Goals

You should be understand the fundamental operation of a radio telescope and recognize how it is similar to, and different from, an optical telescope. You should understand how astronomers, using radio telescopes, recognize the distinctive properties of pulsars. You should understand what is meant by interstellar dispersion, and how it enables us to measure the distances to pulsars.

Procedure

The lab consists of the following parts

1. Familiarization with the radio telescope.

2. Observation of a pulsar with a single-channel radio receiver to learn about the operation of the receiver and the appearance of the radio signals from a pulsar at various receiver settings.

3. Determination of the pulse periods of several pulsars.

4. Measurement of the distance of a pulsars using the delay in arrival times of pulses at different frequencies due to interstellar dispersion.

5. Determine the distance of a pulsar using the techniques you have just learned.

Part 1: The Radio Telescope

1. Start up the Pulsar Lab program. Click **File** on the menu bar, select **Run** and then the **Radio Telescope** option.

- ï The window should now show you the control panel for the CLEA radio telescope. A view screen at the center shows the telescope itself, a large steerable dish, which acts as the antenna to collect radio waves and send them to your receiver.
- ï The Universal Time (UT) and the local sidereal time for your location are shown in the large digital displays on the left.
- ï The coordinates at which the telescope is pointed, Right Ascension (RA) and Declination (Dec), are shown in the large displays at the bottom.

2. Just below and to the right of these coordinate displays is a button labeled **View**. **Click** on the View button, and screen in the center will show you a map of the sky, with the coordinate lines labeled.

- ï A yellow square shows you where the telescope is pointed.

3. You can steer the telescope around the sky by clicking and holding down the **N-E-S-W** buttons at the left side of the window. Try it, and watch the square move, showing that the telescope is moving around the sky.

- ï The coordinate readouts will also move.
- ï You can change the pointing speed of the telescope by resetting the slew rate button at the lower left. Try setting it to 100, and see how much faster you can move the telescope around the sky.

4. You can move the telescope in two other ways:

- ï by clicking on the set coordinates button at the bottom of the screen