

Spectral Lines



Absorption Cell



Sodium Lamp



Hydrogen and Neon Lamps

Purpose: Demonstrates emission and absorption spectra.

For this demo, pass out the UT diffraction-grating glasses to the students.

Start by showing the continuous spectrum produced by the incandescent bulb (the dark horizontal lines are shadows of the supports.) Standing at the rear of the classroom, you can shine the laser pointer onto the board a little above the bulb. The students will see that the 1st order laser spot is dispersed into the red region of the continuous spectra, demonstrating how a laser uses only a single color slice of the whole visible spectrum. How does it do that?

Then place the absorption cell over the bulb (keep the cork side up!). Now the students can see two continuous spectra: one originating from the hot filament and below this the same spectrum after it passes through the solution. In comparing the two, they will see several distinct dark vertical lines in the lower spectra, the result of absorption of light in the blue and green-yellow by whatever is in the solution. (This could be a good point to talk about the emission spectrum of the sun and stars.)

If matter absorbs light at distinct colors, can you get it to emit light in the same way? Here you can set up the discharge lamps and show the spectra from these. The mercury and krypton tubes are a little weak, but the hydrogen and (especially) neon look pretty good. For the grand finale set up the sodium vapor lamp. It takes a few moments to warm up, but once it does it is very bright with a beautiful set of lines.

As a nice finale, see the Laser Spectra demo.

Note: Be careful with the absorption cell — it contains a nitric acid solution (of Erbium oxide). Keep it upright. Try and get back as many glasses as you can.

Extra Equipment: None

Location: Shelf C3