Housekeeping

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Course Website

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Topics for Today

Introduction

Astrometry

Trigonometric Parallax

Angular Resolution Limits

Reading for today: 1.1–1.4, 3.1

Reading for next lecture: 2.1, 2.2

Our Goals for This Course

- *Study the contents of the Universe*
  (What is out there?)
- *Learn to use basic physics to understand the contents and evolution of the Universe*
  (How does it work?)
- *Learn to treat complex problems using approximate methods*
  (Simplify, approximate, estimate)

Nobel Prizes in Astrophysics

1935	*Victor Hess*	*Discovery of cosmic rays*
1937	*Hans Bethe*	*Theory of stellar nuclear reactions*
1974	*Martin Ryle*	*Radio astronomy: discovery of pulsars*
	Antony Hewish	
1978	*Arno Pensias*	*Discovery of Cosmic Microwave Background radiation (CMB)*
	Robert Wilson	
1983	*Subrahmanyan Chandrasekhar*	*Theory of stellar structure and evolution (White Dwarfs)*
	William Fowler	*Nucleosynthesis in the Universe*
1993	*Russell Hulse*	*Discovery of binary pulsar: tests of GR*
	Joseph Taylor	
2002	*Raymond Davis*	*Detection of cosmic neutrinos*
	Masatoshi Koshiba	
	Riccardo Giacconi	*X-ray astrophysics*
2006	*John Mather*	*Study of CMB, detection of anisotropies*
	George Smoot	
2011	*Saul Perlmutter*	*Discovery of the accelerating expansion of the Universe*
	Brian P. Schmidt	
	Adam G. Riess	

Basic Questions of Observational Astronomy:

1. Where is the target?

2. How far is the target?

3. How bright is the target?

"How helpful to us is astronomy's pedantic accuracy, which I used to secretly ridicule."

