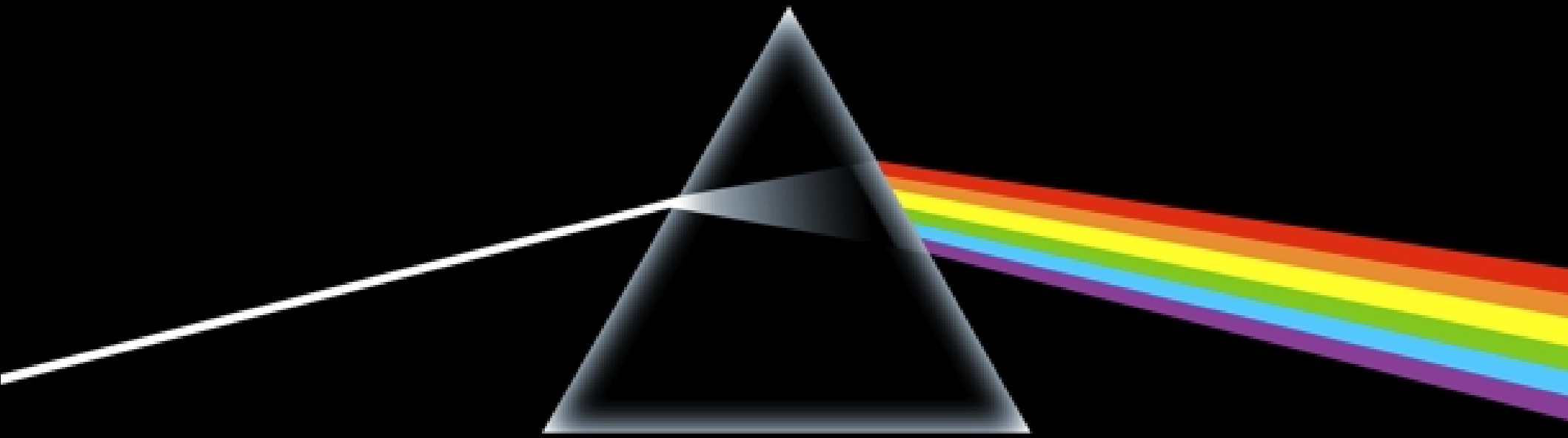
Spectra of Gases and Solids



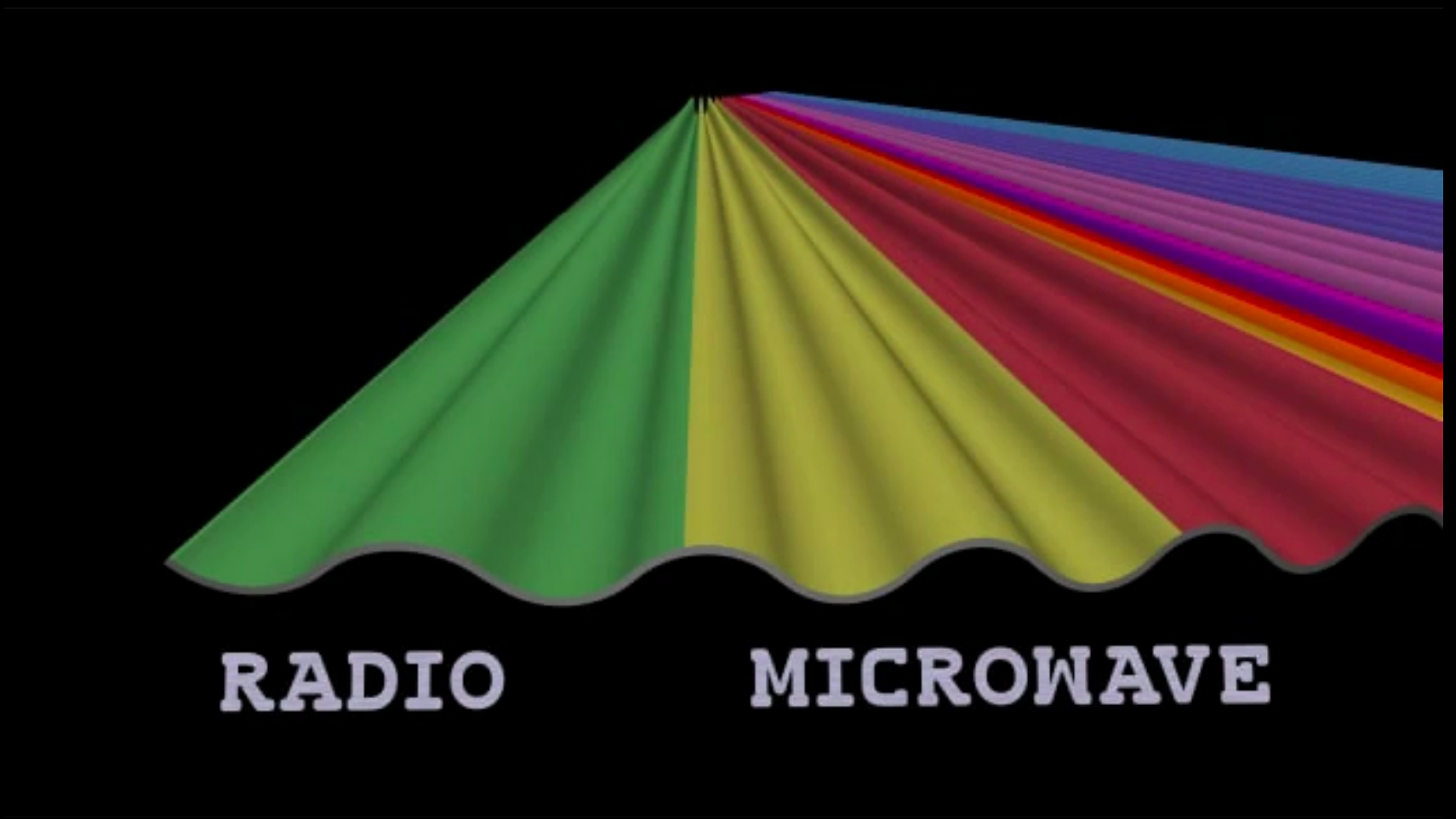
Why are we doing this lab?

Spectra are unique to each element. This allows you to ID an element based on the spectral lines you see (like a fingerprint).

