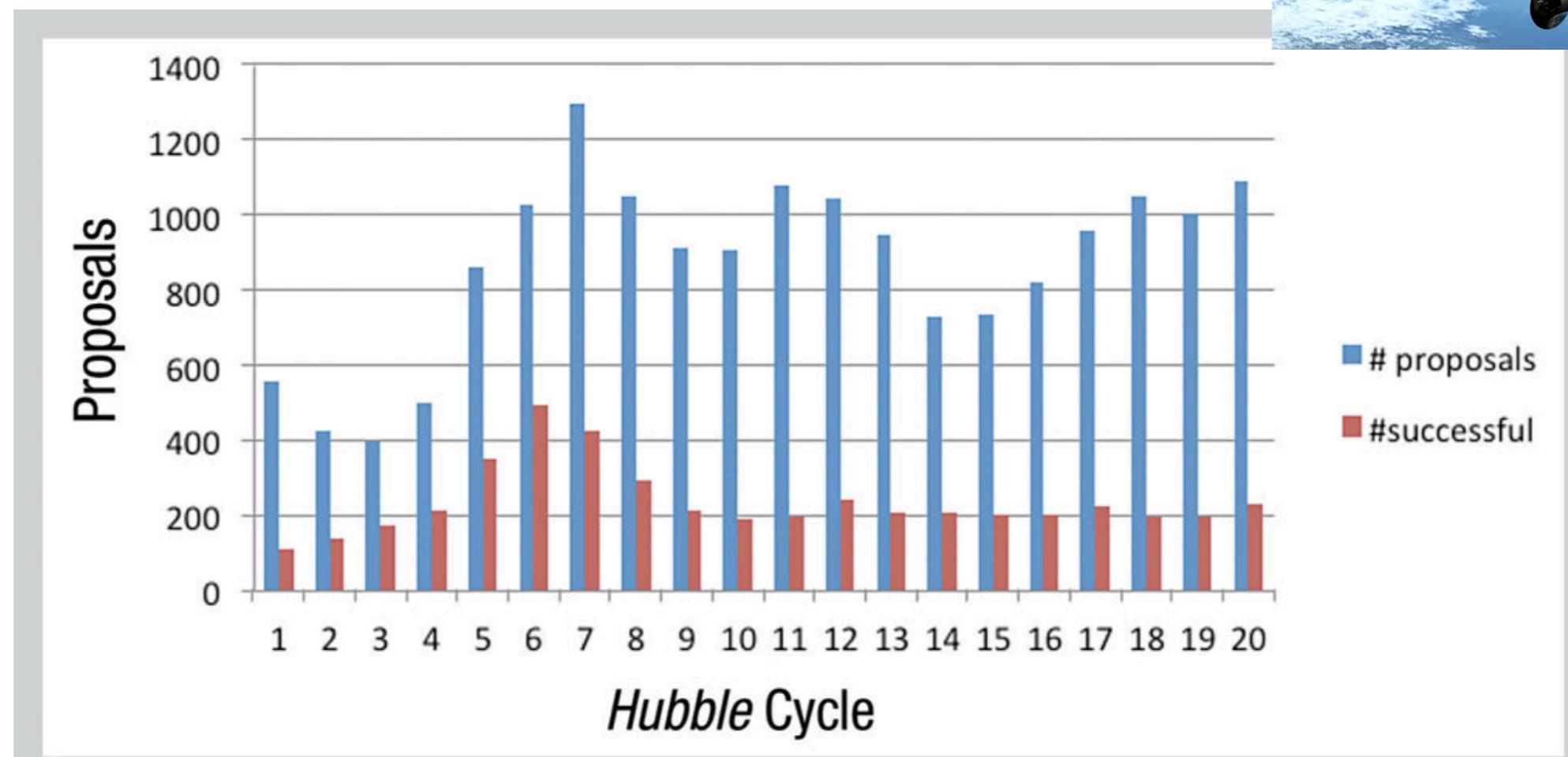


Figure 1: Hubble proposal pressure by number of proposals. The blue histogram shows the number of proposals submitted each cycle; the red shows the number accepted. The Cycle 7 statistics include the cycle 7N and 7AR proposals. The oversubscription ranges from 2:1 in Cycle 6 to more than 5:1 since SM4.

