

# Spectroscopy

Physics 150/126L Spring 2025

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## Introduction

In this lab we will use a diffraction grating to measure a laser wavelength and the blackbody spectrum produced by a halogen light bulb.

## Assembling the optical configuration

Using the rotating slide mount or the cantilever slide mount (see below), center the 500 lines/mm grating above the rotating platform of the stage. Be sure that the grating disperses laser light horizontally, not vertically. On one side of the grating will be your light source, either a laser or collimated light from the incandescent bulb, and on the other side will be the rotating beam that places the light sensor 250 mm from the center of the rotation stage. Screw the light sensor onto the beam, mount the 17 mm focal length projection lens in front of the sensor on the beam, and when the instructions call for it, screw the beam onto the rotation stage.

## Measurements

1. Verify the grating equation using the rotating slide mount and both first-order diffraction spots from the 635 nm laser diode.
2. Replace the rotating slide mount with the fixed cantilever slide mount. Attach the detector beam to the rotation stage. Using this configuration, measure the wavelength of the “mystery laser” given to you by the instructors.
3. Collimate the light from the incandescent bulb, send the beam through the grating, and use the sensor/arm configuration with the  $f = 17$  mm projection lens to measure the blackbody spectrum from the bulb. To get an accurate result, you will need to take account of the light sensor’s wavelength response, which is shown on page 11 of the TSL2591 datasheet from the course web page.