

ASTR21200: Homework 1 (HW1)

1. **GitHub:** Create an individual user account on <https://github.com/>. So that you can be added to the class GitHub page, what is your GitHub username?
2. **Slack:** Create an account on Slack.com. So that you can be added to the class Slack on stoneedgeobservatory.slack.com, what is the email associated with your Slack account?
3. **Astro Software:** For this question, read the wiki pages on Astronomy Software¹ and other Computing Resources
 - (a) What is the name of the computer server where you download fits files from Stone Edge Observatory?
 - (b) What software will we use to view images in fits format?
 - (c) What software can you use to manipulate fits images?
 - (d) The most distant galaxy in the Universe that we've detected water in was discovered by the South Pole Telescope. The object is called SPT-S J031132-5823.4 is about 12.8 billion light-years away. What website would you use to look up information about SPT-S J031132-5823.4?
 - (e) Based on the information that you found on the website, what are the Galactic coordinates (Longitude and Latitude in degrees) of SPT-S J031132-5823.4?
4. **Observability:** We need to pick a random Right Ascension (RA) and Declination (Decl.). Take your birthday month and multiply it by two, this will be the hours in RA (e.g., January = 2h, November = 22h, December = 0h). Take the current time of day in hours and multiply it by 3 to get the Decl. (e.g., 1am = 3d, 1pm = 39d, 10pm = 60d).
 - (a) With this RA and Decl, look up the sky position and search for all objects within 0.5-degrees in [simbad](https://simbad.cds.unistra.fr/simbad/)² or [NED](https://ned.ipac.caltech.edu/)³. What is the astronomical object with the most paper *references* within 0.5-degrees of the position that you choose? What is: a) this object's identifier?, b) What type of object is it? c) What are its celestial coordinates?, and d) How many paper *references* does it have?
 - (b) Make a finding chart for this object using AAVSO⁴. Make the chart 15-degrees across, with North up, and the chart oriented such if you were looking at the sky with the naked eye. Include this finding chart plot in your homework submission.

¹https://github.com/bradfordbenson/ASTR21200_2024/wiki/Astronomy-Software

²<https://simbad.cds.unistra.fr/simbad/>

³<https://ned.ipac.caltech.edu>

⁴<https://www.aavso.org/apps/vsp/>

- (c) Use the ING StarAlt tool⁵ to determine when your object is best visible from Stone Edge Observatory (SEO, i.e., when its highest elevation in the sky. Note that SEO is not a predefined observatory in StarAlt, so you will need to enter the coordinates manually. For the following questions make sure to include the relevant figure in your homework submission.
- i. What is the optimal observing date for your object? Use the “StarMult” mode to determine this.
 - ii. In what months is your object higher than 40deg in the middle of the night? Use the “StarObs” mode to see how the observability changes throughout the year. When it culminates, how far away is the Moon? How much is the Moon illuminated then?
 - iii. Choose a date 6 weeks later, and make another “StarAlt” plot. What changed? Are both nights good to observe your target, or is one clearly better?
 - iv. Tutorial: You can also make a visibility plot using the python module *astropy*. For an example Jupyter notebook that you can modify see footnote 6

⁵<http://catserver.ing.iac.es/staralt/index.php>

⁶https://docs.astropy.org/en/stable/generated/examples/coordinates/plot_obs-planning.html