

Field-of-View Lab

1.0 Purpose

Measure and calculate the true field-of-view of a telescope using two magnifications.

2.0 Theory

The true FOV is inversely proportional to the telescope magnification; i.e., a larger magnification will yield a smaller FOV. The true FOV of a telescope can be calculated:

$$\text{True FOV} = \text{Apparent FOV} / \text{Magnification}$$

The apparent FOV depends on the eyepiece design. For most eyepieces used by the students, **the apparent FOV is approximately 50°**.

The stars move across the sky at **15° per hour**.

3.0 Procedure

The following is just a skeletal procedure. Each lab group might use a different star. It is up to the student to fill in the details.

- locate a bright star and center it in the FOV

- Place the star at one end of the FOV and, with a stopwatch, measure the time it takes for the star to transit the FOV. Make sure that the star passes through the center of the FOV. Time the passage of this star across the FOV using a low and high power eyepiece.

- For each magnification, the student shall take **two** timings.

4.0 Data

Place your data in a table similar to the following:

| <u>Eyeiece f.l.</u> | <u>Timing 1</u> | <u>Timing 2</u> | <u>Average time</u> |
|---------------------|-----------------|-----------------|---------------------|
| 1) mm. | secs. secs. | secs. | |
| <hr/> | | | |
| 2) mm. | secs. | secs. | secs. |

•Write down the telescope parameters: **f.l. = 2000 mm, aperture = 8", AFOV = 50°**

5.0 Analysis

In this section the student will calculate the measured and theoretical true FOV, and magnification for each eyepiece used.

Magnification = telescope f.l / eyepiece f.l.

Measured true FOV (degrees) = $\frac{15^\circ/\text{hr} \times \text{average timing (seconds)} * \text{COS (Dec.)}}{3600 \text{ (seconds/hr)}}$

Theoretical true FOV (degrees) = $50^\circ / \text{magnification}$

- You might want to summarize your results in a table

6.0 Conclusion

The conclusion shall include the following:

- Restate the lab purpose
- Do your results agree with theory? Give a complete statement backing your conclusion with numerical results.
- Is the calculated value close to the measured value for the true FOV. Give a qualitative discussion; don't try to quantify the error.

7.0 Procedural Errors

Make a list and describe all procedural errors which could have effected the accuracy of your results. It is important that the student only emphasize procedural errors. Explain how the error effected your results.

8.0 Suggested Improvements

Make a list and explain some improvements which will decrease the difficulties or errors encountered in this lab.