

Announcements

- Lab 3 is graded
- Next week is another night lab (meet here at 7:30 p.m. instead of 3:30 p.m.)
 - Check the schedule on Canvas for more details

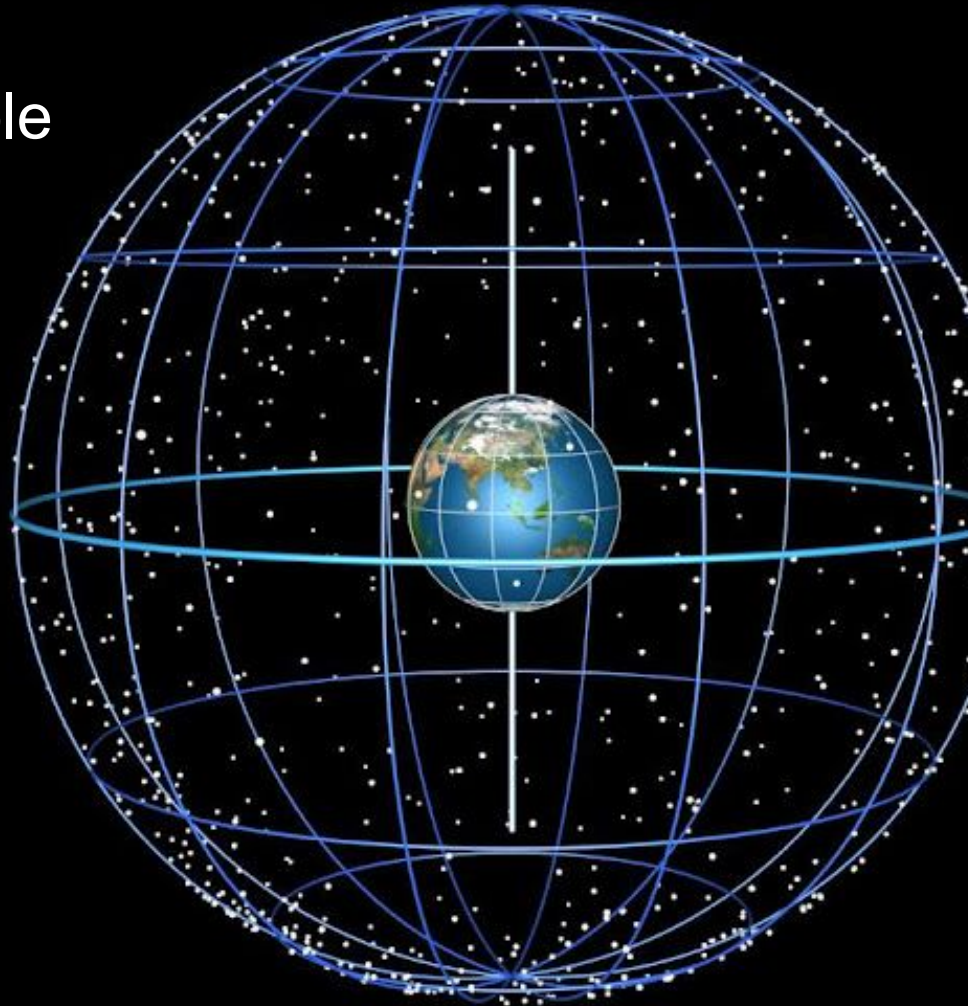
Intro to the Night Sky

Introduction

- This week we begin to explore the night sky
- Observing in the night sky is recorded in the earliest parts of our history
- We will focus on patterns that we see in the sky