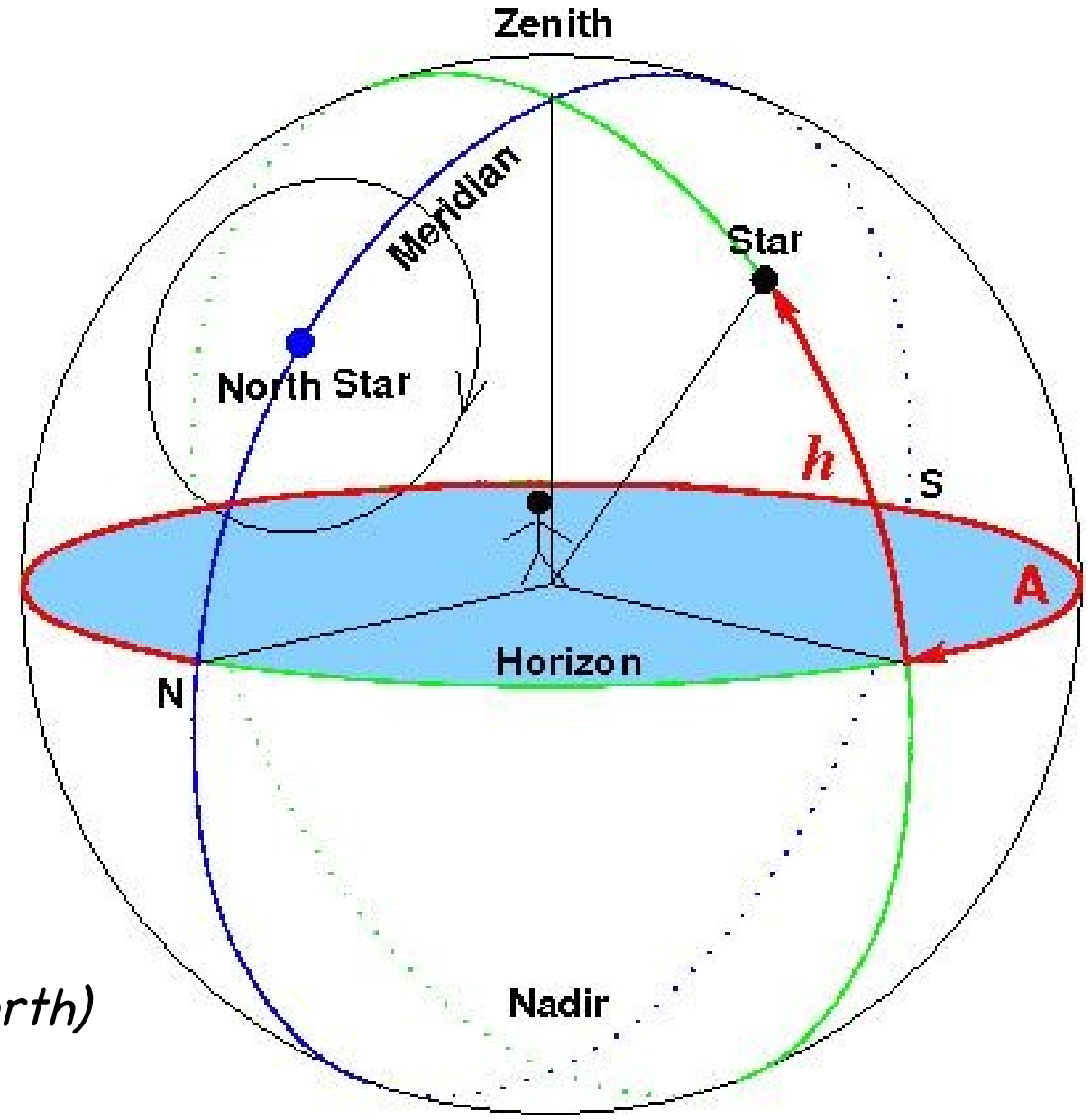
A. Einstein

Altitude – Azimuth Coordinate System

Altitude = h
(measured from the horizon towards zenith)

Zenith Distance =
$z = 90^o - h$
(measured from the zenith to the horizon)

Azimuth = A
(measured along the horizon eastward from north)



