

The daily motion of the sky

Astronomy 101
Syracuse University, Fall 2019
Walter Freeman

September 7, 2021

Some announcements

- People just now joining the class: everything you need is on the course website, walterfreeman.github.io/ast101/
- Labs start this week
 - Today is the last day to change your lab section
 - Most sections are full; we have no ability to override section caps
- Homework due Thursday
 - We'll collect it during class
 - If you must miss class turn it in before class to your TA's mailbox
- Submit your “ask the physicist” questions in Discord or email
- If you have a Monday lab, you'll do Lab 1 next week

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- By email: most of you have cellphone cameras...

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So I am eager to discuss them with you in the help sessions, and your TA's can help you as well. Or you can take a cellphone picture and post your question to Discord.

If you're not sure about the reasoning involved, *ask us in class* or on Discord or email. We won't tell you the answers but we'll make sure you know how to get there on your own! (That's the point...)

This week we will...

Today: consequences of the Earth's **rotation**:

- Review the celestial-sphere model from last time
- Complete the first tutorial-exercise that we started last time

Thursday: consequences of the Earth's **revolution**:

- What about the Sun?
- What causes the seasons?
- What does the Sun do to the Earth?

The celestial sphere model: summary

- We can pretend that everything on the sky is attached to a sphere that rotates around us.
- The axis of the sphere runs from the North Celestial Pole to the South Celestial Pole.
- This is the same as the rotation axis of the Earth:
 - The NCP and North Star are above the North Pole
 - The SCP and South Star (if there was one) would be “below“ the South Pole
- The sphere rotates counterclockwise, while looking from Earth up at the NCP

Which are true in Syracuse?

- I: Some stars are always visible (at night)
- II: Some stars are only visible sometimes; they rise and set during the night
- III: Some stars are never visible

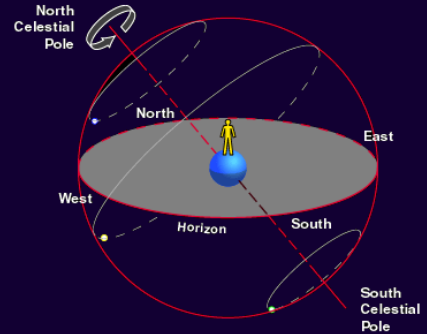
A: I only

B: II only

C: III only

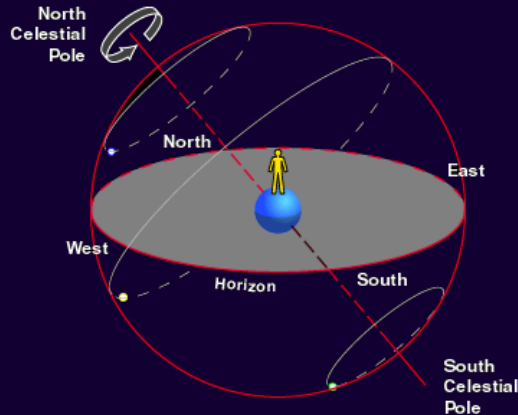
D: I and II

E: I, II, and III

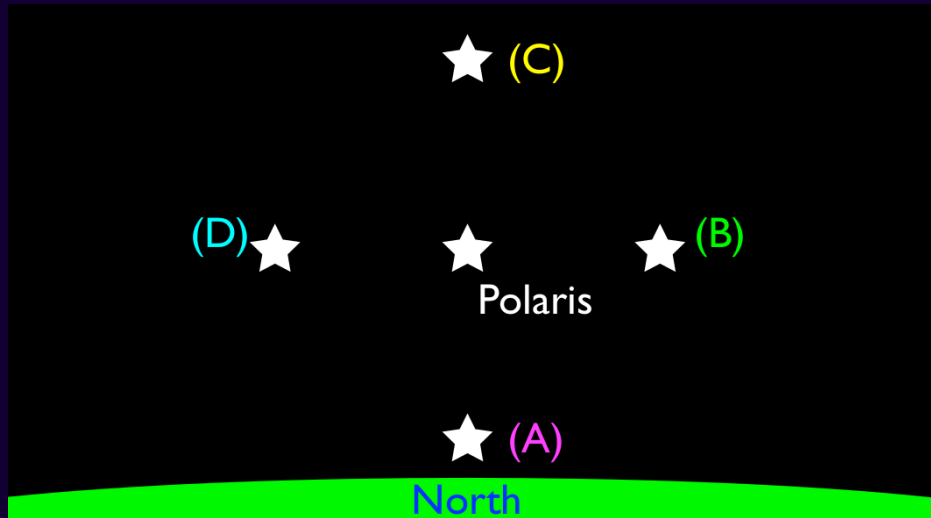


Summary

- We can treat the stars as all rotating together, on an invisible sphere far away
- The axis of rotation is the same as the Earth's, and it rotates once per day
- Only half of the sphere is visible, because the Earth is in the way

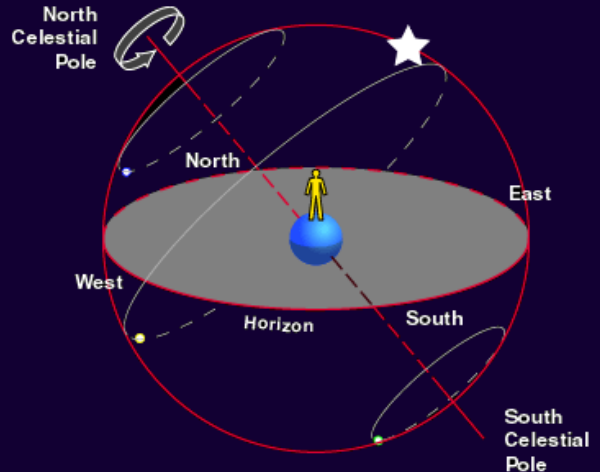


In Syracuse, you see this star at (A). Where will it be six hours later?