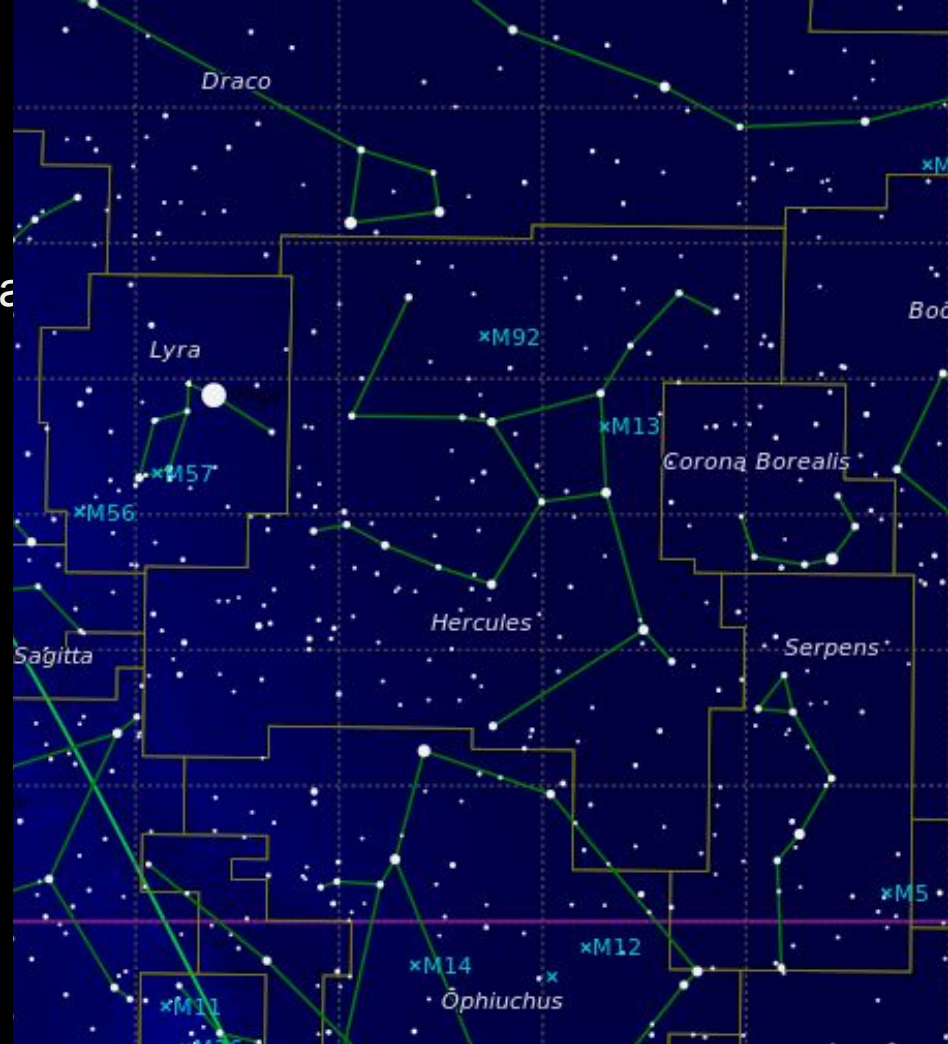
Celestial Sphere and North Pole

- The night sky is like a sphere surrounding Earth this is called the *Celestial Sphere*
 - We can map things onto this sphere; think “angular size”
- The *North Celestial Pole* (NCP) is the northern point where Earth’s axis of rotation intersects with the celestial sphere
- The “North Star” (Polaris) is located very close to the NCP



Constellations

- Constellations = **areas of sky** where a group of stars form a recognizable pattern
- The entire sky is broken up into 88 constellations
- Every point in the sky is part of a constellation
- If an object (Moon, planet) is in front of a constellation, it is *within* that constellation



Special Constellations

- Zodiacal Constellations are the set of 13 constellations that the Sun passes through in its apparent path through the sky each year
- The 12 Zodiacal Constellations you may be familiar with are: Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpius, Sagittarius, Capricornus, Aquarius, and Pisces
- The 13th that you may not be familiar with is Ophiuchus (thanks Babylonians...)
- The ecliptic is the apparent path of the sun in the sky throughout the year - you can find it on your star charts and star wheel!

Special Constellations Cont

- Circumpolar Constellations are those which are close enough to the North Celestial Pole (NCP) that they do not set below the horizon
- The number of circumpolar constellations is dependent on your location, specifically your latitude
 - In Tempe, our latitude is 33° - any object that is within 33° of the NCP will be circumpolar for us
 - Higher latitude means more circumpolar constellations
 - At the equator (latitude 0°), there are none, at the North Pole (latitude 90°), has the most
- Circumpolar Constellations **never set**, meaning that they are “visible” all day and night! (But they do still rotate)
- Also applies to the southern hemisphere (different constellations), but we are in the northern one so...

Asterisms (Patterns in the Sky)

- Often we don't point out entire constellations (remember, constellations are *areas of the sky*), instead:
 - Patterns *within* (or across) constellations
 - Prominent groups of stars
- This is called an Asterism
- Examples:
 - The Big Dipper (part of Ursa Major)
 - The Great Square of Pegasus
 - Technically... The patterns constellations are named for ARE asterisms, but not all asterisms are constellations...



