**PHYS 4270 / 5390 3.0 - Astronomical Techniques**

**Observatory Project**

**Due: Oral – during assigned class**

**Written – upload (PDF) by 10 pm – Mon 12 April 2021**

# To be successful, astronomers, like all scientists, need to be able to communicate well to be effective, in both written and oral formats.

# In this final major assignment, each student will thoroughly acquaint him/herself with one of the following ground- or space-based telescope projects listed below. (These represent world-class scientific projects, either space- or ground-based, that are at their peak of operation, have recently come into operation, or will do so in the near future.) He/she will submit a formal write-up on or before the last lecture of the term *and* be prepared to give a ten-minute oral presentation on his/her project prior to the end of term. While each student will approach the project (loosely) under the following general headings, he/she must also discuss one major instrument in some (technical) detail, keeping in mind the topics that have been covered in this course thus far:

# General overview: should touch upon (where applicable)

# Type of telescope (i.e., wavelength domain, overall configuration), Site (its location and why it was sited there), when it was constructed/launched, etc.

# Partnerships (e.g., contributing nations, universities, etc. involved and their shares)

# Cost (capital or construction cost, as well as operating costs if possible) and the expected duration of the (funded) project

# Technical details:

# Specifics of telescope or array (design, mass, size, details as to how radiation is collected, effective collecting area, focal length(s), etc.) and information about enclosure (where appropriate) [For non-optical/NIR telescopes, be sure to explain how photons are collected and recorded.]

# Briefly list and describe current or expected first-generation instruments in general (type of instrument, spatial or angular resolution, etc.)

# Select one major instrument (*after consulting with and approval from your instructor*) and describe its design and operation in some detail, highlighting its scientific motivation.

# Scientific details:

# What is the overall “science case” for the telescope; i.e., what were/are the science drivers/goals of the project or what discoveries have already been made or expected to be made?

# What special techniques (if any) will be used to process/interpret the data (especially for non-optical/NIR telescopes)?

# If this is a totally/partially a survey instrument, how will it operate?

# Where/how will the data be stored and what is (will be) its availability to the community?

# The write-up should be double-spaced, be at least 12 pages long, excluding Figures and Tables. The oral presentation before the class will be 10 minutes in length with 2 minutes for questions, preferably using PowerPoint or something similar. The oral presentation and written report are of equal weight. Details regarding the selection of Observatories will be provided in a subsequent email message. First come, first served when the web link goes live.

# Students should refer to the following URLs/references on the eClass website for advice in how to give an oral scientific presentation:

# How NOT to Give a Scientific Talk:

# See link on the eClass website.

# Ten Secrets to Giving a Good Scientific Talk: http://www.cgd.ucar.edu/cms/agu/scientific\_talk.html

# Space-based:

1. [Chandra X-ray Observatory](https://www.nasa.gov/mission_pages/chandra/main/index.html)
2. [Gaia Space Telescope](http://sci.esa.int/gaia/)

# [James Webb Space Telescope](https://www.jwst.nasa.gov/) (JWST)

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1. [Nancy Grace Roman Space Telescope](https://www.nasa.gov/content/goddard/nancy-grace-roman-space-telescope) (formerly WFIRST)
2. [Swift Gamma Ray Burst Mission](https://swift.gsfc.nasa.gov/)
3. [Transiting Exoplanet Survey Satellite](https://www.nasa.gov/tess-transiting-exoplanet-survey-satellite) (TESS)

# Ground-based:

# [Atacama Large Millimeter Array](http://science.nrao.edu/alma/) (ALMA)

# [Canadian Hydrogen Intensity Mapping Experiment](https://chime-experiment.ca/en) (CHIME)

1. [Daniel K. Inouye Solar Telescope](http://dkist.nso.edu/) (DKIST)
2. [European - Extremely Large Telescope](https://www.eso.org/sci/facilities/eelt/) (E-ELT)
3. [Gemini (North) Telescope](https://www.gemini.edu/)
4. [Giant Magellan Telescope](http://www.gmto.org/) (GMT)
5. [Hobby-Eberly Telescope](https://mcdonaldobservatory.org/research/telescopes/HET) (HET)
6. [Keck Telescope](https://keckobservatory.org/)
7. [Keck Telescope](https://keckobservatory.org/)
8. [Large Synoptic Survey Telescope](http://www.lsst.org/lsst/) (LSST)
9. [Laser Interferometer Gravitational-Wave Observatory](https://www.ligo.org) (LIGO)
10. [Panoramic Survey Telescope and Rapid Response System](https://www.ifa.hawaii.edu/research/Pan-STARRS.shtml) (Pan-STARRS )
11. [South African Large Telescope](https://www.salt.ac.za/) (SALT)

# [Square Kilometer Array](https://www.skatelescope.org/) (SKA)

1. [Subaru Telescope](https://www.naoj.org/en/)

# [Very Large Array](https://science.nrao.edu/facilities/vla) (VLA)