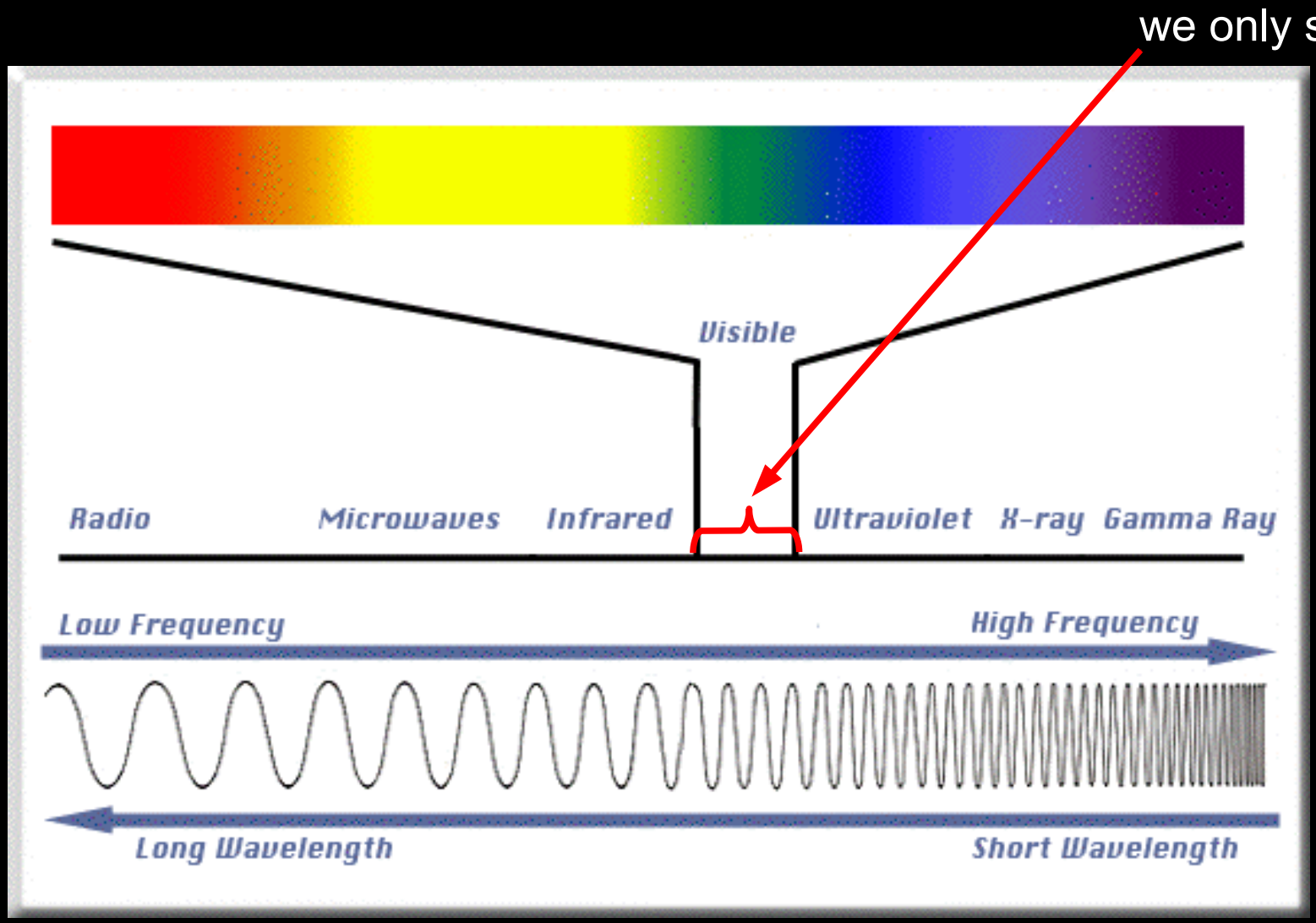
This is particularly useful in astronomy since we can't go to a star to figure out what it's made of. Just from the