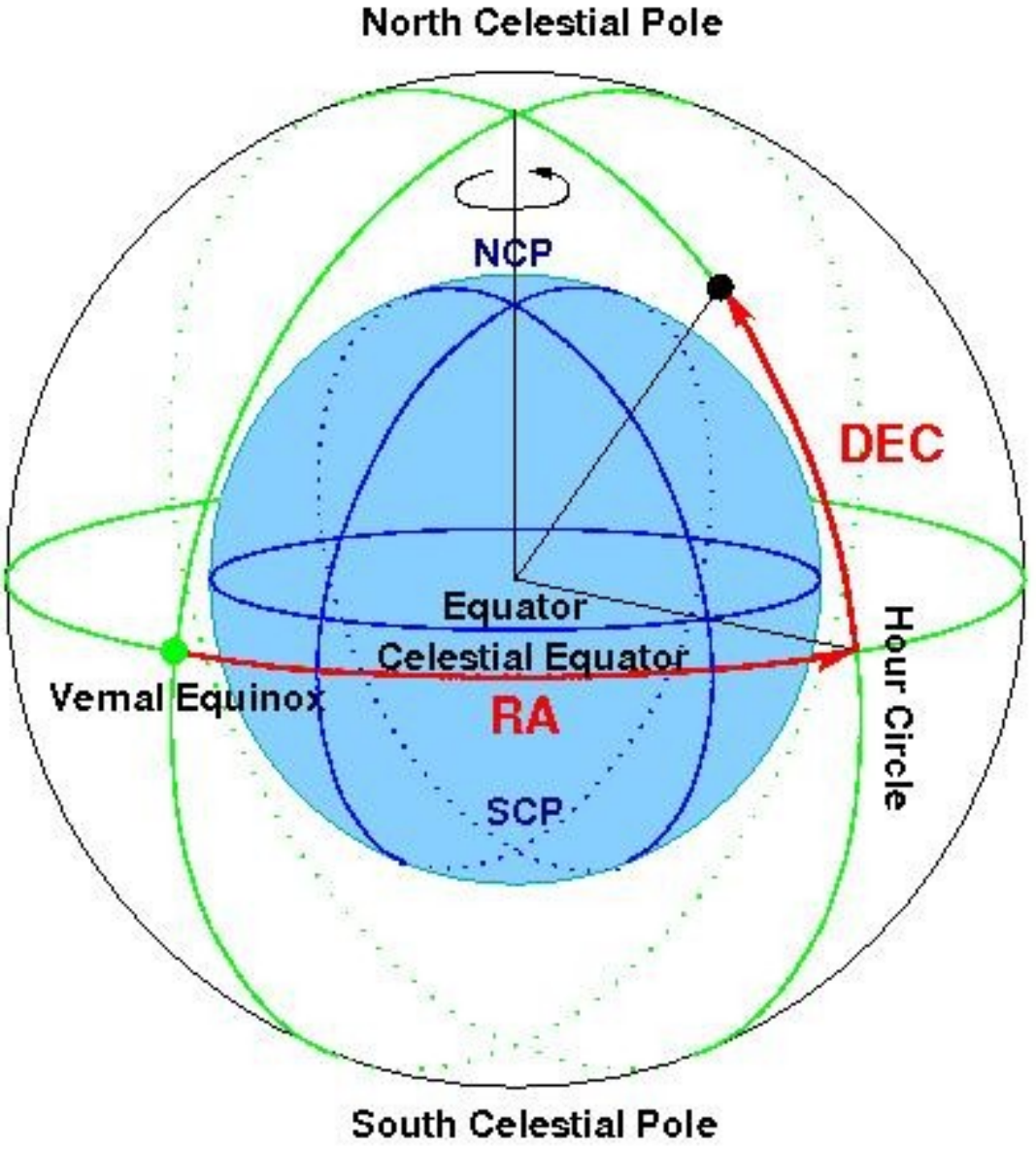
Equatorial Coordinate System

Declination = DEC =

$$2\pi = 360^{\circ}\,(\text{degrees})$$
$$1^{\circ} = 60'\,(\text{arcminutes})$$
$$1' = 60''\,(\text{arcseconds})$$

Right Ascension = RA =

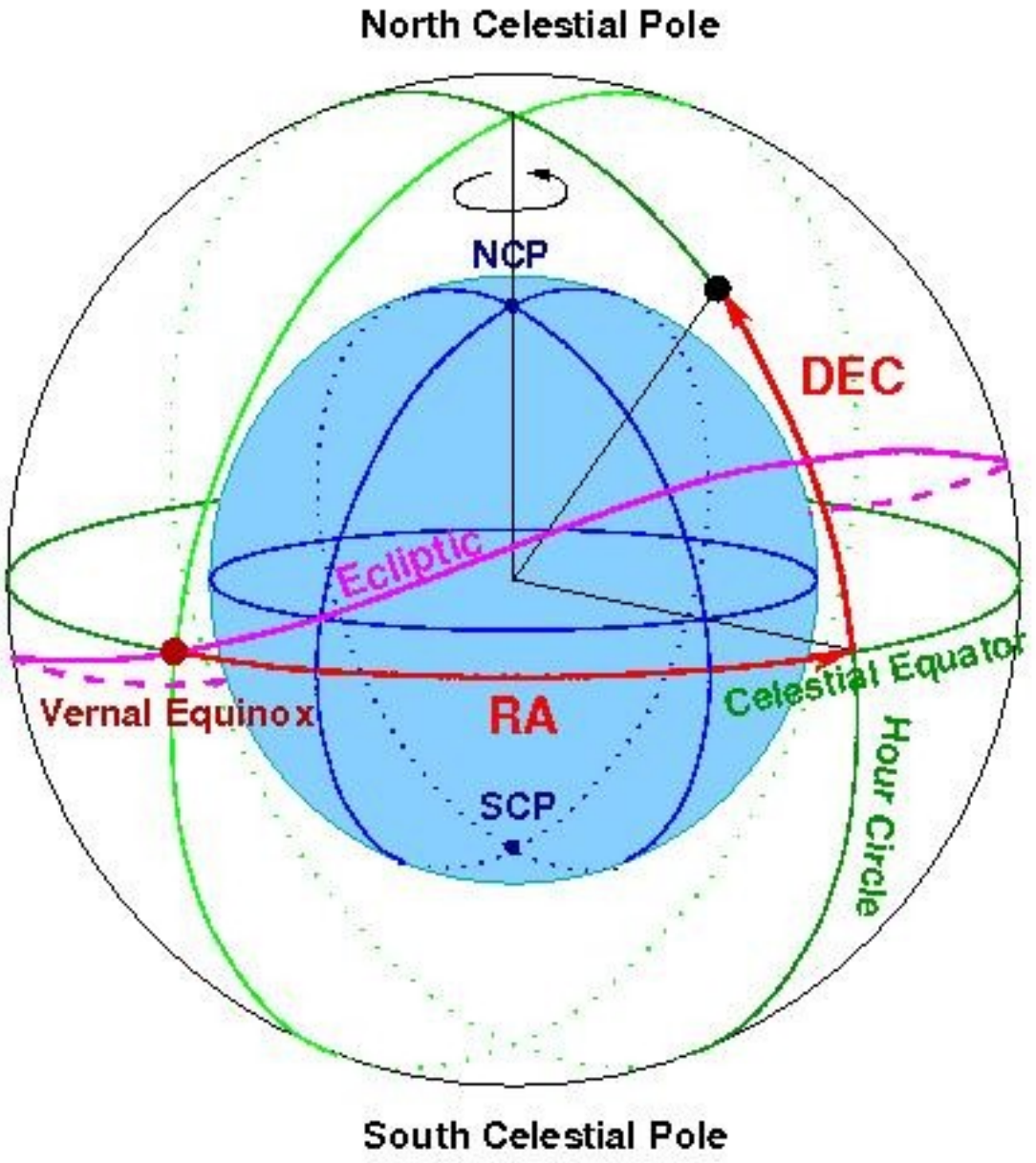
$$2\pi = 24^{h}\,(\text{hours})$$
$$1^{h} = 60^{m}\,(\text{minutes of RA})$$
$$1^{m} = 60^{s}\,(\text{seconds of RA})$$



Equatorial Coordinate System

Vernal Equinox is defined as an intersection of the celestial equator and the ecliptic.