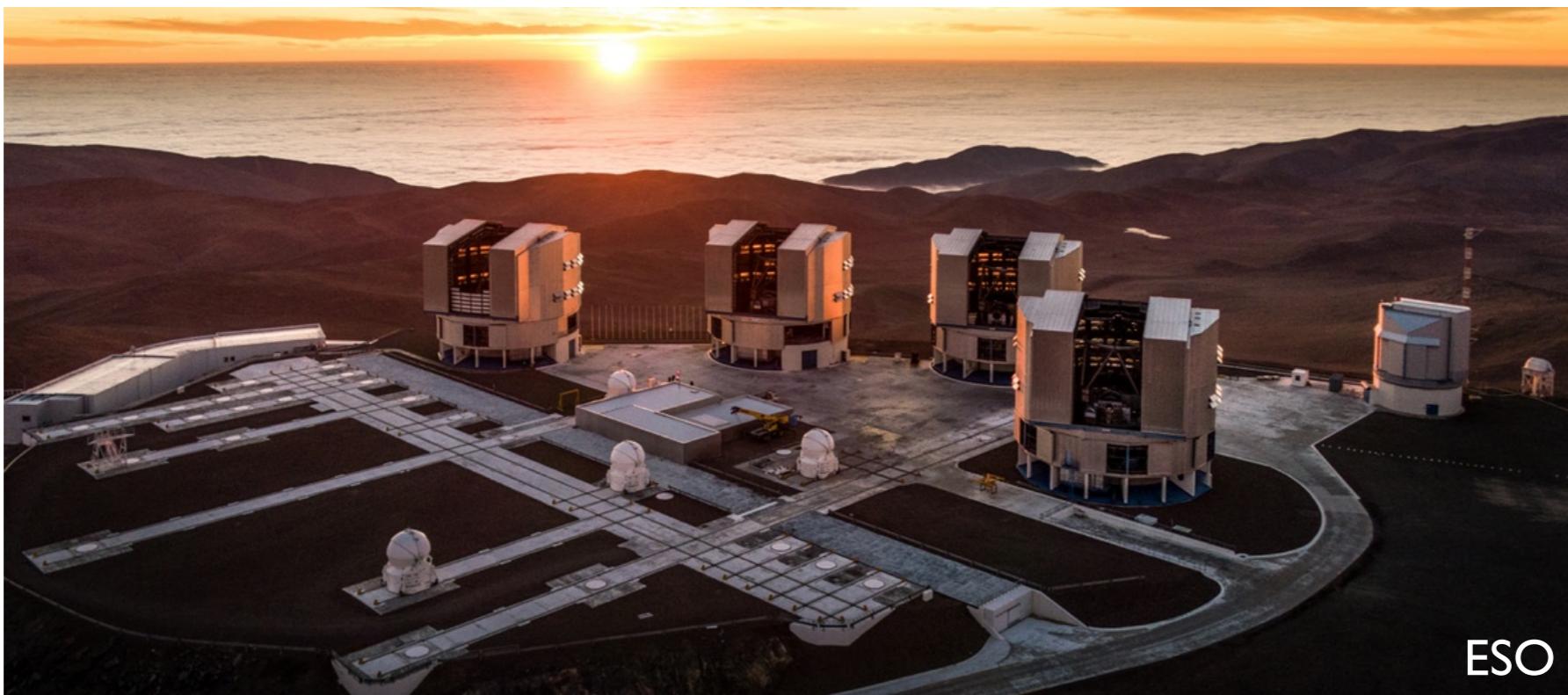
NOAO

- NOAO = National Optical Astronomical Observatories
- US national research & development center for ground-based night-time astronomy
- manages most telescopes with US-wide access
- own facilities: Kitt Peak National Observatory (KPNO, Arizona), Cerro-Tololo Inter-American Observatory (CTIO, Chile)
- Calls for Proposals 2x per year; deadlines end of September and end of March



ESO

- ESO = European Southern Observatory
- manages the Very Large Telescope (VLT; Chile)
- also open to anyone; preference for European projects only in direct conflicts
- Calls for Proposals 2x per year; deadlines end of September and end of March



ALMA

- ALMA = Atacama Large Millimeter Array
- multi-national project
- proposals through respective managing facilities, e.g. for US: NRAO = National Radio Astronomy Observatory
- proposals ~1x per year