light we receive, we can determine a star's composition.

What is a Spectrum?

What is light?



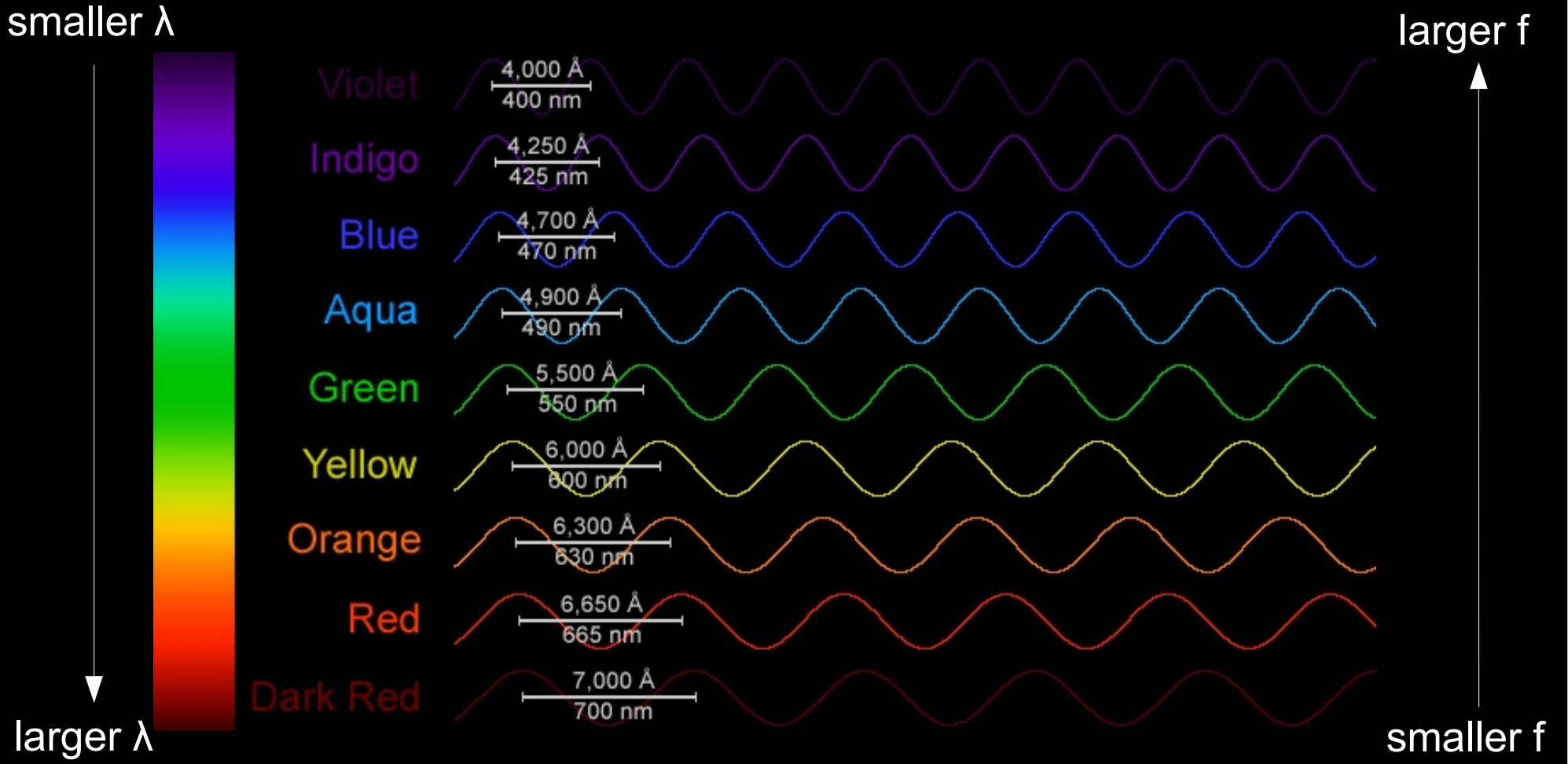
What is light?



