

OBSERVING DEEP SKY OBJECTS

INTRODUCTION

Beyond the solar system lies the vast expanse of interstellar and intergalactic space. Here are encountered suns in profusion: alone in isolated splendor, or bound together in pairs, triplets and mighty clusters. Great clouds of gas and dust (the precursors of stars, planets, and possibly life itself) drift by, occasionally illuminated by the glow of nearby suns. And there is more: planetary nebulae (the shells of dying stars), super novae remnants, white dwarfs, pulsars, and black holes. Beyond the Milky Way are other galaxies by the billions, populating the cosmos to the edge of the observable universe, their feeble light echoing across the eons from near the beginning of time. In this exercise we will sample as many of these celestial wonders as possible using small telescopes and expanding minds.

EQUIPMENT

- (1) Telescope, preferably with setting circles
- (2) Star atlas
- (3) Reference books

- *Optical Equipment*
Binoculars are useful for observing large star fields in the Milky Way, some nebulae, and large bright galaxies. However, a telescope with a large aperture is needed for most deep sky work. In general a short focus, wide field instrument gives best results. Large magnification is useful mainly with close double stars and some planetaries. The telescope should be equipped with a good finder and setting circles are very helpful.
- *Observing Site*
The observing site should be dark - as far from urban sky glow as possible. At a minimum there should be no bright light sources near the telescope.

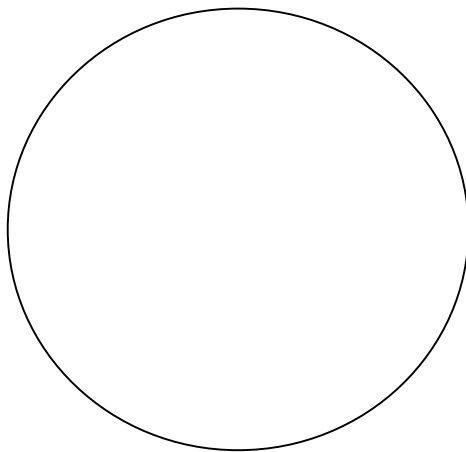
For the best results both the seeing (i.e., the steadiness of the atmosphere) and the transparency should be at their best. Faint objects can be seen on a night with good transparency and unsteady air, but little structure in these objects will be seen.

- *Eye Preparation*
At least twenty minutes should be allowed to let the eye become adapted to the dark. After the eye has become adapted, the only lights allowed should be those with red filters.
- *Averted Vision*
Sometimes a faint object can be seen better by looking away from it. This technique of seeing an object out of the "corner" of your eye is known as averted vision and is used extensively in deep sky work.
- *Finding Objects*
If the telescope is equipped with good quality setting circles, and they are properly calibrated, deep sky objects can be located very easily by simply "dialing in" the proper coordinates. Otherwise, the "star hopping" method must be used. In essence this consists of charting a path to the object via a number of stars which are bright enough to be seen in the view finder and which can be identified in a star atlas. *To find faint objects, an atlas showing stars and other objects down to at least sixth magnitude is a must.* You begin by centering the brightest star in the field of view and then proceed from star to star, identifying them by the patterns they form with surrounding stars, as indicated by the atlas. By careful planning and following the route (and lots of practice!), you should be able to arrive at the desired object.

PROCEDURE

- (1) Set up the telescope. If the telescope has an equatorial mount, the polar axis must be aligned with the pole.
- (2) Select at least three examples of each major deep sky category (i.e., galaxies, diffuse nebulae, planetary nebulae, and star clusters), locate them in a star atlas, and observe them with the telescope.
- (3) Using the observing forms provided, sketch the appearance of the objects to the best of your ability.
- (4) For each drawing provide all of the information requested on the observing forms.

Note: Some sort of reference work will be required to obtain such information as distance of the object from solar system, best estimate of the object's dimensions, number of stars if the object is a star cluster or galaxy, where the object is located, etc. One excellent reference is ***Burnham's Celestial Handbook*** a three volume set by Robert Burnham, Jr. These books are available from the library, the astronomy department, or from the instructor



Object: _____

Observing Location: _____ Date: _____ Time: _____

Sky Conditions: Transparency: _____ Seeing: _____

Telescope: Aperture: _____ f/ratio: _____ Eyepiece: _____

Object Location:

Constellation: _____ RA: _____ DEC: _____

OBSERVATIONS

Feature	Yes	No	Maybe
Clear Shape	_____	_____	_____
Bright central spot	_____	_____	_____
Resolved into stars	_____	_____	_____
Stars in haze	_____	_____	_____

Where is this object located?

Galactic plane: _____ Galactic Halo _____ Beyond the Milky Way _____

What type of is this: Open Cluster: _____ Globular Cluster: _____

Diffuse Nebula _____ Planetary Nebula _____

External Galaxy _____

How far from the Earth is this Object? _____

Additional Comments