

CONSTELLATION PHOTOGRAPHY WITH A FIXED CAMERA

INTRODUCTION

Photography has played a key role in the development of astronomy since the latter half of the nineteenth century. Although professional astronomers today have come to rely on electronic imaging techniques for most work, the excellent quality of modern high speed film has enabled amateurs with relatively modest equipment to produce pictures which rival major observatory photographs of just a few years ago. This exercise introduces astrophotography at its most basic level, using nothing more than an adjustable 35mm camera mounted on a standard camera tripod. With this equipment and fast film, excellent photographs of constellations can be made.

SUMMARY OF EXPERIMENT

- (1) Take photographs of six different constellations, including at least two zodiacal and two circumpolar.
- (2) Determine the scale of the photographs and identify as many objects (stars, planets, and deep sky objects) as possible on each photograph using a star atlas

OBJECTIVES

- (1) To learn the techniques and limitations of fixed-camera astrophotography.
- (2) To develop a basic understanding of the equatorial coordinate system and the use of a star atlas through photographic analysis.
- (3) To learn basic constellation patterns.

EQUIPMENT

- (1) *Camera* capable of taking time exposures with an adjustable aperture 50mm lens. Most modern single lens reflex 35mm cameras satisfy these requirements.
- (2) *Camera Tripod*
- (3) *Cable release*
- (4) *High speed film(ISO 1000 or greater; 1600 - 3200 preferred)*

PROCEDURE

- (1) Load the film into the camera, mount the camera on a sturdy tripod (in a dark location!), and attach the cable release.
- (2) Make sure that:
 - a. the aperture is one stop less than maximum (i.e., if maximum aperture is f/2.0, then stop down to f/2.8). This prevents distortion of stellar images at the edges of the picture.
 - b. the lens is focused at infinity
 - c. the shutter is set for a time exposure (usually designated "B" on the shutter control)
- (3) Select a constellation and center it in the viewfinder. This may take some practice, as the stars will visually appear quite dim through the camera.
- (4) To make an exposure, open the shutter by pressing the cable release; the shutter will remain open until the cable release is disengaged. **Expose for no more than 25 seconds.** If the shutter is left open longer than this, the stars will appear as "streaks" rather than "dots" on the photograph due to the rotation of the earth.

LAB REPORT

Processing procedure for those using their own cameras:

Since most standard photo finishing labs are not familiar with astrophotography, the film should be processed at a facility where it is possible to explain what you want directly to the personnel actually doing the work (i.e., it is not a good idea to simply drop the film off at a drug store). You should make clear that these are astronomical photographs which will consist mainly of bright dots against a dark background, and that you want everything printed. Also, it is a good idea to take a couple of ordinary snap shots at the beginning of the roll so that the automatic film cutters will be able to tell where the frames begin and end; otherwise, the machine might cut right through a prize photo. If you haven't begun the roll with a snapshot, you might want to request that the film not be cut at all.

If you want to use your own pictures to complete this exercise you will need to have the photographs scanned into computer images. This service is now available for about the same cost as prints at many photo processing outlets (the Wolf Camera chain is an example).