The speed of light, c, is 3.00 x 10^8 m/s (a constant). And $c = \lambda f$.
Thus, longer wavelengths have smaller frequencies (and vice versa).

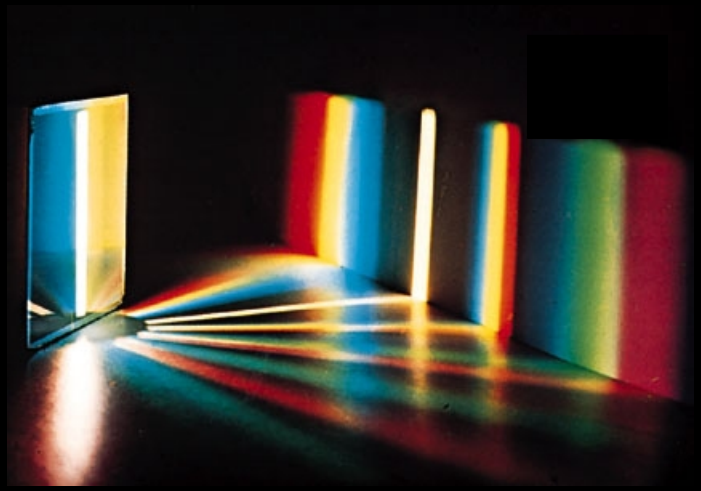
Visible Light

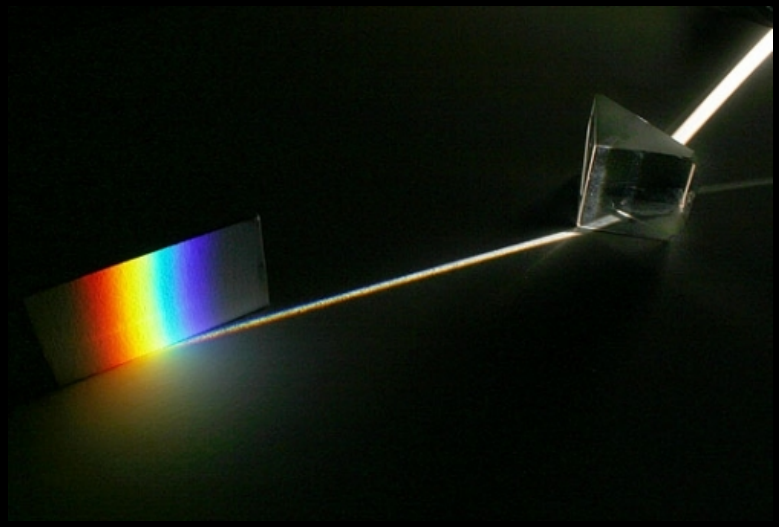
Red light is lower frequency (lower energy) than blue light.



