EE669: Simulation Exercise
Lithography: Diffraction
Instructor: Prof. Anil Kottantharayil

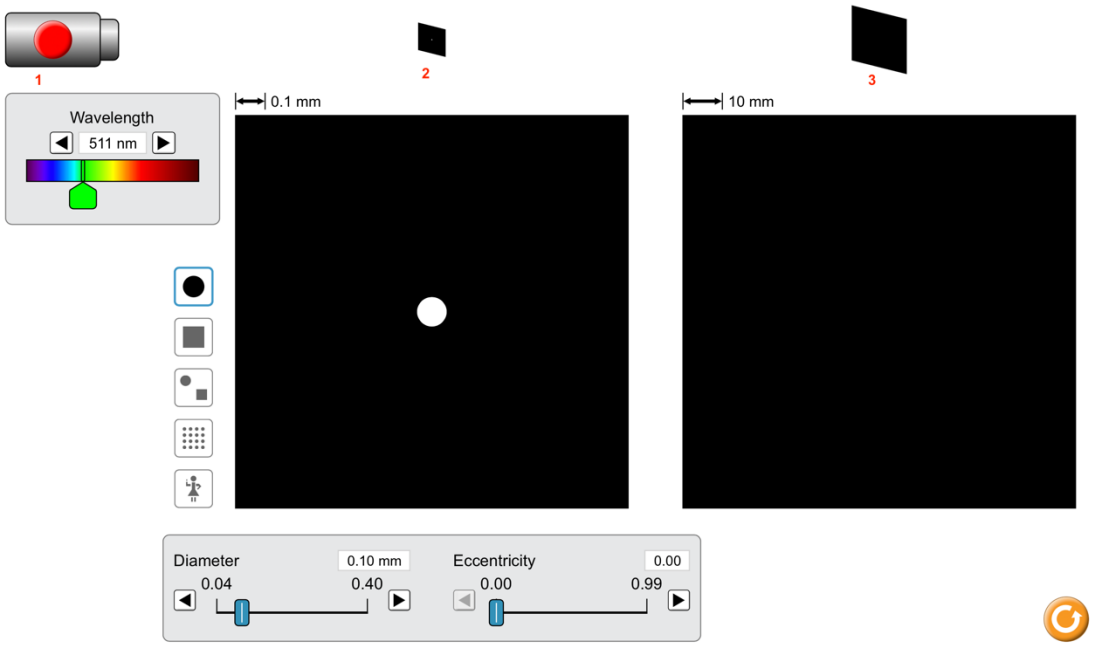
Credits: PhET Interactive Simulations project at the University of Colorado Boulder. https://phet.colorado.edu/en/

Introduction

The smallest features that can be printed on any substrate using photolithography is limited by diffraction of light. In this exercise, an online simulation tool is used for developing an intuitive understanding of diffraction of light. The simulation tools in "Wave Interference" at PhET is used with some guidelines.

How to use the diffraction simulation tool?

- Go to https://phet.colorado.edu/sims/html/wave-interference/latest/wave-interference_en.html
- Click on "Diffraction"
- The tool simulate the diffraction of light as it pass through a slit. The figure below shows the GUI of the program. "**1**" is the light source and the light passes through the slit "**2**" and falls on the screen "**3**". The light source can be turned ON and OFF using the red button.
- The wavelength of light can be varied using the slider "**4**"
- Five different slits can be chosen.
- The slit is graphically depicted as a white opening in the large black square.
- The image formed on the screen is depicted on the right side large black square.
- The dimensions of the slit, and its shape can be adjusted using sliders at the bottom.



Suggested Exercises

You are encouraged to play with the tool. The following exercises are suggested as a baseline.

Set the wavelength to 380 nm.

1. Circular slit. Vary the following:
    a. Diameter
    b. Eccentricity
2. Try similar experiments with square and rectangular slits.

Write a short note on the observations.