Project Presentations
April 26

1   Overview

For our last lab (**April 26**), each of you will give a presentation on an astronomy topic of your choice. I have provided a list of suggested topics here, but you are welcome to come up with a topic of your own. All topics must be approved by me by Friday **April 15**; since everyone must present on a different topic, topics will be approved on a first-come, first-serve basis. This is your opportunity to explore something that intrigues *you* about astronomy and to share that with me and your classmates – so, have fun with your presentations! Class on April 19 will be set aside for presentation preparation. I'm also available by email or by appointment if you have any questions or would like to practice your talk.

2   Guidelines

Preparation

- You should submit your presentation slides along with a list of resources used (e.g., research papers, popular science articles, websites, books, etc.) by midnight on April 25 (i.e., the night before the presentations). You should also include references in your presentation where appropriate; no special formatting or citation style is needed.

- Keep in mind that it is often more compelling to discuss one or a few specific topics rather than to gloss over a wide range of content.

Presentations

- Presentations should be less than **10 minutes in length**

- Each presentation will be followed by a **5 minute question period**

- You may use any combination of slides and/or whiteboard

- All listeners will be required to give feedback to the presenters. On the day of the presentations, printed feedback forms will be provided with the following questions:

    - What's one thing you learned and/or enjoyed in this presentation?
    - What's one strength of the presentation that aided clarity, engagement?
    - If you were to give the same talk, what would you change to convey the ideas more clearly?

- Come ready to ask questions during and after each talk; questions will count towards your participation grade. Any type of question is welcome (e.g., asking the presenter to clarify a statement, asking the presenter for more background information, asking the presenter hypothetical questions based on relevant scenarios) – remember, there's no such thing as a bad questions!

Grading

This project will constitute 15% of your final grade: 10% for the presentation and 5% for your participation. Here is a rubric[1] for your presentation:

Content: 70%

- (35%) Presenter introduces and describe(s) topic at level appropriate to this class [___]

- (40%) Presenter explains extent of and limitations on our knowledge on the topic, including data/observations underlying knowledge [___]

- (20%) Presenter provides context by drawing connections to, e.g., different areas of astronomy, concepts from lab or lecture, other areas of science, areas outside of science, etc. [___]

- (5%) Presenter chooses and cites appropriate references (i.e., goes beyond Wikipedia and popular press releases). Presenter submits reference list. [___]

Delivery: 30%

- (35%) Presentation has a logical flow that audience can follow [___]

- (25%) Presenter can address reasonable audience questions [___]

- (20%) Presentation aids (slides or board-work) are understood by audience [___]

- (10%) Presenter stays within allotted time [___]

- (10%) Presenter speaks clearly, and keeps the audience engaged (questions, activities, etc.) [___]

[___] = easily and concisely (4), sufficiently (3), is somewhat able to (2), barely to did not (1)

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[1]Chiefly adapted from the American Astronomical Society—Chambliss award rubric.

3 Suggested topics

Please submit your proposed topics by midnight on April 15.

A non-comprehensive list of suggested topics can be found below. You can choose something not listed, so long as it's within the realm of stars, galaxies, cosmology, or related topics relevant to our lab's focus area. It should be something you haven't covered in depth in class or in this lab.

Remember, more focused/specific topics often yield more compelling presentations (and are often better suited for 10-minute presentations):

Good topic: "The Great Red Spot and other storms, vortices, and zonal flows on Jupiter."
Not-as-good topic: "Gas giant atmospheres."
  Here are some broad suggested topics; you will likely want to focus on a more specific aspect of your topic of choice.

- Galaxies (including our own)

  - Galactic dynamics (e.g., birth, growth, rotation of galaxies)
  - Supermassive black holes
  - Different theories of dark matter (or different dark matter candidates)
  - The intergalactic medium (IGM)
  - Dark matter halos and the dark matter content of different galaxies
  - Dwarf galaxy satellites of the Milky Way
  - Ultra-faint dwarf galaxies
  - Dark energy
  - Galaxy clusters

- Stars (including our Sun)

  - Interior structure and chemistry of stars
  - Asteroseismology or helioseismology
  - Stellar atmospheres or magnetospheres
  - Stellar or solar winds
  - The process of star formation (or the properties of star-forming regions in galaxies)
  - Binary star systems
  - Clusters of stars (globular clusters or open clusters)
  - Specific types of star (e.g., T Tauri, RR Lyrae, Population III (the first stars))

- (Exo)Planets

  - Solar system formation and history
  - Proto-planetary disks
  - Planet and planetesimal formation
  - Brown dwarfs
  - Exoplanet detection methods not discussed in class (e.g., microlensing, astrometry)
  - Exoplanet atmospheres

- Astrobiology

- The Search for Extraterrestrial Life (SETI)
- The Drake equation
- Dyson spheres (or other hypothetical megastructures)
- Technosignatures vs. Biosignatures
- Communication and signal detection; candidate SETI signals
- Breakthrough Listen or Breakthrough Starshot

- Telescopes and spacecrafts

  - Specific missions/projects (e.g., Hubble Space Telescope, James Webb Space Telescope, Kepler, TESS, Nancy Grace Roman Space Telescope, Vera C. Rubin Observatory, Thirty Meter Telescope).
  - Astronomy at specific wavelengths (e.g., Radio astronomy and very-long-baseline interferometry (VLBI), sub-millimeter astronomy, X-ray astronomy, gamma-ray astronomy)
  - NASA budget, missions, proposals (i.e., how funding decisions are made)
  - Space policy (i.e., laws governing space)

- Miscellaneous

  - The Big Bang and the early Universe (e.g., inflation, nucleosynthesis, the epoch of recombination, the epoch of reionization)
  - The cosmic microwave background (CMB)
  - Gravitational waves and LIGO
  - Compact objects (Black holes, neutron stars, pulsars, magnetars, white dwarfs)
  - High-energy explosions (Fast Radio Bursts or Gamma-Ray Bursts)
  - A biographical presentation on a famous astronomer. If you do this, choose 1-2 scientific contributions to emphasize. Some suggestions for scientists:
    * Annie Jump Cannon (spectra of stars)
    * Cecilia Payne-Gaposchkin (the composition of stars)
    * Vera Rubin (dark matter)
    * Jocelyn Bell Burnell (radio pulsars)
    * Nancy Grace Roman (stellar classification and motion)
    * Jill Tarter (SETI)
    * Sara Seager (exoplanets)
    * Caroline Herschel (comets)
    * Annie Maunder (sunspots, solar corona, eclipses)
    * Margaret Kivelson (solar wind, Europa's ocean)
  - A recent or historically significant astronomy paper (I recommend searching through https://ui.adsabs.harvard.edu/ or https://arxiv.org/archive/astro-ph, or asking me for help finding a paper).