

JWST Phase 2 assignment

In this assignment you will learn to use the proposal preparation tools for the forthcoming James Webb Space Telescope.

You are an astronomer carrying out a survey to find and characterize the most distant quasars in the universe. Your photometric survey has revealed two objects that have colors that can only be explained by quasars at redshift $z=8\pm 1$ making them potentially the most distant known quasars. You decide you need JWST spectra of these quasars to measure their actual redshifts and determine the central supermassive black hole masses. Use JWST proposal preparation tools to plan these observations as if you are going to request these data. Note you do not need to write a science justification.

Questions regarding this assignment should be directed to Chris Willott (chriswillott1@gmail.com)
Deadline: April 12. Do not attempt to submit the proposal to STScI!

Data requirements:

- 1) Fixed-Slit spectroscopy covering REST-FRAME UV and optical wavelengths from 120 to 520 nm (emission lines Lyman-alpha to [OIII]).
- 2) High enough signal-to-noise and spectral resolution in the H-beta line (486nm rest-frame) to measure the line FWHM and use this to determine the black hole mass - see Meja-Restrepo et al. (2016) <https://arxiv.org/pdf/1603.03437.pdf> for details.
- 3) No contamination of the spectra by objects close to the line-of-sight entering the slit
- 4) Must include a "WATA" target acquisition observation of correct exposure time.

Tools:

JWST General Target Visibility Tool (GTVT)

<https://jwst-docs.stsci.edu/display/JPP/JWST+General+Target+Visibility+Tool+Help>

Attach one of the output plots from GTVT as the "PDF Attachment" in APT

JWST Exposure Time Calculator (ETC)

<https://jwst-docs.stsci.edu/display/JPP/JWST+Exposure+Time+Calculator+-+ETC>

If you do not already have one you will need to get a MyST account first at

<https://proper.stsci.edu/proper/authentication/auth> to log in to the ETC and save/share your workbook.

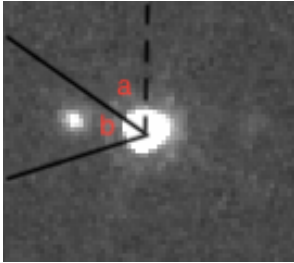
Note the ETC may be under heavy load in the 2 weeks before the Cycle 1 GO proposal deadline of 6 April. It is recommended to use the ETC well before this time

JWST Astronomer's Proposal Tool (APT)

<https://jwst-docs.stsci.edu/display/JPP/JWST+Astronomers+Proposal+Tool%2C+APT>

Target details:

Cutout images are 2" on a side with North up and East to the left. Assume the quasars will have a typical quasar spectrum. The file <http://www.astro.uvic.ca/~sara/A511/quasarspectrum.dat> can be uploaded to the ETC in the "Upload Spectra" tab. The flux-density will need to be renormalized to the observed magnitude of each quasar.



Q1:

Position: 13:42:08.10 +09:28:38.61

Magnitude from HST: WFC3/IR F160W filter AB magnitude=22.2

Angle a = 55 degrees, angle b = 52 degrees.



Q2:

Position: 22:32:55.15 +29:30:32.23

Magnitude from HST: WFC3/IR F160W filter AB magnitude=20.9

Assessment:

ETC workbook: 30%

The ETC calculations should include target acquisition and the spectral observations for each target.

"Share" your workbook with Sara (sarae@uvic.ca) and Chris (chriswillott1@gmail.com) when you have completed the assignment.

APT file: 70%

Email your completed APT file to Sara and Chris when complete.

Make sure to run the Visit Planner to ensure the planned observations are schedulable.

There should be no red 'x' symbols in APT when complete.