

Astronomy 3 Laboratory

Number 1

Observations with the Telescope

The purpose of this laboratory is for you to see some of the objects that are being studied in the course. It is divided into three parts. The first lets you see one of the brightest galaxies. The main thing you will probably learn is that by eye, there is not a lot that one can see. The second shows the center of the Orion Nebula, a region of star formation and a beautiful sight. The third part gives you a look at the planets Mars and Saturn. The discovery of the satellites led to the understanding of gravitation which is an important component of Astronomy 3.

The data that you collect are sketches that you are to make on the forms supplied with this lab. Note that each of these drawings must be your own work and signed by the authorized person at the lab. Have the telescope operator or the lab assistant check over your work, and be sure that they sign your lab work sheet. Your lab work cannot be graded without the signature of the lab assistant or telescope operator on the work sheet and your signature on the observing record maintained by the telescope operator. Be sure all required signatures are made!

I. The Andromeda Galaxy

You are to make visual observations of M31 (The Andromeda Galaxy).

1) Sketch the galaxy on the form provided. Be sure to record the diameter of the field of view, date, and time of the observation.

In your write-up to be turned in answer the following questions:

- 2) Find a photograph of this galaxy either in books or on the web. Compare your drawings with this picture. What parts of the galaxy did you actually see? What are the morphological or Hubble types of the galaxies?
- 3) Your lab instructor will give you the distance to M31. Take this distance and the angular sizes of the galaxy estimated from your sketch to determine the physical size of the galaxy.
- 4) Comment on the stellar contents of the galaxies, how much dust and gas it contains.

II. The Orion Nebula

The entire region of Orion and Taurus contains areas of star formation. M42 is an example of an interstellar cloud. It is about 1500 light years away. What you see is a dense region of mostly hydrogen about 2.5 light years inside. The gas glows due to the ultraviolet radiation from the four hot stars near the center. Several hundred other young stars are also present behind the cloud.

1) Make a sketch of M42 which is located in the sword of Orion. Again record the field of view, time and date of observation. This is a complicated object so at least draw the main regions that you see, noting the "Trapezium" near the center, and major dark and bright lanes.

In your write-up answer the following questions:

- 2) Why does ultraviolet radiation from some of the stars make the nebula glow?
- 3) Is there also some dust in the Orion nebula? Where might this be located in your drawing?
- 4) In which part of the galaxy is the Orion nebula?

III. Mars and Saturn

Saturn (which you are going to look at) and Jupiter (poorly placed for this lab) are the two largest planets in our solar system and in the winter of 2004, Saturn is well placed for observation. From the point of view of Astronomy 3, they are of interest because they show other gravitating systems, in addition to being beautiful to see. The four largest or Galilean satellites of Jupiter have been closely studied by spaceprobes. The largest satellite of Saturn, Titan, has an atmosphere and is the goal of the current Cassini mission. The rings of Saturn beautifully illustrate the form of another kind of object that is discussed in many other systems.

Mars has been in the news lately and has been the object of intense studies for centuries as it is the most earth-like of the planets and a possible home for extraterrestrial life.

A. Saturn

- 1) Sketch the planet and its rings. Draw in any surface markings you may be able to see.
- 2) Relative to Saturn, try to find Titan and any other satellites. Your lab instructor will help you to find Titan.

Now answer these questions:

- 3) Of what are the rings composed? Describe how they can form a stable configuration around Saturn.
- 4) What would happen to Titan if it were moved closer to the center of Saturn than the outer radius of the ring?
- 5) What are the surface markings on Saturn?

B. Mars

1. Sketch the planet and draw any surface features that you can see.
Now answer these questions:
2. Can you identify any of the surface features? What are they?
3. Comment on the seeing. Did this help or hinder your seeing surface details?
4. Compare Mars with Saturn and the Earth. Give a list of the similarities and differences that you could see.

Other optional objects: The moon, Venus and Jupiter. If you start early you may be able to view Venus low in the SW. If you are late, you may be able to find Jupiter in the E. Depending on the date of your lab, you may or may not be able to see the moon.

NOTE: All exams and quizzes are closed book and notes. The Honor Principle is strictly in force for these and the labs. For the laboratory write-ups, while discussion with your lab partners is unavoidable and permissible, the reports themselves must be your own work. Any results from discussions or outside sources must be referenced in the reports. If you have any doubts or questions ask your instructor first.

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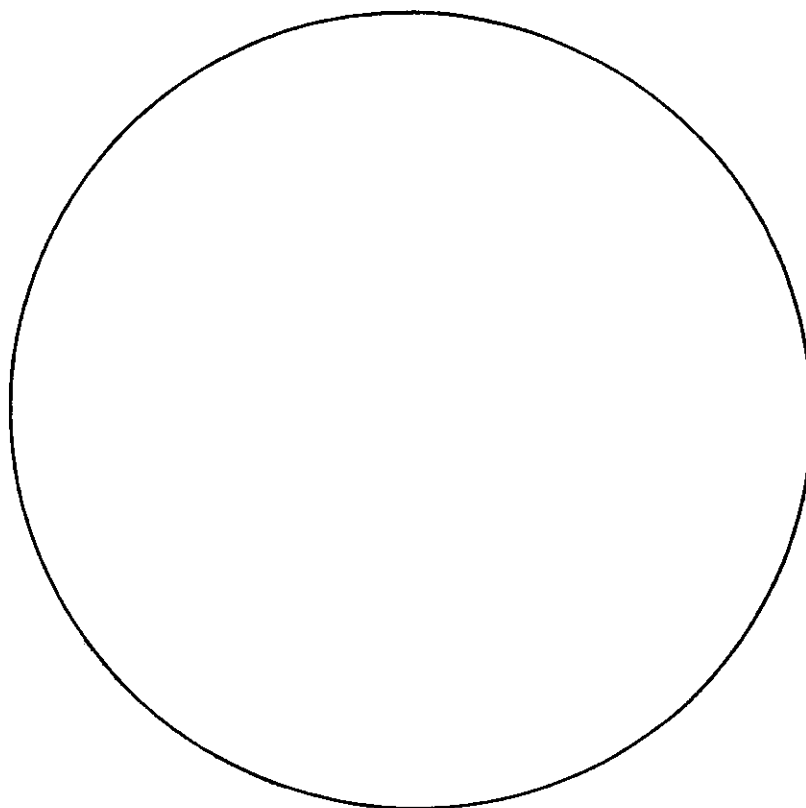
Exercise 1

