Astronomy 2115   Mid-Term Project

Fall 2022

The final project for the class will be either a written report **<u>or</u>** an oral presentation on a scientific paper.

The written report should be 5 pages long (one paragraph or so over or under is fine) with 1 inch margins, single-spaced, and written in Times fontsize 12 (or equivalent).

The presentation can be performed in powerpoint, keynote, google slides, or a similar presentation software. The length needs to be ~10-12 minutes.

The Papers:

1) The merger that led to the formation of the Milky Way's inner stellar halo and thick disk: https://arxiv.org/abs/1806.06038
2) Origin of the heavy elements in binary neutron-star mergers from a gravitational wave event: https://arxiv.org/abs/1710.05463
3) A triple protostar system formed via fragmentation of a gravitationally unstable disk: https://arxiv.org/abs/1610.08524
4) Asteroseismology can reveal strong internal magnetic fields in red giant stars: https://arxiv.org/abs/1510.06960
5) The Sun is less active than other solar-like stars: https://arxiv.org/abs/2005.01401
6) Multiple images of a highly magnified supernova formed by an early-type cluster galaxy lens: https://arxiv.org/abs/1411.6009
7) A massive stellar bulge in a regularly rotating galaxy 1.2 billion years after the Big Bang: https://arxiv.org/abs/2102.05957

Scan through (at least) a few of those papers, before picking one to report on. **Make sure you read at least the abstract before selecting (or dismissing) a paper.** Most of those papers will have a few pages of the main text, and often a "Supplementary Information" or "Methods" section further down (after the first set of references). encourage you to also refer to this "extra" material in order to better understand aspects of the main paper.

Content and structure:

I recommend the following regardless for structuring your report and presentation. If you have a different idea for how to organize your report/presentation, please check with me first.

<u>Introduction:</u> Background to the topic of the paper you chose. Do not simply summarize their introduction, but instead make this section accessible to the rest of the class (yes, even if you choose to do a written report). For sources, use both material from the class, and other papers referenced in your chosen paper's introduction.

<u>Description:</u> description of the paper's methods and results

<u>Reflection (bonus):</u> (this can go after "Conclusion" if you prefer) Provide your thoughts on the paper you presented on. Some prompts:

- What science did the authors get right? What did they get wrong?
- Do authors of subsequent papers believe their results?
- What are you still curious about?
- Where do you think the research will take us? What are the implications if the results hold up?

Conclusion: A few sentence/one-slide summary that wraps up the paper/presentation.

Searching for sources (cited papers, or papers that cite the one you choose):

I like to use the ADS digital library to search for papers. Find the paper you chose on that website. Then, in the menu on the left, you will see both "Citations" (subsequent papers that cite this one) and "References" (previous papers that are being cited by this one).

Grading rubric:

- quality of research into background and motivation of the paper (including at least a cursory investigation of previous papers on the topic)
- effective representation and argumentation of the paper's methods and results
- writing style (for report)
- grammar, spelling and punctuation (for report)
- keeping to page number recommendation (for report)
- Structure of the slide deck; slide content and format (for oral presentation)
- Delivery (for oral presentation): non-verbal, eye contact, articulation, volume, speed
- Keeping to allowed time (for oral presentation)
- Bonus: independent insight. See my suggestions under "Structure and Content" above.
*Please note that I will not penalize you for anything that isn't exactly accurate because you missed one study, or because the background you got during the course and previous courses was not sufficient for a exactly accurate reflection. In other words, I am more interested in your **efforts** at independent insight and reflection. However, your bonus marks could be decreased for a statement that is incorrect **and** that I expect you to know is incorrect based on what we have learned in class.*
Try to be quantitative in your argument, **if possible** (e.g. do the calculations to back up your arguments and show these calculations in your presentation; look for related calculations that we have done in class).

Steps and deadlines:

Paper selection – due September 6, 2022
Report – due October 4, 11am
Slides – due October 11, 9am

Presentations will take place on October 11.