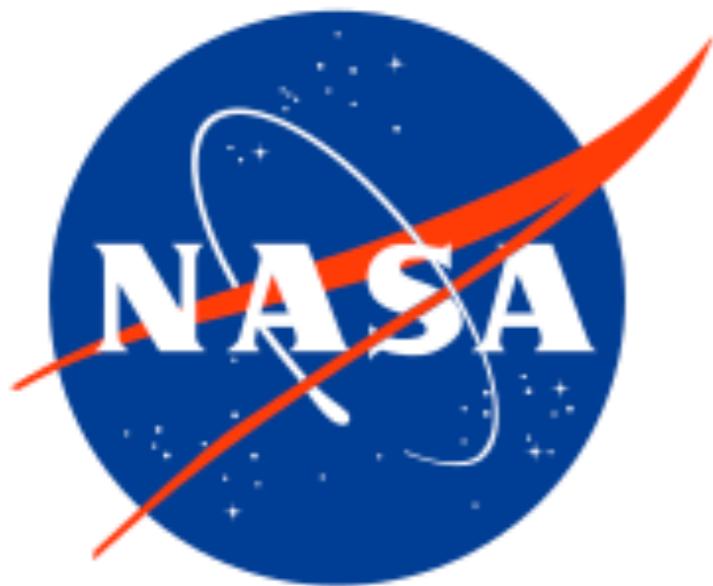
Other telescopes

- some facilities are not open-access, but only available to researchers at the institutions / countries who built / finance them
- for example:
 - Keck telescopes (mostly CalTech, University of California + University of Hawaii)
 - Subaru telescope (mostly Japan + University of Hawaii)



NASA

- Calls for Proposals for observing time on active missions (Hubble, Chandra, etc.) includes proposals for analysis of archival data
- Research Opportunities in Space and Earth Sciences (ROSES): funding for broad range of research activities under NASA, including analysis of archival data



National Science Foundation (NSF)

NSF Astronomy & Astrophysics Research Grants:

- funding for broad range of research, including analysis of telescope data (yours, or public)
- deadline once a year



PHY517 / AST443 proposals

- each of you will write a ~~telescope~~ *data analysis* proposal for your Lab 3
- you will then review the other students' proposals
- we will hold a Time Allocation Committee (TAC) meeting to discuss and rank the proposals
- each group will conduct their top-ranked project

PHY517 / AST443 proposals

- Proposal deadline: **Monday, Mar. 15, 3pm (strict !)**
- Time Allocation Committee: **Wednesday, Mar. 24**

Possible project resource: basic astronomy

- think back to your introductory astronomy class (e.g. AST203)
- there are some “classic” measurements, e.g. redshift-distance relation
- you could choose one of these
- make sure that there is a measurement goal!

Possible project resource: astro-news

- check astronomy news (e.g. Sky & Telescope)
 - is there something that inspires you to look at further data?
 - research the scientific background
-
- make sure that there is a measurement goal!
 - example: “*I want to make a pretty picture of this galaxy*” is not a quantitative measurement goal

Possible project resource: your own idea!

- come up with your own idea!

Example projects

- Hubble diagram:
 - Not many galaxies have distance measurements. Find galaxies with direct distance measurements, and identify those for which you can measure a redshift.
 - Download archival spectroscopy data for these galaxies and analyze it to measure the redshifts.
 - Plot redshift vs. distance and measure the Hubble constant.
- Rotation curve:
 - Identify a galaxy for which you can measure its rotation curve.
 - Download archival spectroscopic and imaging data. Measure the rotation curve, and estimate the stellar mass.
 - Compare total and stellar mass.

Data analysis

- Project needs to have a data analysis component
- Is it always necessary to start from “raw” pixels?
 - No, many archives provide calibrated data
 - No, can come up with compelling projects that use existing databases (e.g. Gaia) - *check with me*
- E.g. in Hubble project: plotting distances and redshifts from NED is not enough

(Some) telescope data archives

- Hubble Legacy Archive - images from the Hubble telescope, nice interface
- MAST - data from UV, optical, and infrared space telescopes; some High-Level Science Products; PanSTARRS
- ESO - data from ESO telescopes, including the VLT
- NOAO - data from NOAO telescopes; older site here
- KOA - some data taken with Keck telescopes
- Gemini
- CFHT
- telarchive: python script that searches main optical data archives (link on wiki)

