

ASTR469: Problem Solving Day #4.

We have one hour of time allotted to observe at the Green Bank Telescope (GBT) somewhere in the 11am-1pm range, probably March 6 (still to be confirmed). These exercises will help you prepare for those observations in a way that's much like what we do to prepare for observations in a team of astronomical researchers.

We will be observing HI emission in the Triangulum Galaxy, also known as Messier 33 (M33).

Initial logistics:

- Use NED or SIMBAD to get the RA, Dec, gl, gb, and redshift (or blueshift) of this object.
SIMBAD: <http://simbad.u-strasbg.fr/>
NED: <http://ned.ipac.caltech.edu/>
- Inspect the optical image of this target through SIMBAD. Debate with your team whether you (naively, based on Kirchoff's laws) expect to see the HI from this galaxy in emission or absorption, assuming that the HI exists all throughout the galaxy itself?
- At approximately what mean wavelength will you observe the HI line in this object?

Time and telescope pointing logistics:

- Will the object fit within the field of view of your telescope? Note: the interactive AladinLite view on SIMBAD will allow you to estimate the angular extent of the object. Hint: for GBT, the field of view is actually the same as the resolving power of the telescope.
- (If not fitting in FOV) How many total fields-of-view would you have to observe to totally cover the galaxy? Determine this assuming your FOV is square, and first determine it in the N-S and E-W direction.
- (If fitting in FOV) What fraction of the field of view will this object fill?

Dealing with the sun:

- The atmosphere is transparent to radio waves so we can observe during the day! However, the Sun itself is a bright radio source, so pointing too close to the Sun or the Solar limb (within $\sim 10^\circ$ of Sun's position) can mess up your observation. Will M33 be too close to the sun between 11am and 2pm on March 8?

Making measurements:

- Based on the resolution of GBT, if you were to make an image, what angular scales will you be able to resolve in the object?
- What linear scales will you be able to resolve in the object with the GBT?