

## Astronomy 350: Worksheet 0 - Positional Astronomy

- Check the alignment of the telescope: Make sure Polaris is in the center of the scope and finder.
- Set the RA/Dec to be that for Arcturus: (RA) 14h, 15m 39.7s (Dec)  $+19^{\circ}10'56''$ . Actually its best to do this the following way: find Arcturus in the middle of the telescope and then adjust the RA wheel for Arcturus so that it reads as close as possible to the given RA for Arcturus. Make sure the Dec wheel is roughly ok for Arcturus, though the Dec wheel cannot be moved.
- Use the telescope to find out the hour angle of Arcturus: point the telescope straight up without touching the RA calibration wheel. When its pointing straight up, read of the RA on the RA wheel. Note this down. Note down also the standard time of the observation.
- The RA of the zenith is the local sidereal time (ST). Then find the Hour Angle (HA) by using  $HA = ST - RA(\text{star})$ .
- Do the same for  $\alpha$  Peg: (RA):23h 04m 45.6538m, (Dec)  $5.82^{\circ} 5.09' 58''$ .
- Do the same for Altair: (RA): 19h 50m 46.99s, (Dec)  $6.59^{\circ} 6.17' 79''$ .
- Compute the average sidereal time from these measurements and the average standard time.
- To a reasonable approximation, why is the sidereal time just the hour angle of  $\beta$  Cassiopeiae? which has RA:  $00^{\text{h}}09^{\text{m}}44^{\text{s}}$ .
- Get the RA of the Sun at roughly 9.00pm today by using <http://cesar.kso.ac.at/main/ephemeris.ph>
- From this and the sidereal time you have just found, find the hour angle of the Sun. This is the local solar time.
- Determine, from the internet, the equation of time,  $EQT$  for a date close to when you made these observations.
- What does the sign attached to the value for the equation mean?
- The longitude correction =  $(\text{longitude} - \text{longitude of time Zone Center}) / (15^{\circ} / \text{hr})$ .
- So now calculate the standard time from

$$\text{Standardtime} = HA_{\text{of Sun}} + \text{LongitudeCorrection} - EQT + 12^{\text{h}}.$$

Why is there a  $+12^{\text{h}}$  in this equation?

- Compare the computed standard time with what you got for the standard time in the earlier part where you were observing the three stars: that is you got this from your watch.
- Discuss sources of error including what may happen if you chose stars near the Polaris instead of Arcturus, Altair and  $\alpha Peg$ .