* *links are on class wiki page*

(Some) sky surveys

- SDSS - imaging and spectroscopy of the northern extragalactic sky
- PanSTARRS - imaging of everything at
- Dark Energy Survey - imaging of 5000 sq. deg. of southern extragalactic sky
- 2MASS - infrared all-sky survey
- Gaia - astrometry and photometry for 1.8 billion stars, all-sky
- TESS - lightcurves of 200,000 stars, all-sky
- OGLE - lightcurves of stars in Galactic bulge and Magellanic Clouds
- LIGO - Gravitational Wave events

* *links are on class wiki page*

General databases

- SIMBAD - mainly galactic
- NED - NASA/IPAC Extragalactic Database

* *links are on class wiki page*

Proposal Structure

- cover sheet
 - abstract
 - PI and Col names SBU IDs
 - dataset to be analyzed
 - telescope / instrument / set-up request
- Scientific Justification
 - limited to 1 page
- Technical Justification (be concise)
- Figures, Tables, References, Object lists

Scientific Justification

- describe your project to a knowledgeable, but non-expert audience
- provide background information / motivation
- what is the goal of your measurement?
- make it exciting / important!
- polish the text - typos and carelessness are distracting

Technical Justification

- detail the proposed analysis so that reviewers can judge whether the stated goal is feasible
- e.g. the Hubble diagram:
 - which galaxies have direct distance measurements?
 - on which galaxies can you measure the redshift? How?
 - which archival datasets have you identified for your measurements?
 - what steps will you take to calibrate your data, and perform the measurement?

AST 443 / PHY 517 proposals

deadline: **Monday, Mar. 15, 3pm (strict!)**

proposal template available on github:

https://github.com/anjavd/PHY517_AST443/wiki/Lab-3:-Your-own-archival-proposal

blind review: list only your SBU ID as author!

your labmates are your Co-Is, list their IDs too

Time Allocation Committee

Time Allocation Committees

- proposals are reviewed by panels of researchers, chosen by the responsible agencies (e.g. HST - STScl)
- panels are assembled by topical groups (e.g. cosmology)
- every panelist has to read every proposal assigned to that panel, typically ~80
- preliminary grades submitted online
- 2-day meetings to discuss all proposals and finalize grades

AST 443 / PHY 517 TAC

- date of TAC meeting: **Wed., Mar. 24**
- you will be assigned a list of proposals to evaluate and grade
- you will have to send in grades and comments for all proposals on your list before **midnight, Mar. 21** (also strict)

AST 443 / PHY 517 TAC

- you will be primary reviewer for one proposal, and secondary reviewer for another proposal
- during the TAC meeting, the primary and secondary reviewers will lead to discussion of each proposal, but *everybody will be expected to take part*
- the PI of the proposal and their collaborators, as well as PIs of directly competing proposals, will leave the room