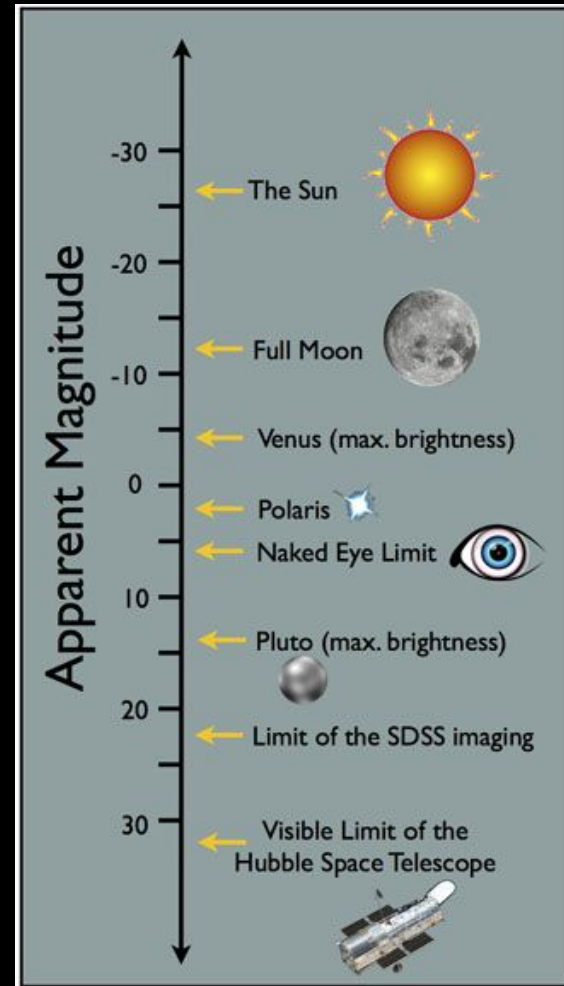
Magnitudes (More in future labs - Stellar Magnitude and H-R Diagrams)

- Stars don't look the same
- Apparent Magnitude is how we describe a celestial object's brightness
- The *smaller* the magnitude, the *brighter* the object is
- On star charts, etc, Magnitude is denoted by the size of the star in the illustration
- The scale is logarithmic - a magnitude 1 star is ~2.5 times brighter than a magnitude 2 star

Apparent Magnitude

Mag. 1		
Mag. 2		x 2.5
Mag. 3		x 6.25
Mag. 4		x 16
Mag. 5		x 40
Mag. 6		x 100

EarthSky.org



Stellar Nomenclature

- Common names are names for the brightest stars (ex: Polaris, Vega, Betelgeuse)
 - The number of stars with common names has been increasing as the IAU has started to officially recognize star names from more cultures
- Proper names consist of two parts: the name of the constellation the star is in and a Greek letter
 - The Greek Letter **typically** denotes the brightness like a rank: α (alpha) is the brightest, β is the second brightest, etc. (exceptions exist) (*cough* Question 6 *cough*)

The Lower-case Greek Alphabet

α	alpha	ι	iota	ρ	rho
β	beta	κ	kappa	σ	sigma
γ	gamma	λ	lambda	τ	tau
δ	delta	μ	mu	υ	upsilon
ε	epsilon	ν	nu	ϕ	phi
ζ	zeta	ξ	xi	χ	chi
η	eta	$\omicron$	omicron	ψ	psi
θ	theta	π	pi	ω	omega

How to Use the Star Wheel

- The star wheel is a tool to see what the sky will look like at a specific day and time of the year
- Spin the wheel so that the date is aligned with the time (Feb 10/11, 8:00 PM)
 - It is like a map of the stars
 - The hole in the middle is Polaris (the North Star)

Today:

- Do Questions 1-8 now
 - Then we will go to the roof for the rest of the lab
- I have a couple Audubon Guides available to borrow for Questions 5-8
 - Page 561
 - But you can also use the Stellarium web or mobile app
- Careful with Question 6
 - It's an exception to the normal naming convention
- After this, we will go to the roof

Stop! Roof Stuff After This

Roof Rules

- Bring your stuff with you
 - We will not be coming back to the classroom
- Do not leave the walled in area
- Red flashlights only
 - No white lights except in emergencies
- We will be up there with one or more other classes
 - You can ask me or the other TA(s) if you have any questions

Roof and Sketching Tips

- Give your eyes time to adjust
- Make an attempt at all sketches
 - I will not be grading you on artistic skill or precision
 - As long as you make a genuine attempt and I can tell what you were trying to do, while including the required objects, you will get full credit
- Draw what you can see
 - Not what you think we want you to see
 - Some of you may have better eyesight and can see more stars than others - draw them
 - If you can't, don't
 - If a required object is blocked by a building or cloud - note that (or even draw said cloud/building)
 - Use the size of dots to represent brightness - the brighter an object, the bigger the dot
- The bottom of the page is the horizon, and the top is straight overhead
- Questions 9 and 10: Can also use your star wheel or Stellarium for this information

Required Objects in sketches and tables

- Constellation Sketch:
 - Orion
- Table 1:
 - Sirius, Betelgeuse, Rigel, Polaris, Castor, and Pollux
- Table 2:
 - Jupiter and *maybe Saturn**
- Northern Sky Sketch:
 - At least: Polaris, Ursa Minor, Cassiopea, *maybe Ursa Major**
- Southern Sky Sketch:
 - At least: Orion, Taurus, Canis Major*, Canis Minor
- If you can see more, draw more

*May be blocked by a building