

# Introduction to Spectroscopy

Record all of your observations in your lab notebooks. Each of you should have your own drawings of each spectrum.

**In all of your drawings: try to make clear the distinction between sharp and fuzzy lines, bright and faint lines, and regions where the continuum is bright or faint. Also make sure to indicate whether you are using ink on the paper to represent light or the absence of light.**

## 1 Spectra of light bulbs

### Materials

spectroscope

### Instructions

Observe the light sources listed below through your spectroscope. Remember that you need a fair amount of light to be able to see a spectrum. In order to see the spectrum you need to line the light source up with the slit. The spectrum will then appear to one side of the slit. It may take some practice to get the hang of lining the light source up in the slit.

Also try to make sure your spectrum isn't contaminated by some other light source.

**For each object you observe:**

- Describe it.
- Write down where you found it.
- Draw its visible spectrum.
- Classify its spectrum as emissions line, absorption line, blackbody, or other (explain).
- Explain why the object has that type of spectrum.

Light sources:

1. As many different kinds of indoor lighting as you can find (at least three). Make sure one is an incandescent bulb.
2. As many kinds of outdoor lighting as you can find (at least two). You can look through the windows. Note lights that appear to have different colors, as these will show different spectra.
3. Something emitting light that is not listed above. Think about things that might emit light, and feel free to scout around the building for candidates.

## 2 Safety note on gas tubes

Power sources should be turned off and unplugged before gas discharge tubes are touched. The gas tubes can get quite hot after a while, so exercise caution and ask a TA to help you when you want to change the tubes.

### 3 Spectroscopy of known gasses

#### Materials

spectroscope, labeled gas discharge tubes, printout of gas spectra

#### Instructions

I have set up two power sources at a table with several different gasses in labeled discharge tubes. It may take some practice to get the hang of lining the spectroscope slit up with the tube.

**For each gas:**

- record the name
- draw its visible spectrum
- compare its spectrum to the spectrum in the printout and note any differences

### 4 Spectroscopy of unknown gasses

#### Materials

spectroscope, unidentified gas discharge tubes, printout of gas spectra

#### Instructions

I have set up two power sources at a table with several different gasses in discharge tubes labeled only with a letter.

**For each unidentified gas:**

- record the label
- draw its visible spectrum
- identify the gas by comparing its spectrum to the spectra in the printout, or to the spectra you have observed in the labeled gas tubes