

FRONTIERS OF ASTRONOMY

AST 202

Tu & Th 3:30-4:50pm @ Science Center 1313

Intro

- Who are we?

- Why are we here?

What comes to mind when you think of “Frontiers of Astronomy”?

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-

Astronomy is a data-motivated science

- Best telescopes
=> highest quality data
=> good science!



Everyone wants to use them!
But time is limited ...

So how do people use the Hubble? Who gets to observe?



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Hubble Space Telescope Cycle 24 Call for Proposals



Inbox x



 Space Telescope Science Institute <STScIGeneric@stsci.edu>
to Dipankar ▾

Jan 13 ☆



Hubble Space Telescope Cycle 24 Call for Proposals

Release Date: January 13, 2016
Proposal Deadline: April 08, 2016

NASA and The Space Telescope Science Institute (STScI) are pleased to announce the Cycle 24 Call for Proposals for Hubble Space Telescope (HST) Observations and funding for Archival Research and Theoretical Research programs. Participation in this program is open to all categories of organizations, both domestic and foreign, including educational institutions, profit and nonprofit organizations, NASA Centers, and other Government agencies.

This solicitation for proposals will be open through April 08, 2016 8:00pm EDT. The [Astronomer's Proposal Tools \(APT\)](#), which is required for Phase I Proposal Submission will be made available/released for Cycle 24 Phase I use during the 2nd week of February 2016. Results of the selection will be announced by the end of June 2016.

All programmatic and technical information, as well as specific guidelines for proposal preparation, are available electronically from the STScI Announcement Web Page:

<http://www.stsci.edu/hst/proposing/docs/cycle24announce>

Thousands of proposals are received from around the world.

Let me give you a few examples...

What happens afterwards

- After a couple of months NASA creates a “Time Allocation Committee” (TAC) composed of experts in the field.
 - They are your peers. Sometime you are invited.
- The TAC is given those proposals beforehand to read.
 - If you are in a TAC, you are not to tell this to your colleagues, or discuss these proposals ever with anyone else except those in the TAC.
- Then the TAC is invited (*imprisoned*) for a few days in a hotel somewhere where all they do is discuss the merits and demerits of the proposals. Every proposal is given a numerical grade by every TAC member. The average of all these grades is ultimately passed on to NASA by the panel chair.
- Every proposer gets their result, as well as a summary of the criticism of their proposal.
- Only top ~10% or so of the proposals get time to observe
 - For telescopes like Hubble, Chandra, Swift, you can also get money if accepted!

Let me give you a few examples

We are going to take a similar strategy in this class

- Over the course of the semester everyone will propose a few projects that they would like to do with a telescope.
 - One project at a time.
 - We will start with the Hubble Space Telescope
- The proposals are due at least 2 days before the review.
 - Submit on shared google-drive. Email class.
- Also, the proposer gets to defend their proposal on the day of the review.
 - A 15 minute presentation + 10 minute Q&A.
- We then politely ask the proposer to leave the classroom for 15 minutes during which
 - We the rest (i.e. the TAC) discuss the proposal and give grades.

Where to get new ideas for proposals?

- Reading current journals, articles, papers
- The library has excellent resources, which include
 - Popular journals, which are great starters, e.g.
 - Sky & Telescope
 - Scientific American
 - Astronomy
 - And then on to more technical journals for original research
 - Nature
 - Science
 - Astrophysical Journal (ApJ)
 - Astronomical Journal (AJ)
 - Annual Reviews of Astronomy & Astrophysics (ARA&A; coming soon)

Warm up exercise for next class (Feb 02)

- Pick the most exciting astronomy news/article that you recently read.
- Present it to us in 3-4 slides, in about 10 minutes.
 - Tell us what the main result is, where you read it, and
 - Why it attracted your attention (why you think it is scientifically important)
- The library has excellent resources
 - Sky & Telescope
 - Scientific American
 - Astronomy
 - Nature
 - Science

Conducting the day-2-day business of *peer review*

- There will be 2 proposers defending their proposals during every class (the reviews start in 3 weeks, from February 16th)
- The proposers should have uploaded their proposals on google-drive at least 2 days in advance so that the TAC can read it carefully.
- The chair of the TAC is in charge of inviting the proposers to give their talks, keep track of time during presentations, lead the questions and discussions sections, and the voting.
- The chair will also take notes during the discussion that will be sent to NASA (i.e. me) to be forwarded to the proposers along with their grade.
 - The chairs will be selected from those who are not proposing. The position will rotate from day to day.

Conducting the day-2-day business of *peer review*

What to do if you are a ...

- Proposer, presenting today
 - You have already uploaded your proposal to me 2 days ago, and have emailed the whole class asap after uploading.
 - The proposal should strictly adhere to the formatting guidelines and page limits (no more than 2 pages of text + 1 more for tables, graphs, figures, references)
 - Upload PDF version as lastname_firstname_cycle1.pdf
 - Present your 15min defense and convince us why your project absolutely needs to be done.
 - This is your chance to really hammer your points.
 - And be well prepared for questions from everyone.
 - Leave the classroom while the TAC deliberates on your proposal. Someone will be sent to fetch you when we're done.

