Physics 10293 Lab #10:
Tonight's Sky

Introduction

This week, we will take advantage of all that we have learned with the Starry Night application to answer some questions about the night sky at this time of year.

Open up Starry Night, and take the following steps in preparation:

- Type "options" into the search bar to turn on the options sidebar.

- Under "Guides", expand the "Alt/Az Guides" menu, and turn on "Labels", "Grid" and "Meridian".

- Under "Local View", click on the words "Local Horizon" to open a dialog box. Near the top of this box, select "Flat" so that the application displays a flat horizon.

- Under "Solar System", uncheck "Asteroids", "Comets", "Satellites" and "Space Missions".

- Under "Solar System", click on the words "Planets-Moons" to open a dialog box. In this box near the bottom,
    - Activate "Labels"
    - Activate "Label only planets brighter than…"
    - Move the slider to a magnitude of about 5.

- Under "Stars" and the sub-menu "Stars", activate the "Labels" button to help identify bright stars.

- Under "Constellations", select "Labels", "Boundaries" and "Stick Figures"

- Set the time to 9pm tonight.

Now close the options sidebar and use the Starry Night controls to answer the following questions.

Q1. In what constellation is the bright star Sirius?

Q2. At approximately what time, to the nearest minute, will Sirius cross the meridian tonight?

_____

Q3. At approximately what time, to the nearest minute, will Sirius cross the meridian tomorrow night?

_____

Q4. The difference between these two times is the sidereal day. How long is the sidereal day, in hours and minutes?

_____ hours _____ minutes

Q5. At what time, to the nearest minute, will the Sun cross the meridian today?

_____

Q6. At what time, to the nearest minute, will the Sun cross the meridian tomorrow?

_____

Q7. The difference between these two times is the solar day. How long is the solar day, in hours and minutes?

_____ hours _____ minutes

Q8. Set the time to 9pm tonight. In what constellation is the bright star Regulus?

_____

Q9. How far is Regulus from the Earth, in light years?

_____ light years

Open the options sidebar, and under “Guides” and the sub-heading “Ecliptic Guides”, turn on “The Ecliptic”. Notice that Regulus is very close to the ecliptic. That made it a useful marker star for the Persians, who considered Regulus one of the “Four corners of heaven” or “Royal Stars”, marking four bright stars along the ecliptic separated by about 90 degrees.

Q10. Another of the “Royal Stars” is Aldebaran. In what constellation is the bright star Aldebaran?

_____

Q11. Now look to the North, set the time step to 1 minute, and observe the motion of the sky. If you wish, you may use the options sidebar to disable “Daylight” under “Local View”. Name six bright stars (with proper names) that are circumpolar (always above the horizon) from our location:

_____, _____, _____

_____, _____, _____

Q12. Find the constellation Perseus. What is the name of the brightest star in this constellation (designated Alpha Persei)?

_____

Reset the time to 9pm tonight, and look toward the East.

Q13. Which star is at a higher altitude, Arcturus (in the constellation Bootes) or Spica (in the constellation Virgo)?

_____

Q14. Which zodiacal constellation is closest to the zenith?

_____

Q15. Two months from now, which zodiacal constellation will be closest to the zenith at 9pm?

_____

Q16. Return to today’s date at 9pm. Which zodiacal constellation is just now rising over the Eastern horizon?

_____

Q17. In the constellation Gemini, which star is brighter, Castor or Pollux? Remember that the magnitude system measures brightness backwards (so smaller apparent magnitude = brighter star)!

_____

Q18. Check to see if any major, visible planets are up (Venus, Mars, Jupiter or Saturn), and if so, what constellation are they found in? List any you see above the horizon at 9pm tonight, along with their constellation (you will find them near the ecliptic).

Q19. What time today will the planet Saturn transit (cross the meridian)?

_____

Q20. What time today will the planet Jupiter rise?

_____

Q21. In what constellation is the planet Neptune found today?

_____

Q22. Zoom in on Neptune. What is the name of Neptune's largest moon?

_____

Zoom back out to a normal view. Under "Deep Space" and the sub-heading "Messier Objects", turn on "Labels".

Q23. List which Messier Objects are located within the constellation Perseus.

_____

Q24. Find M45 (the Pleiades). In what constellation is M45?

_____

Q25. Zoom in on the Pleiades. There are nine named stars in this small cluster. List these names below.

_____ _____ _____

_____ _____ _____

_____ _____ _____

Q26. Zoom back out to a normal view, then find M31. What kind of object is M31?

_____

Q27. In what constellation is M31 found?

_____

Q28. What kind of object is M13?

_____

Q29. In what constellation is M13 found?

_____

Q30. How far away from Earth is M13?

_____

Return to today's date and locate the Moon. The best way is to type "moon" into the search box on the upper right and double-click "The Moon" below that. If the Moon is below the horizon, click "Best Time" to see the Moon when it crossed the meridian today.

Q31. In what constellation is the Moon today?

_____

Q32. In what phase is the Moon today? _____

Q33. At what time does the Moon cross the meridian today?

_____

Q34. At what time does the Moon cross the meridian tomorrow?

_____

The difference between these two times, which is approximately 24 hours and 50 minutes, is called a lunar day. Since the Moon's orbital speed around the Earth varies, the lunar day length has a range of values, but the average lunar day length is 24 hrs 50 min.

Q35. Visit https://tinyurl.com/yathu5pd to watch an animation of the lunar day, and explain below with the help of a simple diagram, why the lunar day is longer than the solar day.

There is no essay with this week's lab.