Astronomical Measurement and Error

Time, Coordinates, and Navigation

Problem: This lab exercise is a primer for future lab exercises. We want to address the process of addressing a problem with experimentation, perform error analysis, and present our results in a lab write-up.

A) **Time and Measurement Errors:** Perhaps the most difficult part of scientific experimentation is determining how good our measurements are. When we reach an answer to our problem, how good is that answer? Error analysis allows us to get a sense of the worth of our experimental result. The goal of this exercise is to see how well everyone in the class can agree as to what time it is and how it is measured.

B) **Coordinates and Celestial Navigation:** How do you know where you are? How does our position on the globe affect what we can see in the sky? How does the passage of time relate to our view of the night sky?

1.) Evaluate the class time measurements – start by thinking of ways to do the calculations that will minimize mistakes. How well does the class keep time? Are any of the measurements bad enough to justify throwing them out?

2.) Find the latitude and longitude of your hometown. What is the difference in local apparent time between Boston and your hometown? (Boston is at 71˚6.4' longitude and +42˚21'01" latitude)

3.) Find an interesting star that passes through the zenith in your hometown.

4.) Devise a method for measuring the height of an object above your horizon. Describe or diagram the importance of the altitude of Polaris.

5.) Learn how to find the sidereal time, given the date and the solar time.