Conducting the day-2-day business of *peer review*

What to do if you are a ...

- TAC member
 - Read the proposals thoroughly, making notes what you felt were good points, what was unclear, what questions would you like to ask, etc. Give the proposal a preliminary grade out of 10 where 10 is astounding/ground-breaking/must-do, and 1 is poor.
 - Reviewer Evaluation Form is on onCourse
 - Bring your initial evaluation sheet to class.
 - Listen to the proposer's presentation in the class. Revise your initial evaluation, ask questions that were not clear.
 - After proposer leaves, discuss, summarize what you thought were the plusses and minuses. Revise preliminary grade if needed. Vote.
 - Submit your revised notes and final grades to NASA (me!) at the end of the class.

Conducting the day-2-day business of *peer review*

What role do I (DM) play during the proposal writing and review process

- Once you come up with an idea for a proposal (it could be observational, theoretical or computational), you could (should) talk with me about it.
 - Remember, this is not a homework where there is one correct answer and you have to arrive at it by yourself. Here you are tackling an open problem in astronomy ... pushing the frontier. Often two heads are better than one, and I can give advise/pointers (usually).
- During the TAC meetings DM will be the NASA liaison officer, helping the TAC come to decisions/conclusions by offering technical or science inputs.
 - It is blatantly undemocratic, but the liaison officer's vote weighs 3x that of other TAC members.
- The liaison officer is also responsible for sending out the proposal evaluation summaries and grades to the proposers, that he has received from the chair, within 3 days of proposal review.
- The liaison officer also keeps track of proposal summaries sent to him by every TAC member for every proposal. (For eventual evaluation of TAC)

Conducting the day-2-day business of *peer review*

What role do I (DM) play during the proposal writing and review process

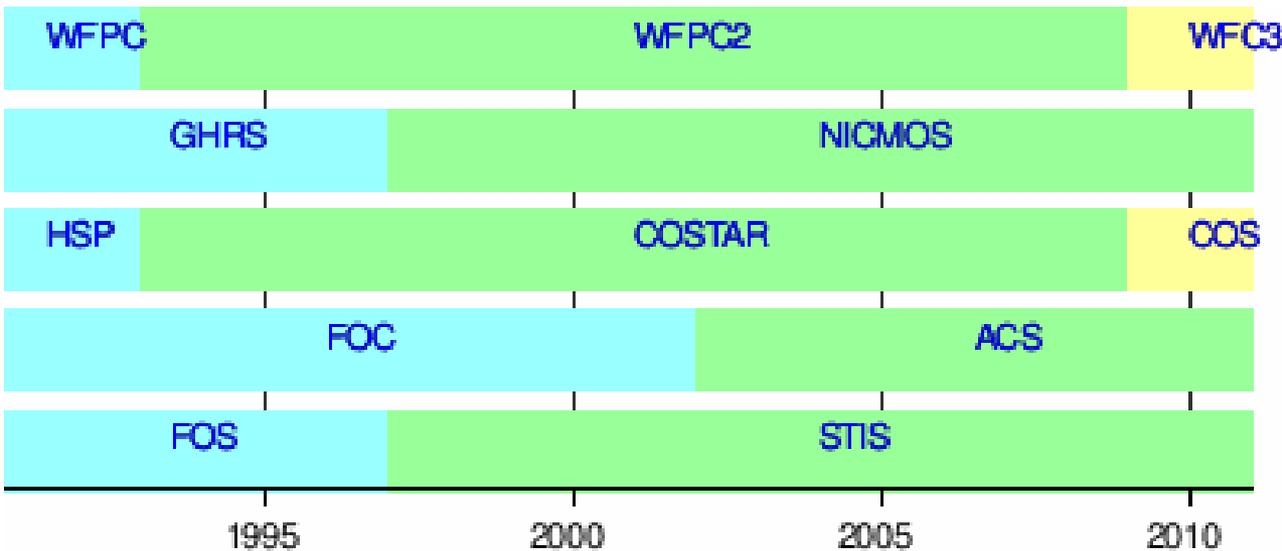
- You will find the liaison officer in his office (SC 1330) on:
 - Mondays 10am-12noon
 - Wednesdays 3pm-5pm
- Or if found in office and not talking with anyone else
- Or by appointment
- Or via email --- round the clock [send a reminder if you haven't heard back in 48 hours]
- Contact info:
 - Room: SC1330; Phone: 508-286-5697; Email:maitra_dipankar@

Which instrument on HST will best for my science?

