Astronomical Techniques I Lecture 2

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solar time, universal time, sidereal time, sidereal/synodic months, sunrise, sunset, twilight, equation of time.



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The equation of time describes the discrepancy between two kinds of solar time. These are apparent solar time, which directly tracks the motion of the sun, and mean solar time, which tracks a *fictitious mean sun* with noons 24 hours apart.

There seems to be no convention for the sign (+-) of the equation of time.

Mars analemma



Read: http://scienceblogs.com/startswithabang/2009/ 08/26/why-our-analemma-looks-like-a/, () () ()

Earth precession - 25800 year cycle



Note direction of precession

Earth precession changes the pole star



Altazimuth coordinates



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How sun moves?



How do stars move in the sky?

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Celestial sphere



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Celestial sphere - definitions



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Circumpolar stars



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Circumpolar stars



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Right ascension (α) and Declination (δ)



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Right ascension (α) and Declination (δ)

- RA measured in hours, minutes and seconds or decimal degrees.
- Dec measured in degrees, minutes and seconds or decimal degrees.

Hour angle (HA)



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is the hour angle of the vernal equinox. It can also be defined as the right ascension of the meridian.

Do sidereal time clocks run slower or faster depending on whether the earth is closer or further from the sun in its elliptical orbit?

- is the hour angle of the vernal equinox. It can also be defined as the right ascension of the meridian.
- Do sidereal time clocks run slower or faster depending on whether the earth is closer or further from the sun in its elliptical orbit?
- Compute the local sidereal time at 6 pm local time on 22 December (winter solstice)?

$\mathsf{HA} = \mathsf{LST} - \alpha$

What is the hour angle of an object at RA=23:00:00 at 6 pm local time on 22 December (winter solstice)?

 There is a secular increase in length of day of about 2.3 milliseconds per century which mostly results from slowing of the Earth's rotation by tidal friction. How much longer before we have 48 hour days?

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 $86400/2.3\times10^3\times10^2=3800$ million years

Ecliptic latitude and longitude



What is the ecliptic latitude and longitude of the summer solstice point? What is the ecliptic latitude of the north celestial pole?

Galactic Coordinates



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Milky way in galactic coordinates



year, equation of time, precession, coordinate systems: horizon, equatorial, ecliptic, galactic. Any questions on these topics?