How do you make a Spectrum?

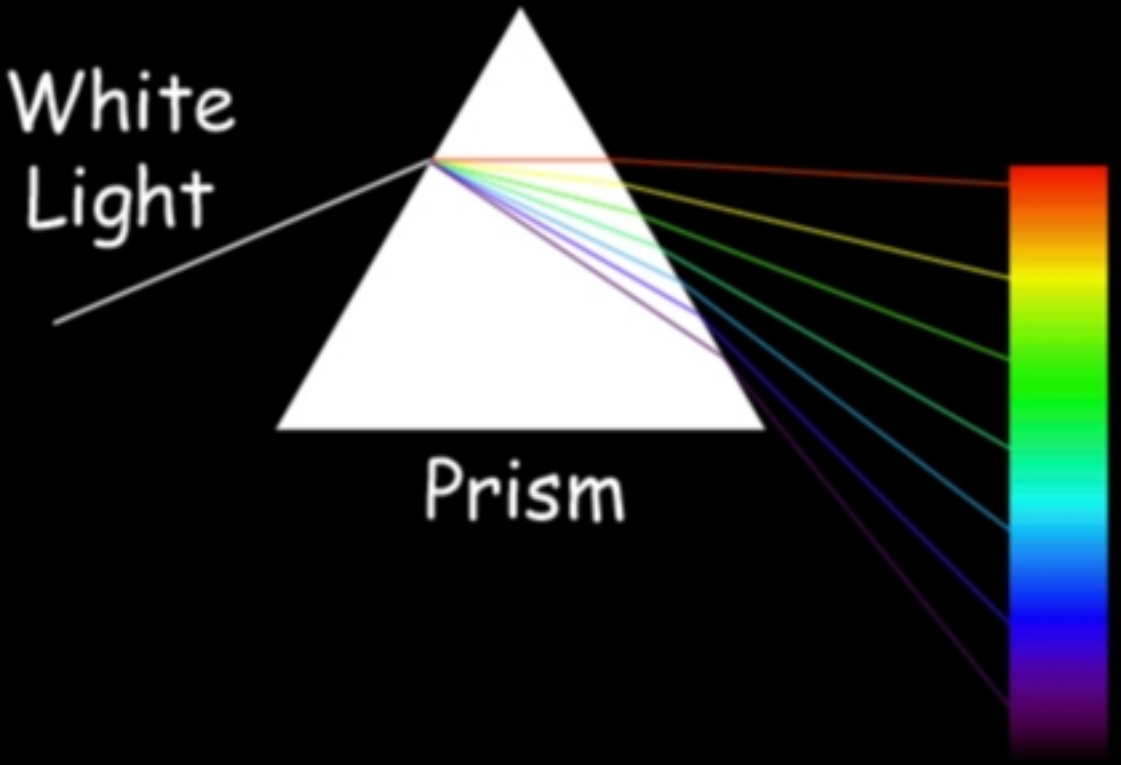
If you bend light (spread it) different wavelengths will bend at different angles. That lets you see a “rainbow”.





