

Introductory Astronomy

Week 1: Positional Astronomy

Clip 4: Where is the Sun?

The Sun Also Rises (and Sets)...

- The Sun, like anything off Earth, is somewhere on Celestial Sphere
- When sidereal time near RA of Sun it is daytime
- Stars near Sun not visible
- Where is the Sun?
- How is sidereal time (ST) related to local time (LT)?

...But Slower

- As it **spins** once a day, Earth also **orbits** Sun once a **year** in the **same sense**
- Seen from Earth, Sun orbits once a year, so **not** fixed on **Celestial Sphere**
- Sun **moves** along Celestial sphere from **West** to **East** (**increasing RA**) completing full revolution in a year
- Visible (**night**) part of sky changes over the year
- This means Sun moves across sky from **East** to **West** slightly slower than stars – one less revolution per year

Clocks

- This means time from noon to noon is a bit ($1/365$ of a day or about 4min) longer than time it takes Earth to turn 360°
- A (mean) solar day is longer than a sidereal day
- Our clocks (LT) keep solar time so run slower than sidereal clock (ST)

24 sidereal hours = 23h 56m 4s

Finding Sidereal Time

- By convention $ST \cong LT$ on September 21
D days later (earlier)

$$ST \cong LT + / - D \times 4m$$

This is approximate. In any event ignores time zones and Daylight Savings Time

On December/March/June 21

$$ST \cong LT + 6/12/18 h$$

Summary - Example

- When is Vega (in Lyra) RA 18h 36m high at midnight?
- Vega is high when $ST = 18h\ 36m$
- This is midnight ($LT = 24h$) when

Credits

- Sky Simulation: Starry Night
<http://www.starrynight.com/>
- Astronomy Animations: University of Nebraska-Lincoln Astronomy Education Group
<http://astro.unl.edu/>