Instrument teams will present the details on Feb 04 and 09)



Timeline of instruments on the HST



Date	Presenter(s)
04	X
04	X & Y
04	X
09	X
09	X & Y

Date	Agenda	Chair	Special remarks
Jan 28, Th	Intro, logistics	DM	X, Y, Zs to be determined via lottery
Feb 02, Tu	Warm up: Present an intriguing problem in 10 mins	DM	
Feb 04, Th	HST Instrument teams present (20 min/instrument)	DM	WFC3: X; NICMOS: X & Y; COS: X
Feb 09, Tu	HST Instrument teams present (20 min/instrument)	DM	ACS:X; STIS: X & Y
Feb 11, Th	Guest lecture: Geoff Collins (Wheaton)	DM	Talk from 3:30-4:30. Dinner afterwards.
Feb 16, Tu	Proposal review cycle 1 - X & Y	DM	
Feb 18, Th	Proposal review cycle 1 - X & Y	Z	
Feb 23, Tu	Proposal review cycle 1 - X & Y	Z	
Feb 25, Th	Guest lecture: Stephanie Bouchey (Brown)	DM	Meet the speaker:3:30-4:30; Talk: 5-6; Dinner at Chase afterwards
Mar 01, Tu	Prop rev + Guest lecture: Lisa Lebduska (Wheaton)	Z & DM	Writing workshop after first round of proposals. Dinner afterwards
Mar 03, Th	Proposal review cycle 1f - X & Y	Z	Revise your proposals and submit/present again. Panel will be tough.
Mar 08, Tu	Proposal review cycle 1f - X & Y	Z	
Mar 10, Th	Proposal review cycle 1f - X & Y	Z	
Mar 15, Mar 17	Spring Break		
Mar 22, Tu	Guest lecture: Manasvita Joshi (BU)	DM	Meet the speaker:3:30-4:30; Talk: 5-6; Dinner at Chase afterwards
Mar 24, Th	Proposal review cycle 1f - X	Z	
Mar 29, Tu	Discussion panel: Scope(s) for improvement	DM	
Mar 31, Th	Proposal review cycle 2 - X & Y	Z	
Apr 05, Tu	Proposal review cycle 2 - X & Y	Z	
Apr 07, Th	Proposal review cycle 2 - X & Y	Z	
Apr 12, Tu	Proposal review cycle 2 - X	Z	
Apr 14, Th	Project update meetings	DM	
Apr 19, Tu	Guest lecture: Joey Neilsen (MIT)	DM	Meet the speaker:3:30-4:30; Talk: 5-6; Dinner at Chase afterwards
Apr 21, Th	Proposal review cycle 3 - X & Y	Z	
Apr 26, Tu	Proposal review cycle 3 - X & Y	Z	
Apr 28, Th	Proposal review cycle 3 - X & Y	Z	
May 03, Tu	Proposal review cycle 3 - X	Z	
May 05, Th	Micro-conference @ Spencer Cafe	DM	
TBD	Field trip to MIT Kavli Institute and CXC		One friday afternoon. Feb 19 or Apr 29 or Apr 15 or May 06

We will do a lottery to assign dates in a moment ... don't let me forget this

Grading scheme

- 50% of the final course grade will be based on the grades you received for your proposals and presentations.
 - How well was the scientific background presented (do we know what you are talking about)?
 - How well was the science question posed (why is it important)?
 - Is this something Hubble can do (a.k.a. feasibility)?
- 30% will be based on your performance as a member of the TAC.
 - How well did you do as a chair/TAC member.
 - How prepared were you with the proposals that you read. What were your inputs/questions during the discussion?
- 10% will be based on your summaries of the talks by the guest lecturers over the semester and the field trip.
- 10% will be on the results and presentation of a project of your choice.
 - Project ideas: Build an instrument, write a code, run some existing code to understand the science, do a citizen science project, take some new/archival data and analyze it to show results, *and many more ...*

GLOBE at Night

What you do: Go outside and compare key constellations to a provided guide to determine level of local light pollution.

Equipment needed: Can be done on computer or even iPhone with downloadable app.

Great World Wide Star Count

What you do: Count stars in certain constellations sometime during a 4-day period to determine light pollution (next count: October 14-28, 2011).

Equipment needed: None!

Moon Mappers

What you do: Identify craters larger than a certain size with a drawing tool (Crater survey); compare two images to see which has more boulders (Boulder Wars).

Equipment needed: Computer and internet connection. (100% online)

Ice Investigators

What you do: Help the New Horizons Mission find Kuiper Belt Objects!

Equipment needed: Computer and internet connection. (100% online)

Planet Hunters

What you do: Look at Kepler light curve data to identify extrasolar planets.

Equipment needed: Computer and internet connection. (100% online)

Solar Stormwatch

What you do: Identify and track solar storms.

Equipment needed: Computer and internet connection. (100% online)

The Milky Way Project

What you do: Identify and outline giant bubbles in images of the Milky Way as taken by the Spitzer IR telescope.

Equipment needed: Computer and internet connection. (100% online)

Galaxy Zoo

What you do: Look at pictures of galaxies from the Sloan Digital Sky survey and click on "classifications."

Equipment needed: Computer and internet connection. (100% online)