Continuous Spectra

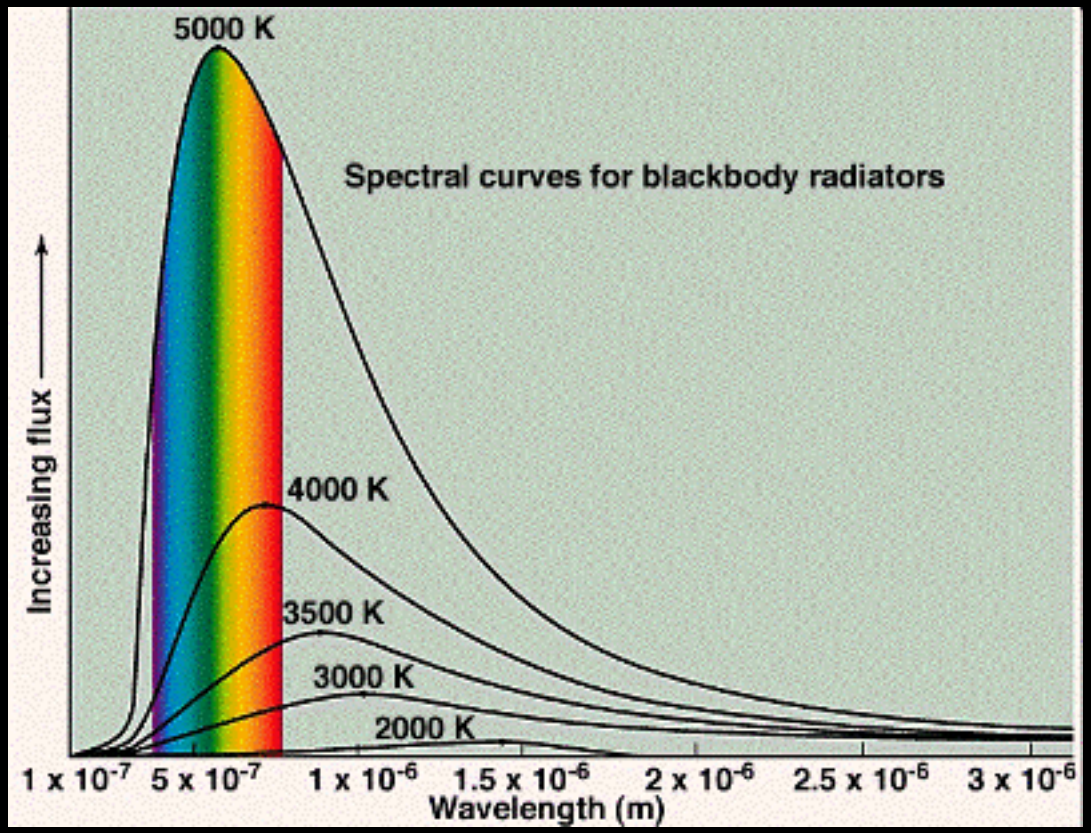
Has all the colours of a rainbow...

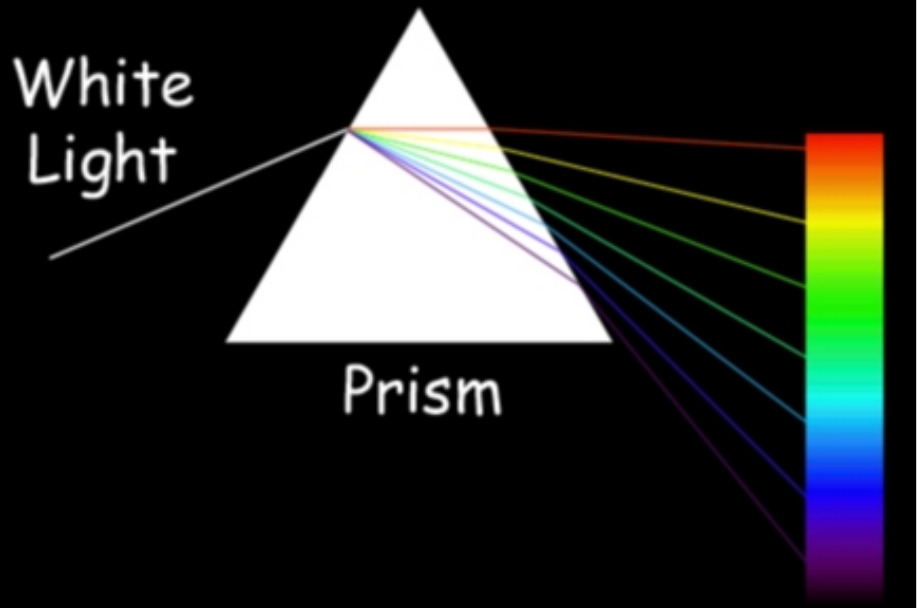


If you plot the brightness at each wavelength, you create a special curve.

