QuickLAB

Wear safety goggles and an apron.

The Wave Nature of Light: Interference

Question

Does light show the wave property of interference when a beam of light is projected through a pinhole onto a screen?

Procedure

Record all your observations.

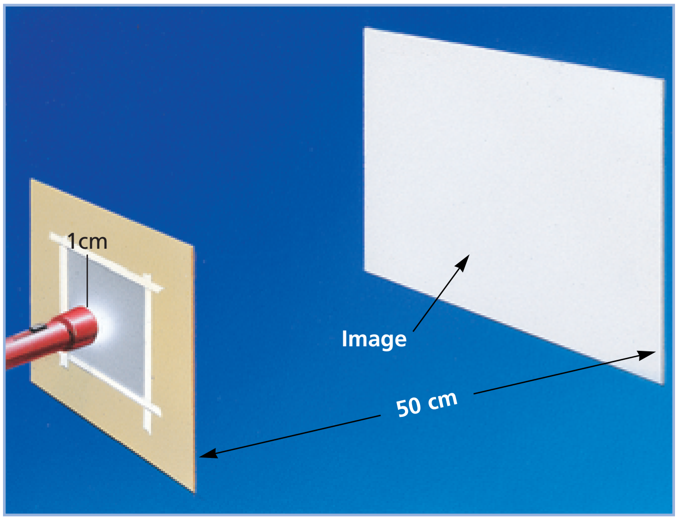
1. To make the pinhole screen, cut a 20 cm × 20 cm square from a manila folder. In the center of the square, cut a 2 cm square hole. Cut a 7 cm × 7 cm square of aluminum foil. Using a thumbtack, make a pinhole in the center of the foil square. Tape the aluminum foil over the 2 cm square hole, making sure the pinhole is centered as shown in the diagram.
2. Use white poster board to make a projection screen 35 cm × 35 cm.
3. In a dark room, center the light beam from a flashlight on the pinhole. Hold the flashlight about 1 cm from the pinhole. The pinhole screen should be about 50 cm from the projection screen, as shown in the diagram. Adjust the distance to form a sharp image on the projection screen.

Discussion

1. Did you observe interference patterns on the screen?
2. As a result of your observations, what do you conclude about the nature of light?

Materials

- scissors
- manila folders
- thumbtack
- masking tape
- aluminum foil
- white poster board or cardboard
- flashlight



Solutions to the Schrödinger wave equation are known as wave functions. Based on the Heisenberg uncertainty principle, the early developers of quantum theory determined that wave functions give only the *probability* of finding an electron at a given place around the nucleus. Thus, electrons do not travel around the nucleus in neat orbits, as Bohr had postulated. Instead, they exist in certain regions called orbitals. *An* **orbital** *is a three-dimensional region around the nucleus that indicates the probable location of an electron.*

Figure 11 illustrates two ways of picturing one type of atomic orbital. As you will see later in this section, atomic orbitals have different shapes and sizes.