How long is this star visible in the sky each day?

- A: All the time
B: More than 12 hours
C: Less than 12 hours
D: It's never visible



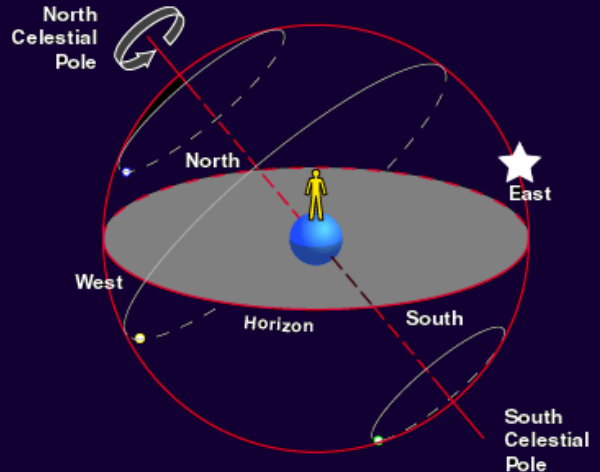
Take 10-15 minutes to complete the exercise from before. Then we will do something with your beach balls!

Two things to note:

- The reference to the “camera” on the bottom of the second page means “the part of the simulation facing you”.
- There is an error on page 5 (section 2.3). #3 should ask about the *green* star, not the purple one.

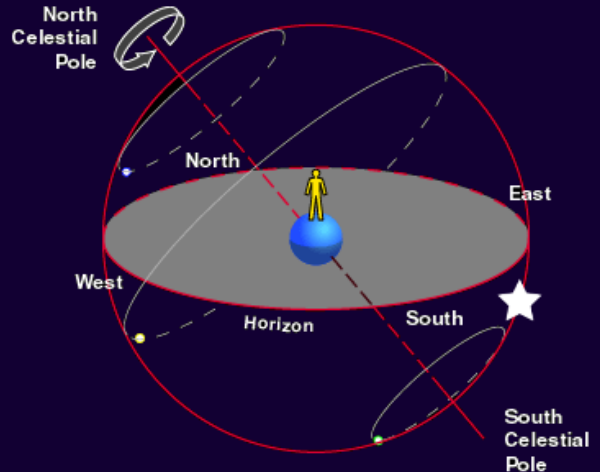
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What's “wrong” with this model of the heavens?

Problem 1: Depth and the sky

The constellation of Orion:



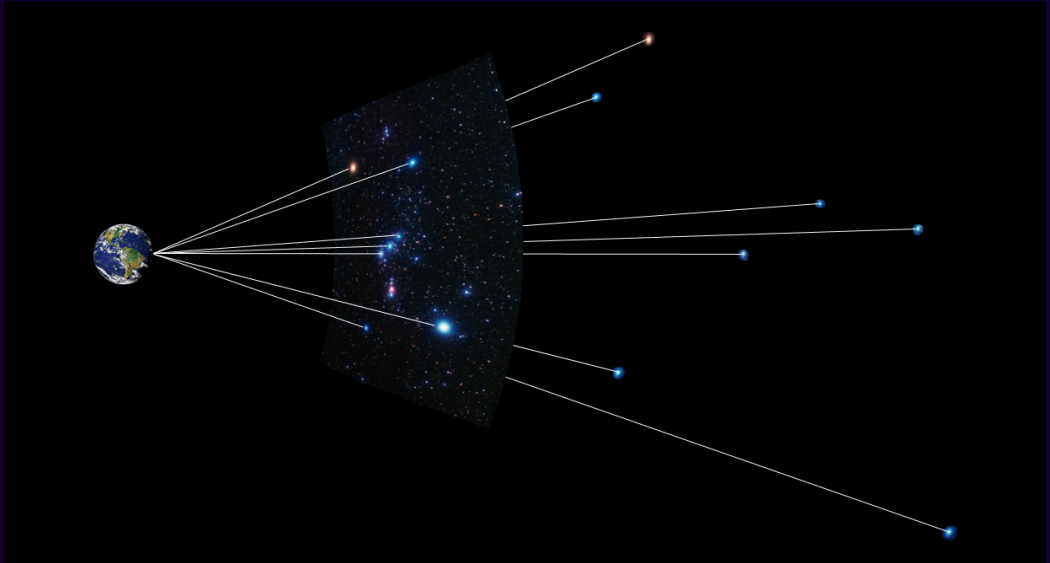
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The reality:



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Let's now figure out the motion of the stars with this knowledge.

We'll start the Exercise together, then you should finish with the people around you.

As always, raise your hand as you have questions!

There are two boxes by either exit of the auditorium.

Please turn your homework in there. (It's the last page of the Exercise handout from last Thursday.)

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Be well, enjoy the beautiful fall weather, and I'll see you Thursday!