

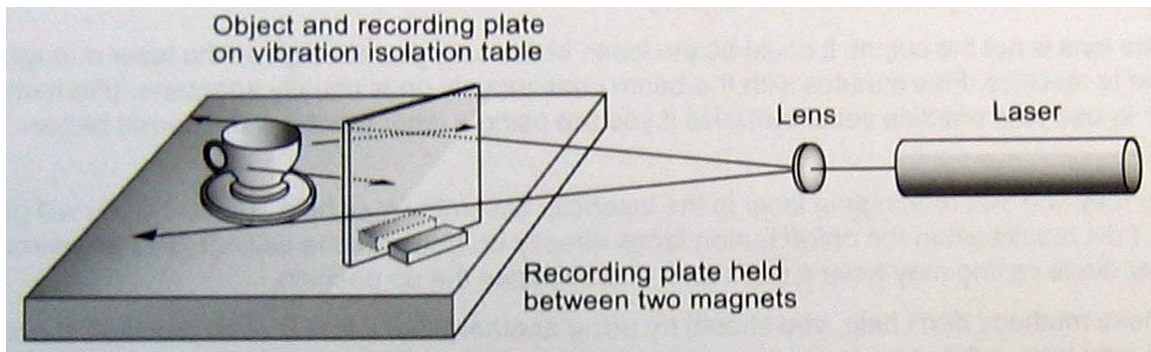
# Lab: Holograms

## Parts (Approximately)

- 1 Recording Plate
- 1 Laser Pointer
- 1 3 D Cell Battery Pack
- 8 1 x 8 beams
- 8 2 x 4 blocks
- 2 1 x 6 beams
- 2 1 x 10 beams
- 1 2 x 10 block
- 1 wedge piece
- 8 2 x 2 blocks
- 2 2 x 4 plates
- 2 1 x 8
- 2 axels
- end caps

## Purpose

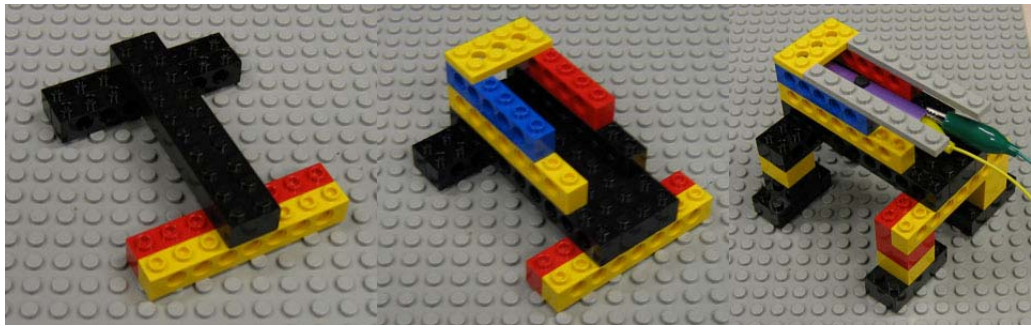
Using a laser diode, we will illuminate an object setting up constructive and destructive interference patterns on a recording plate. We will develop the interference pattern on the plate, so that when you illuminate the plate you can see a holographic image of the original object you recorded.



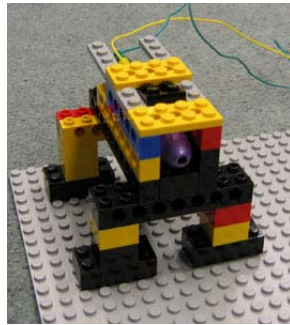
## Procedure

### Setup

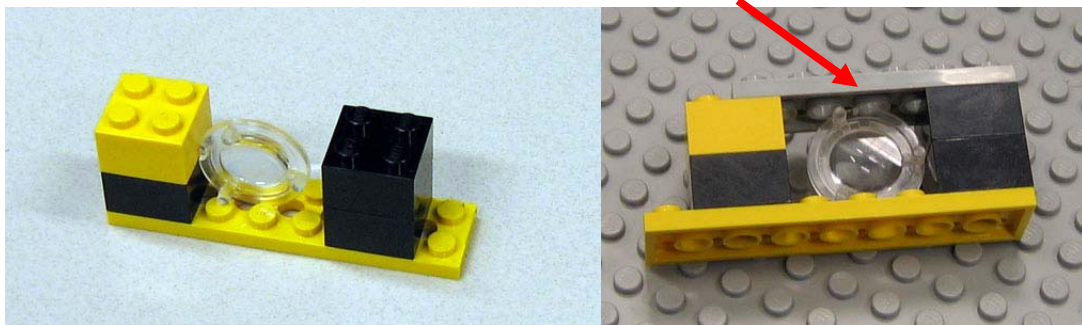
1. Start by mounting the laser using the typical base and adding side walls to prevent movement. Then add a bracing piece across the top to form a rectangular structure. Place a top-mounted wedge to keep the laser diode on while performing the exposure.



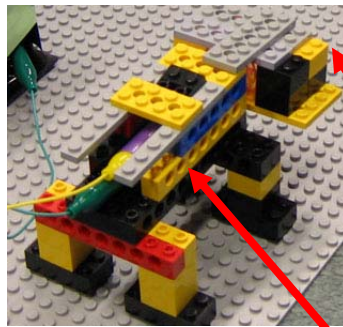
2. Next will have to elevate the laser platform in order to fully illuminate the recording plate.