Continuous Spectra

The special curve...

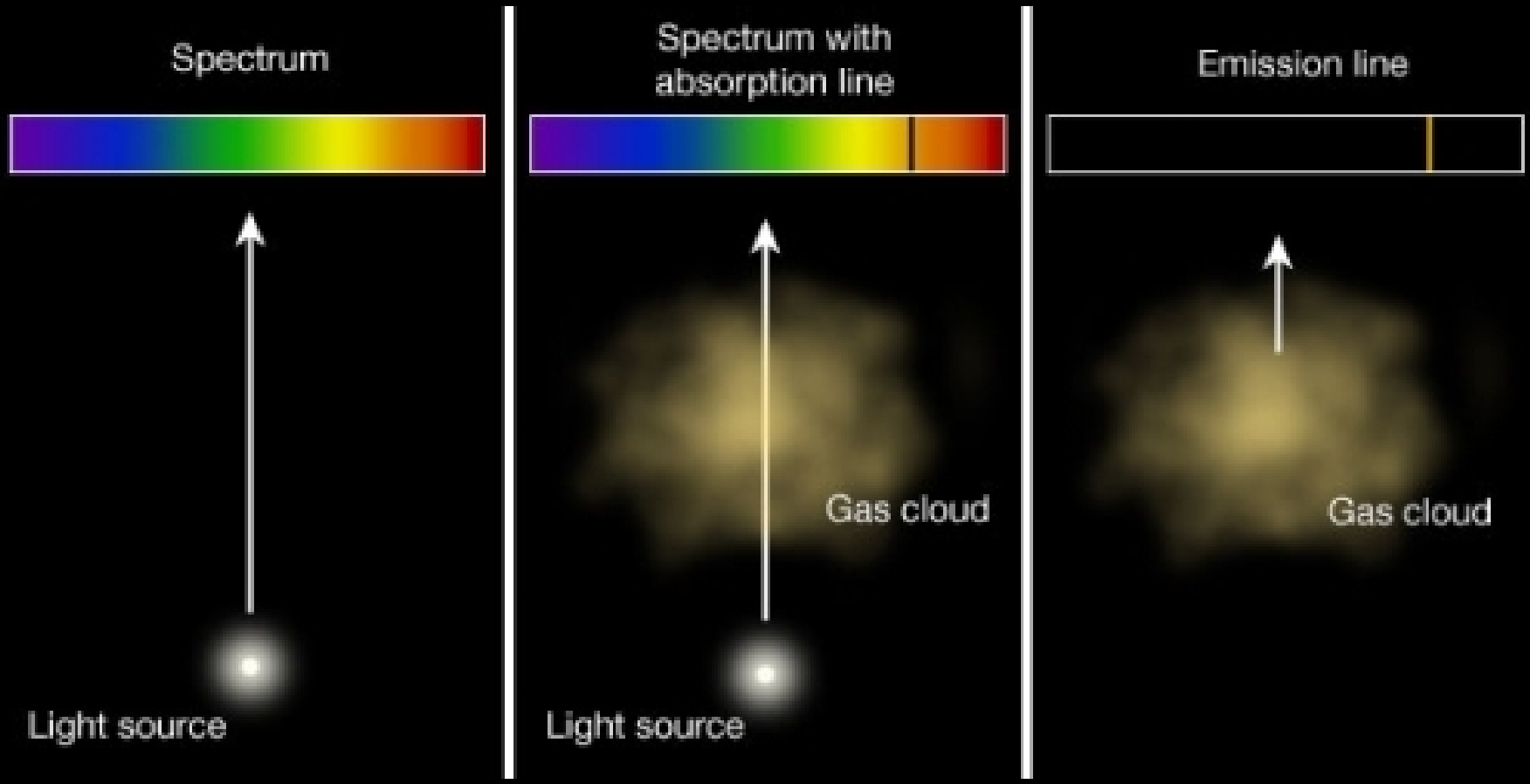




The amount of light and type of light you see depends on the source's temperature!

