

Study questions:

Why do stars shine? (Think radiation laws!) What kind of spectrum does a shining star make, overall? Why? What can we learn from the shape of that spectrum --- in particular the wavelength at which it peaks?

When you run an electric current through a gas-filled tube (i.e., a “discharge tube”), you see a glow. What kind of spectrum does it make? Why?

Mercury vapor thus “sparked” looks “lavender” to the eye. If we run the light through a spectrometer, we see narrow bands of light at these wavelengths: 435 nm, 546 nm, and 578 nm . Explain why it has this color. (Think color mixing rules!)

When light with a more-or-less continuous spectrum --- e.g., starlight (or, schematically light for a candle, or a filament bulb) passes through a cloud of atoms, some observers may see absorption lines or emission lines due to the presence of the cloud? Can you diagram this, and explain what is going on?

When we look at the spectrum of a distant galaxy we often find that it has a pair of very strong absorption lines, spaced as if they were the familiar lines made by ionized Calcium, but farther toward the long wavelength end of the spectrum. Explain what this phenomenon means, both in terms of the motion of the galaxy and in terms of the universe.

Why do stars (except for the sun) appear as points when we look at them with the unaided eye? How many degrees wide does something have to be for us to see it as having width, instead of being a point? Why is this width an angle instead of a distance or length?

If you can see some object in the sky (e.g., Mars, Rigel, Betelgeuse) as a color , what does that tell you about that light and about the photoreceptors in your eye? Why do almost all the stars seem appear white?

If light from a star is collected by a large telescope and dispersed into a spectrum, what kind of spectrum is usually observed? What do these spectra of the stars, tell us about the individual stars? What have we learned about the chemical composition of the universe by studying stellar spectra?