STAR TRAIL PHOTOGRAPHY

OBJECTIVES: After completing this activity the student will be able to:

1) locate the celestial north pole and celestial equator.

2) use a camera to photograph star trails.

MATERIALS NEEDED: a camera which can take time exposures, a tripod, cable release, and a clipboard or some other writing surface.

INTRODUCTION

As the Earth rotates on its axis it gives the stars an apparent motion from east to west. If a camera is used to make a time exposure of the night sky the star images appear as short lines or curves. Stars near the celestial equator will move in straight lines and stars nearer to the celestial poles will move in a circle centered on one of the celestial poles. In this project you will take photographs of star trails in two different areas of the sky, the celestial north pole, and the celestial equator.

PROCEDURE

Be sure to choose a moonless night because bright moonlight will fog your film. It is also best to find an observing site which is relatively dark. However, some students have successfully taken star trail photographs from suburban locations.

1) Mount the camera to a tripod. If a tripod is not available set camera on a portable table or a car roof and prop it up with some books or magazines.

2) Use a street map or compass to locate north.

3) Set shutter speed on B (Bulb) to take a time exposure.

4) Set f stop ring to its smallest number (1.5, 1.8, 3.5, etc.) so that the lens is wide open. If you are in a suburban location set f stop at 5.6.

5) Focus for infinity.

6) Attach cable-release to camera.

7) The altitude of the north celestial pole above the north point on your horizon is equal to your latitude on the earth's surface. The latitude of Atlanta is about 35 degrees north. Therefore, you need to point your camera to the north and aim in about 35 degrees above the horizon. You can use your tripod to do this or you can place your camera on a solid surface like a folding table,

car roof, etc. and prop it up to 35 degrees using books or magazines or whatever you can find easily available. The camera should now be pointing toward the celestial north pole.

9) Start the exposure and record the date, starting time and ending time, and exposure length for each attempt and any comments such as clouds passed by during exposure, car lights may have shown into camera, etc. You may want to try several more exposures in this area of the sky to be sure you have a good photo of the polar region.

10) You may need to try several different exposure times until you get a picture you like. I suggest you start with a 5-minute exposure and increase of decree the exposure time depending on how the 5 minute one looks to you. During each exposure make sure stray light does not strike the camera and do not touch the camera. If you are in a suburban location you may need to limit your exposure time or stop the camera lens down. By stopping down the lens the background light will be suppressed but the pin points of star light will still show nearly as brightly as the do with a faster f/2.6 or f/3.5 setting. You will have to experiment around with it until you like.

11) Close the shutter and record the time and exposure length in Table 1 below. Also record comments such as

12) Repeat steps 5 through 11 with the camera aimed at the celestial equator. To locate the equator, turn the camera to the south and aim it about 50 degrees above southern horizon.

13) Mount a photo from each area of the sky in the spaces provided on Figure 1 along with about start and ending times, exposure length and any relevant comments related to the photo.

Table 1: Exposure data table.

DATE	EXPOSURE NUMBER	START TIME	END TIME	EXPOSURE LENGTH

Figure 1: Star Trail Photos.

(Place photo in this box.)	Date: Start Time: End Time: Exposer Length: Comments:
Star Trails at Celestial North Pole	
(Place photo in this box.)	Date: Start Time: End Time: Exposer Length: Comments:
Star Trails Along Celestial Equator	