Observation Sheet

Name: _____ Date and time: _____

Telescope Operator: _____

Put your sketches of the Andromeda galaxy in this section.



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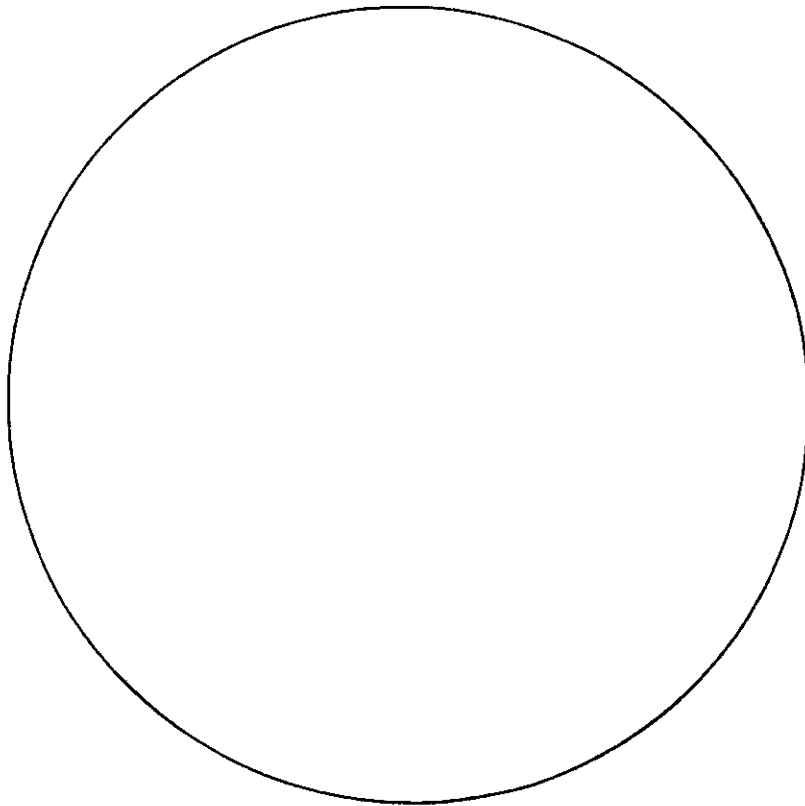
Exercise 1

Observation Sheet

Name: _____ Date and time: _____

Telescope Operator: _____

Put your sketch of the Orion Nebula in this section.



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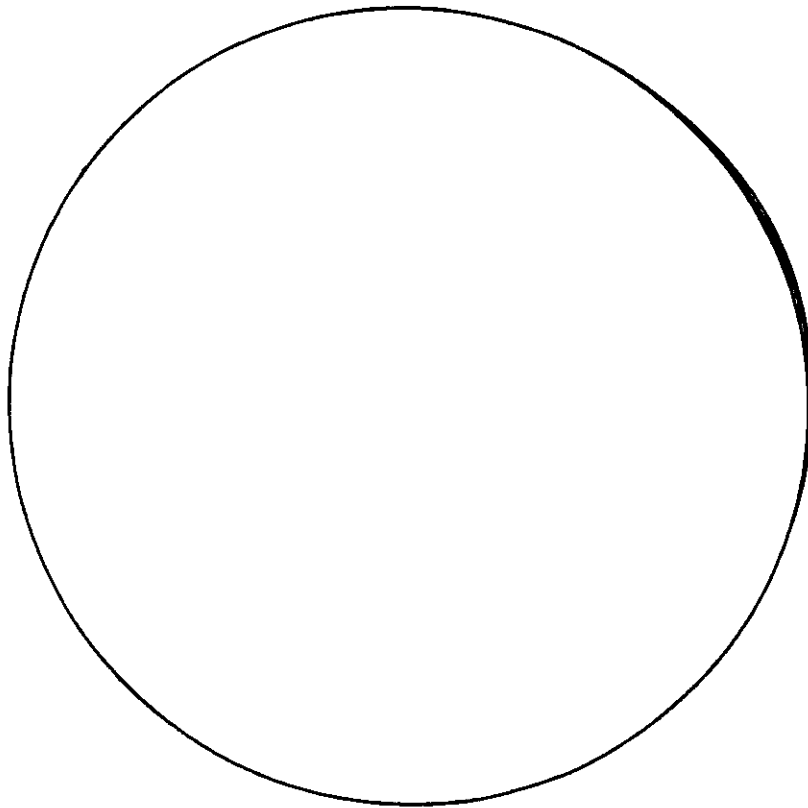
Exercise 1

Observation Sheet

Name: _____ Date and time: _____

Telescope Operator: _____

Put your sketch of Mars in this section.



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Exercise 1

Observation Sheet

Name: _____ Date and time: _____

Telescope Operator: _____

Put your sketch of the Saturn system in this section.