AST 443 / PHY 517 TAC

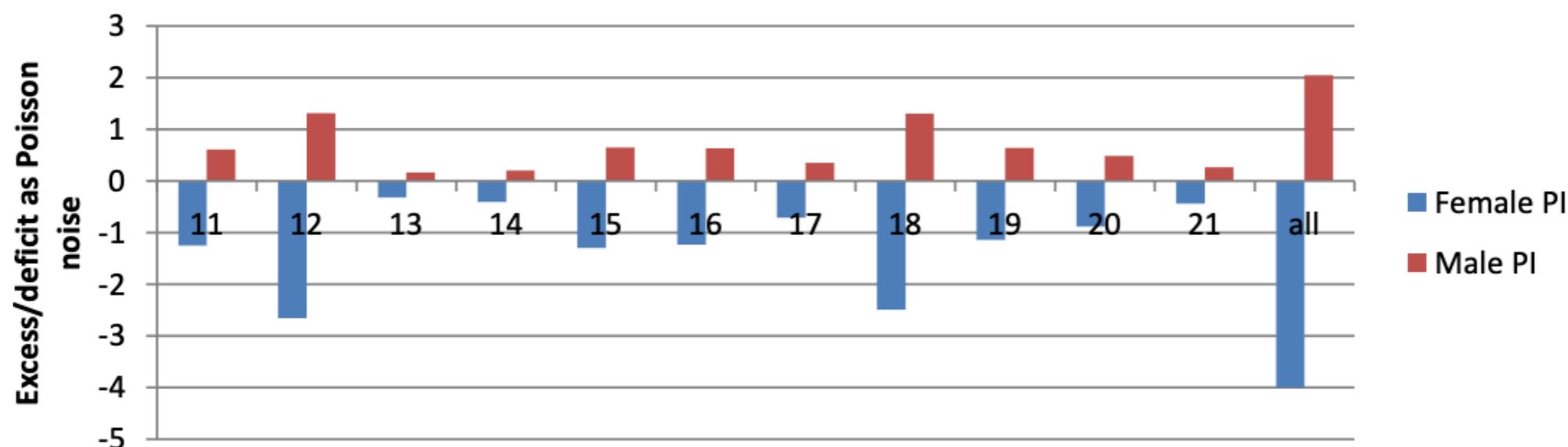
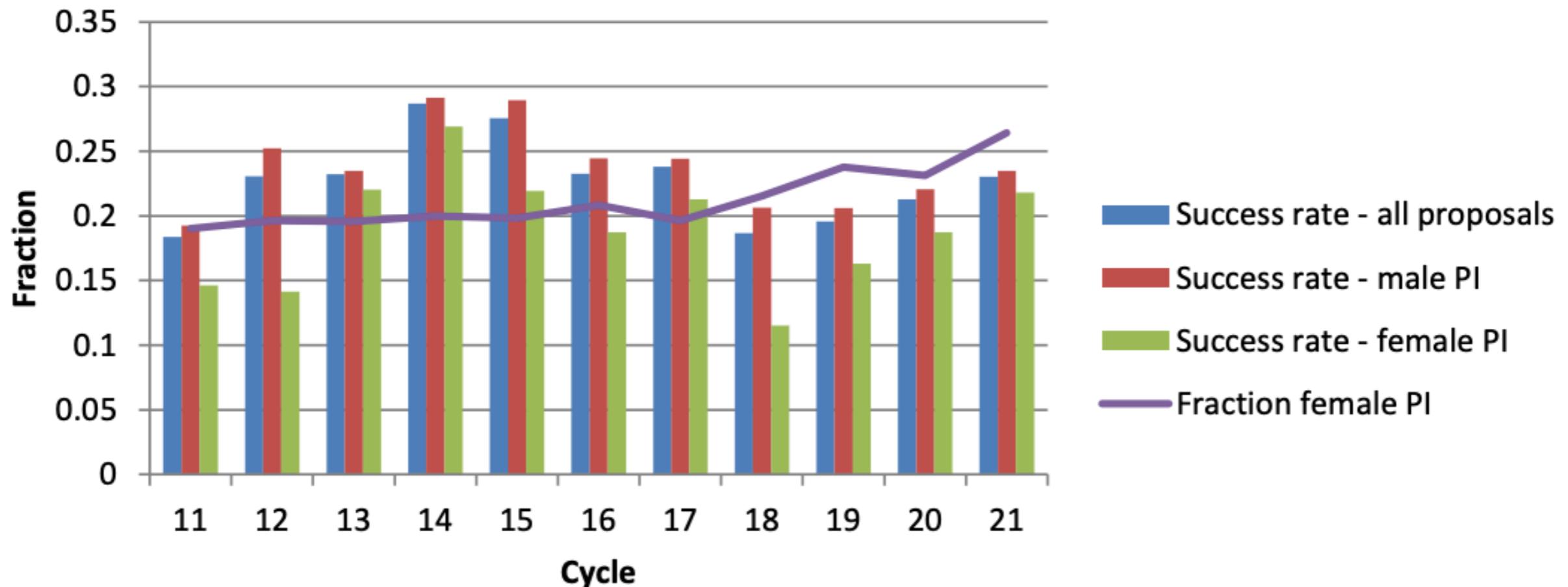
- after each discussion, you will re-grade the proposal via secret ballot
- we will rank the proposals based on the final grade
- *each group will work on its top-ranked project*
- after the TAC meeting, the primary and secondary reviewer will collate the comments into a final evaluation of that proposal

Blind reviews

Avoiding unconscious bias

- Unconscious / implicit bias: our judgment is biased by stereotyped expectations
- has been well documented in much of society, e.g.:
 - identical applications / teaching evaluations with female / colored names are ranked worse than those of males / whites
- Reid (2014): success rates of Hubble proposals by female PIs systematically lower than those by male PIs