It gives the position of the Sun on March 20-21.

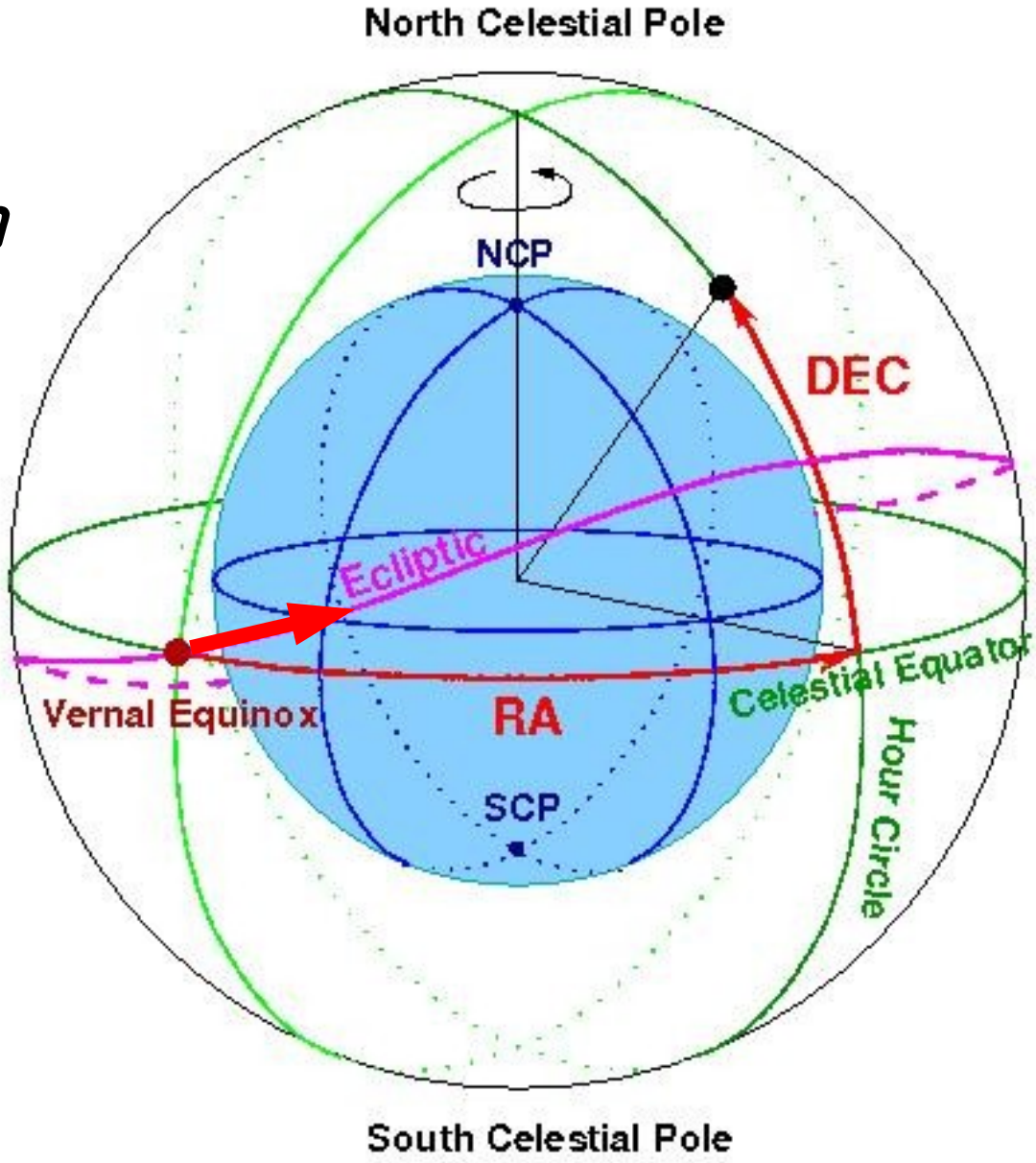


Question:

Does the Sun move in the direction of increasing or decreasing RA?

Answer:

Increasing RA.



Problem: *Calculate the angular distance between binary stars Sirius A and B.*

Sirius A: 6 45 08.9 -16 42 58
Sirius B: 6 45 09.0 -16 43 06