3. After the elevated platform is complete, you must build a diverging lens in order to make a highly divergent beam of light that will illuminate the holographic plate and the object. First you must mount the 22mm focal lenses (given in class) into two separate lens holders. Make sure the lenses are vertical and centered within the setup and clamp them down with two plates. The fit should be snug. Place one lens behind the other having the concave sides facing the laser.

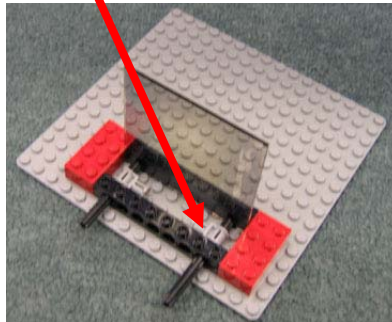


4. Mount the two lenses in front of the laser diode. (This step might require tweaking the lens position along with the height of the laser point holder.)

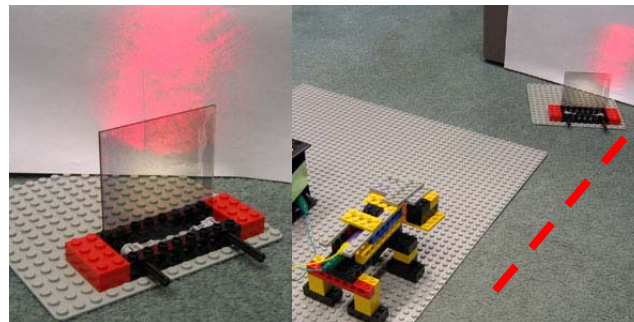


Lens Holders  
Laser Mount

5. Next you need to build the recording plate holder. Start by using two 2x4 bricks and placing them on the sides of a 1x8 beam creating a “u” shape. Then place a model recording plate in front of the beam. Place another beam and slide two small axels through the beam and slide connectors on the other side. (Slide just enough to hold the recording plate).



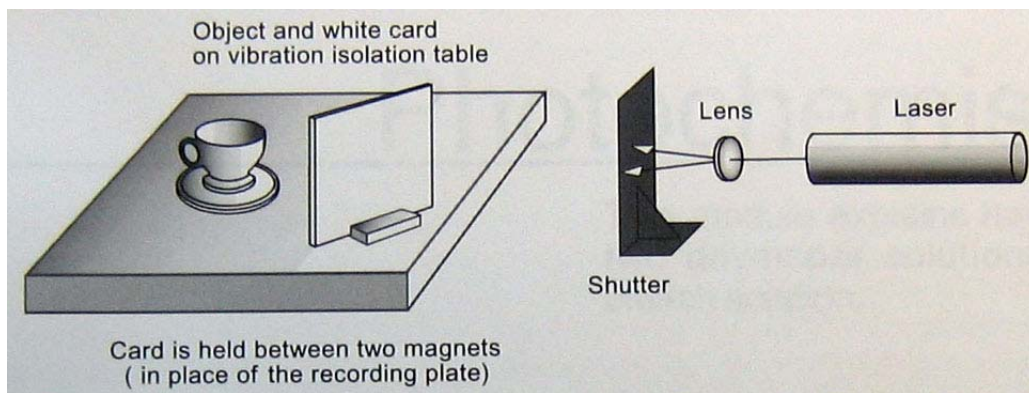
6. Set up the recording plate at a 45 degree angle with respect to the incoming laser beam. Place the plate about 30 cm away from the lens so that the beam covers the recording plate. Place your object immediately behind the plate.



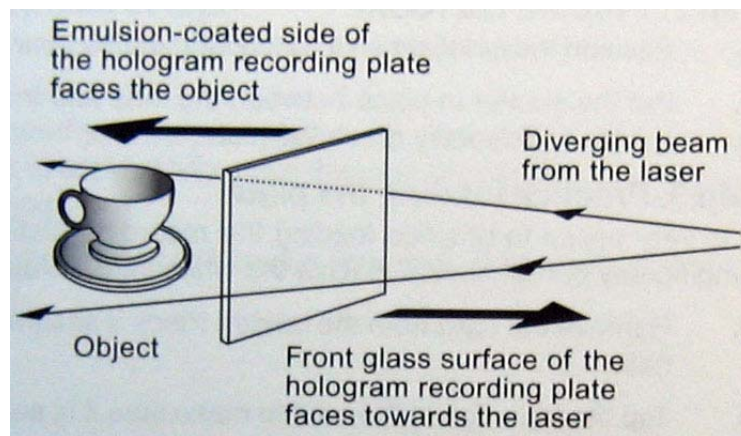
**Aprox. 50cm**

## Exposure

7. Since the setup is now complete, we need to prepare the recording plate for exposure to the laser diode. Make sure that the main lights in the room are turned off and that there is no ambient light. Turn on the green “safe light.” Since the recording plate is less sensitive to green light it will not affect the hologram recording.
8. In order to prevent the laser from prematurely illuminating the recording plate setup a shutter in front of the laser path. Make sure that it blocks the whole beam.



9. Remove the recording plate out of the packaging try to grasp along the edges and be careful not to touch the center of the plate. You will notice one side is sticky because it has the emulsion on it. **Make sure in your setup the emulsion side is facing the object.**



10. Once the optical setup is aligned and the recording plate installed correctly, expose the plate for 30 secs. After the exposure use the shutter to block the laser light.
11. After completing the exposure remove the plate and place it in the light-tight box. We will develop the recording plates elsewhere to speed up the process.