Avoiding unconscious bias



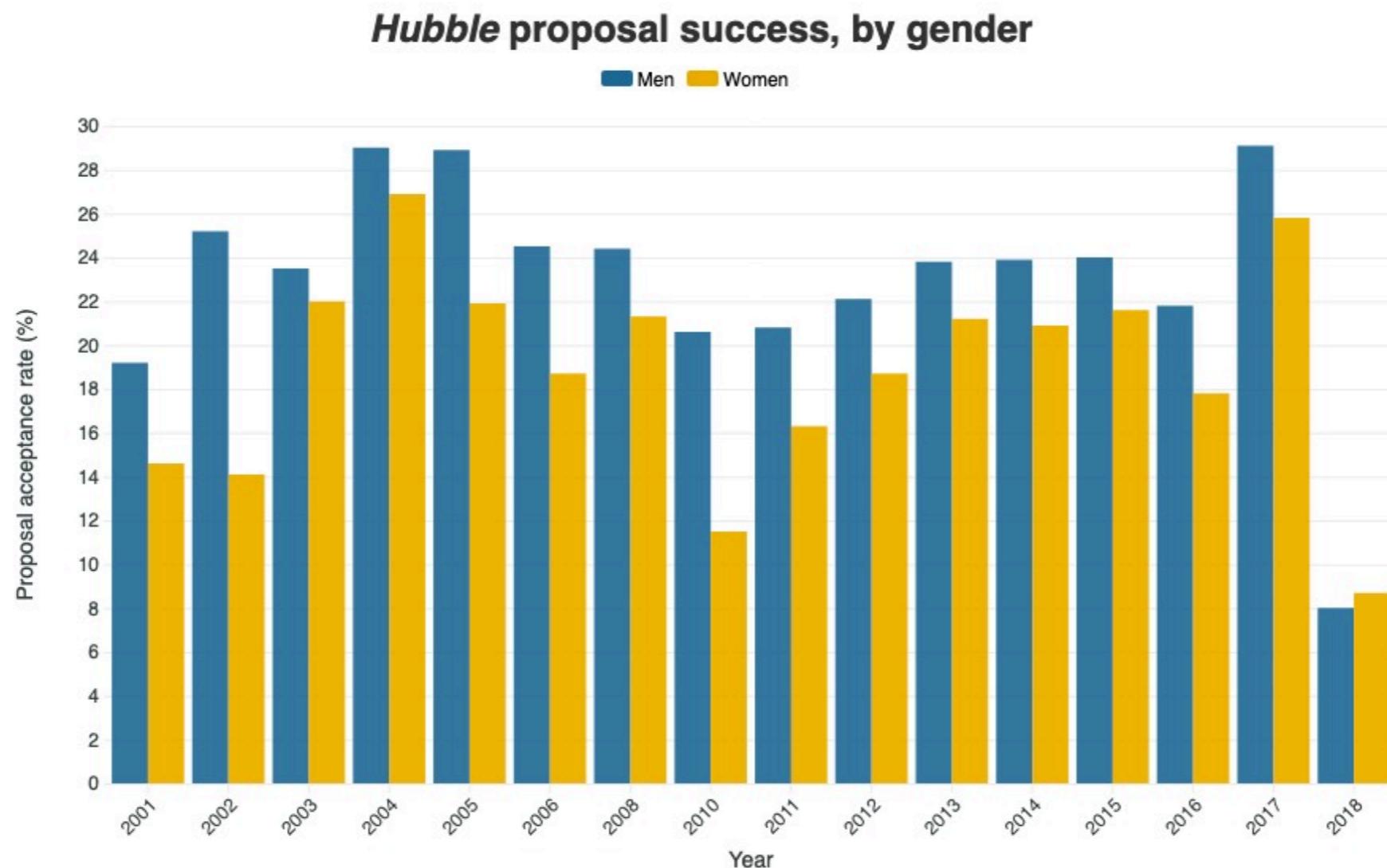
Reid 2014

Avoiding unconscious bias

- In 2018, the Hubble TAC was conducted dual-anonymously
- PIs were not identified; had to avoid identifying themselves in the narrative
- Reviewers were told not to guess the proposers

Avoiding unconscious bias

- In dual-anonymous review: male/female success rates were even!



Strolger &
Natarajan 2019

- Implemented also for several other review processes

Further Reading

- Reid 2014: Gender-based Systematics in HST Proposal Selection. <https://ui.adsabs.harvard.edu/abs/2014PASP..126..923R/abstract>
- Strolger & Natarajan 2019: Doling out Hubble time with dual-anonymous evaluation. <https://physicstoday.scitation.org/do/10.1063/PT.6.3.20190301a/full/>