

Chapter 5: The Speed of Light

Overview:

In this experiment we will use Foucault's rotating mirror method with a laser to determine the speed of light, one of the most important physical constants in the universe!

Suggested Reading Assignment:

History of the Speed of Light, see website

<http://galileoandinstein.physics.virginia.edu/lectures/spedlite.html>

Pre-lab Questions:

1. What is the exact speed of light? What is the modern uncertainty in this value?
2. What is the speed of light, expressed in miles per second?
3. How long does it take light to travel a distance of one foot?
4. We will also use lenses in this experiment. As a refresher, solve this problem: A beam of light (from a laser) is inclined at an angle of $\alpha = 0.03^\circ$, and strikes a lens having a focal length $f = 250$ mm. The beam passes the central axis of the lens while it is still $B = 500$ mm away from the lens. You can imagine that this beam originated at a distance $D + B$ from the lens, where $D = 8$ m (the fixed mirror will be located at $D + B$, and the rotating mirror at B). Compute the location d_i and the height h of the image of this beam. Also, repeat these calculations assuming that $D = \infty$. You should find that in this case, h simplifies to the multiplication of two of the givens.

