

29:50 Astronomy Lab
Stars, Galaxies, and the Universe
Fall 2007
Observing the Night Sky II

Name:.....

Date:.....

Introduction

This will be the second of the exercises featuring observation of the night sky. Hopefully, most of the students will have the opportunity of making these observations at the Palisade-Dows Observatory of the Cedar Amateur Astronomers organization.

There are three main goals of this exercise. First, we will have the chance to see the changes in the sky which have taken place in the (approximately) six weeks since the first session. Second, we will have a chance to see some of the objects which have been discussed in lecture during the course of the semester. Finally, we will take advantage of the fortuitous appearance of Comet Holmes in the night sky to see an important type of solar system object, as well as a celestial spectacle.

In this exercise, we will again use the Sky and Telescope star wheel, the SC1 constellation chart, and the Sky and Telescope Pocket Star Atlas. The star wheel and SC1 chart will be used for constellation identification, and also finding the approximate locations of “deep sky” objects. The Pocket Star Atlas will be used to help us find objects in the telescope.

Finding Stars and Constellations

- (1) Get yourself oriented so you know which directions are north, west, etc. Use the star wheel to help you find Vega. *Roughly* estimate its altitude and azimuth and write down the numbers in the space below. Also, compare its present position with its position during our last session in September. **Do it!**.....
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- (2) Use the Star Wheel to help you find the star Fomalhaut in the constellation of Piscis Austrinus. Recall from lecture that Fomalhaut is a star not greatly different from the Sun, but much younger. We see evidence that its “solar system” is right now in the process of forming. Several billion years from now, complex life might arise on one of the planets of the Fomalhaut system . After you find Fomalhaut, point it out to one of the observing assistants.....
- (3) Find the constellation of Pegasus (the “Great Square” of Pegasus), as well as the constellation of Andromeda which is attached to it. How does the position of

Pegasus compare to what it was in September? Note the position of M31 (the Andromeda Nebula) on the SC1 chart. Now try and see it with the naked eye. Be sure to use “averted vision”, in which you look slightly off to one side of the object. The human eye is most sensitive to faint light when using averted vision. Get a pair of binoculars and look at this position. This should allow you to see Andromeda better. Further on, you will have the chance to look at Andromeda in a telescope. Point out the Andromeda Nebula to the observing assistants.....

- (4) Use the Star Wheel to help you find the star Capella in the constellation of Auriga. This was the bright star we were looking for in the northeast in the September observations. Be prepared to point it out to the observing assistants.....
- (5) Comet Holmes is now in the constellation of Perseus. Use the SC1 chart to familiarize yourself with the constellation of Perseus. Find Perseus in the sky, and then identify Comet Holmes. It will appear as a slightly fuzzy star which is not plotted on the star charts. Point the comet out to the observing assistant.....

Estimating Stellar Magnitudes

To estimate stellar magnitudes, we need some “calibrators”, or stars of known brightness. This allows you to “calibrate your eye”, and make it able to estimate magnitudes of other stars. All of the stars below are in the vicinity of Andromeda.

Star	Constellation	Apparent Magnitude
Beta Andromedae (one of the brightest stars in Andromeda)	Andromeda	2.1
Mu Andromedae (the next one up, moving towards M31)	Andromeda	3.9
Nu Andromeda (right next to M31)	Andromeda	4.5
Gamma Cassiopeiae (the middle star in the “W” of Cassiopeia)	Cassiopeia	2.5

Now look at the sky and estimate the apparent magnitude of the faintest star you can see. Write down its magnitude here.....

Look at Vega again, which is magnitude 0. This simple exercise should give you a good idea of the relative brightness of two stars separated by several magnitudes.

Find the following stars in the sky, and estimate their apparent magnitudes. Try and estimate to 0.5 magnitudes. Go back to the above table to refresh your memory. Write down your estimate of the apparent magnitude in the column provided.

Star	Constellation	Apparent Magnitude
Alpha Arietis	Aries	
Albireo (Beta Cygni)	Cygnus (end of the “Northern Cross”)	
Theta Capricorni	Capricornus	
Alpha Andromedae (one of the stars in the square of Pegasus)	Andromeda	

Observing Objects through the Telescope

We will look at a number of objects through telescopes during our observing session. If you have the opportunity, try and find one or more of these objects yourself, using the Pocket Sky Atlas. In other cases, you can look through one of our telescopes or through one of the telescopes of the Palisade-Dows Observatory. In all cases, think about what you are looking at, and what we have said about it during the semester.

- (1) **Comet Holmes.** We did not talk about comets, because they are solar system objects. Comet Holmes is currently between the orbits of Mars and Jupiter, and recently had a 15 magnitude flare up. What you are seeing is reflected sunlight from a huge “coma” of gas and tiny ice particles surrounding the comet.
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- (2) **Andromeda Galaxy (M31).** The Andromeda Galaxy is the nearest major galaxy to us, and is the only object visible to the naked eye (in the northern hemisphere) which is not in the Milky Way. This is what the Milky Way and all its stars would look like if viewed from a distance of 2 million light years.
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- (3) **The Ring Nebula (M57).** Look for this object between two stars of the parallelogram of the constellation of Lyra. It is shown on the SC1 chart, and the Pocket Sky Atlas should help you find it. This is a planetary nebula, which consists of glowing gases that have been thrown off by a highly evolved star on its way to be a white dwarf. With a larger telescope, you can see the central star, which is the core of what was once a main sequence star like the Sun.
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- (4) **The Crab Nebula (M1).** This is one of the most important objects in astronomy. It is the remnant (leftover) of the supernova of 1054 AD. The light which you are seeing is *synchrotron radiation* produced by electrons traveling at nearly the speed of light. In the center of this nebula, visible with large telescopes, is the Crab Nebula pulsar. You can find M1 on your SC1 chart, and use the Pocket Sky Atlas to “home in” on it.