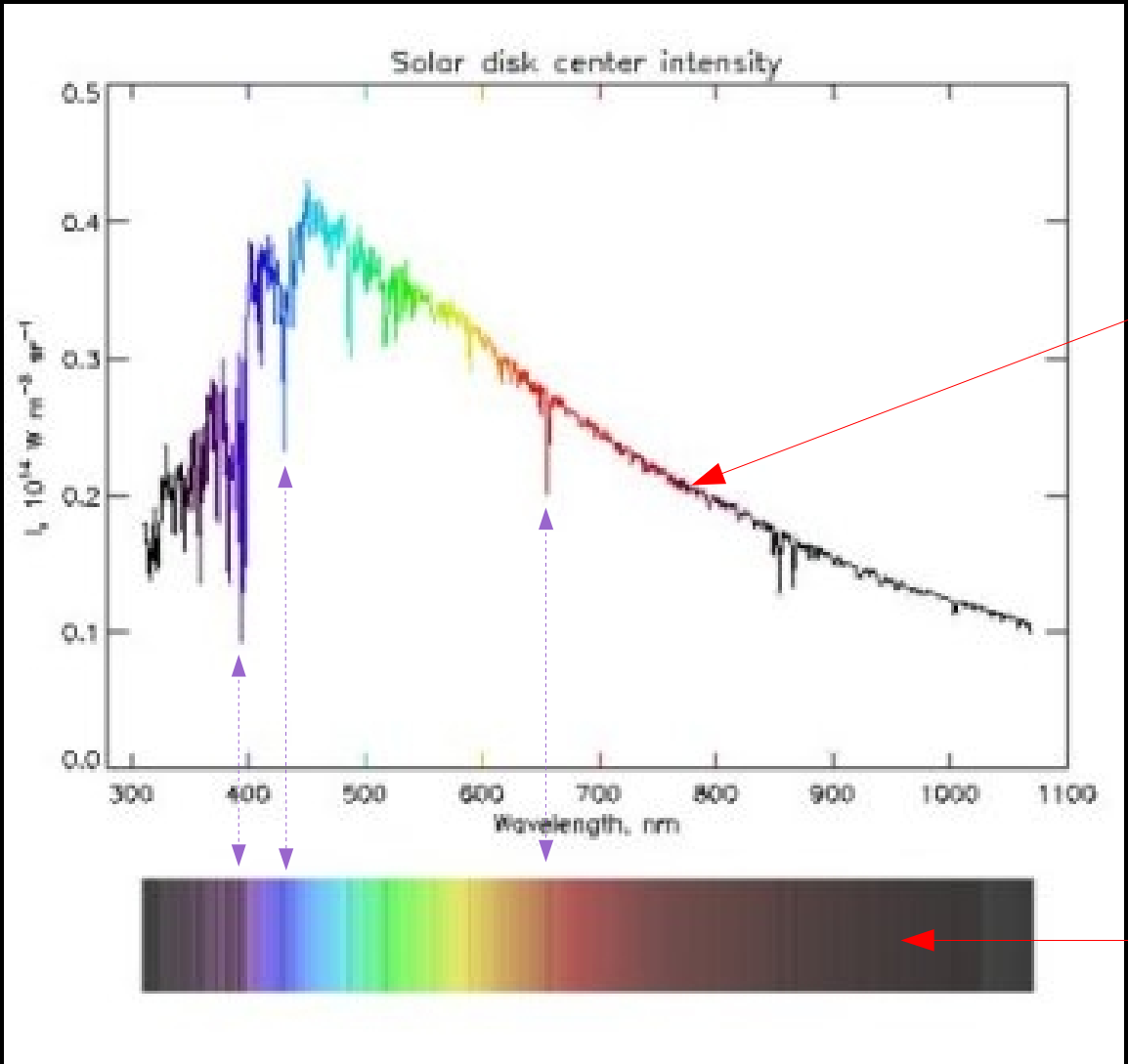
Kirchoff's Laws

Depending on how the light gets to us, we see a different fingerprint pattern.



The Sun

The Sun's spectrum



The Sun's “black body” curve. Note that some colours are removed.

Sun's spectrum
Darker absorption lines mean less light reached us.