

# Aberrations

Physics 150/126L Spring 2025

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## Introduction

In this lab we will measure the aberrations of a spherical plano-convex lens, which describe how the image formed by the lens differs from the predictions of first-order paraxial theory.

## Assembling the optical configuration

Center the tip of your single mode fiber on axis as far as possible from the plano convex lens, which should be attached to the 3-axis roller bearing translation stage. Remove the adjustable lens from the Raspberry Pi camera, then place the sensor in the image plane of the plano-convex lens.

## Measurements

1. With the convex side of the lens facing the fiber tip, take pictures in focus and at a known distance on either side of focus.
2. Flip the lens around so that the flat side is facing the fiber tip, then repeat the measurements.
3. Move the fiber tip so that it is off axis and repeat all the previous measurements with the lens in its two possible orientations.
4. Using Optiland, model the optical configurations you measured. To do this, you may modify the the program `pcx.py` from the Examples section of the course handouts page. Compare your measurements quantitatively with what the software predicts.