

Properties of Light

- As far as we know,
nothing travels faster
than light: 186,000
miles per second.

Properties of Light

- Light exhibits some interesting properties that help astronomers answer questions about distant objects.
 - Reflection
 - Refraction
 - Diffraction
 - Doppler Shift

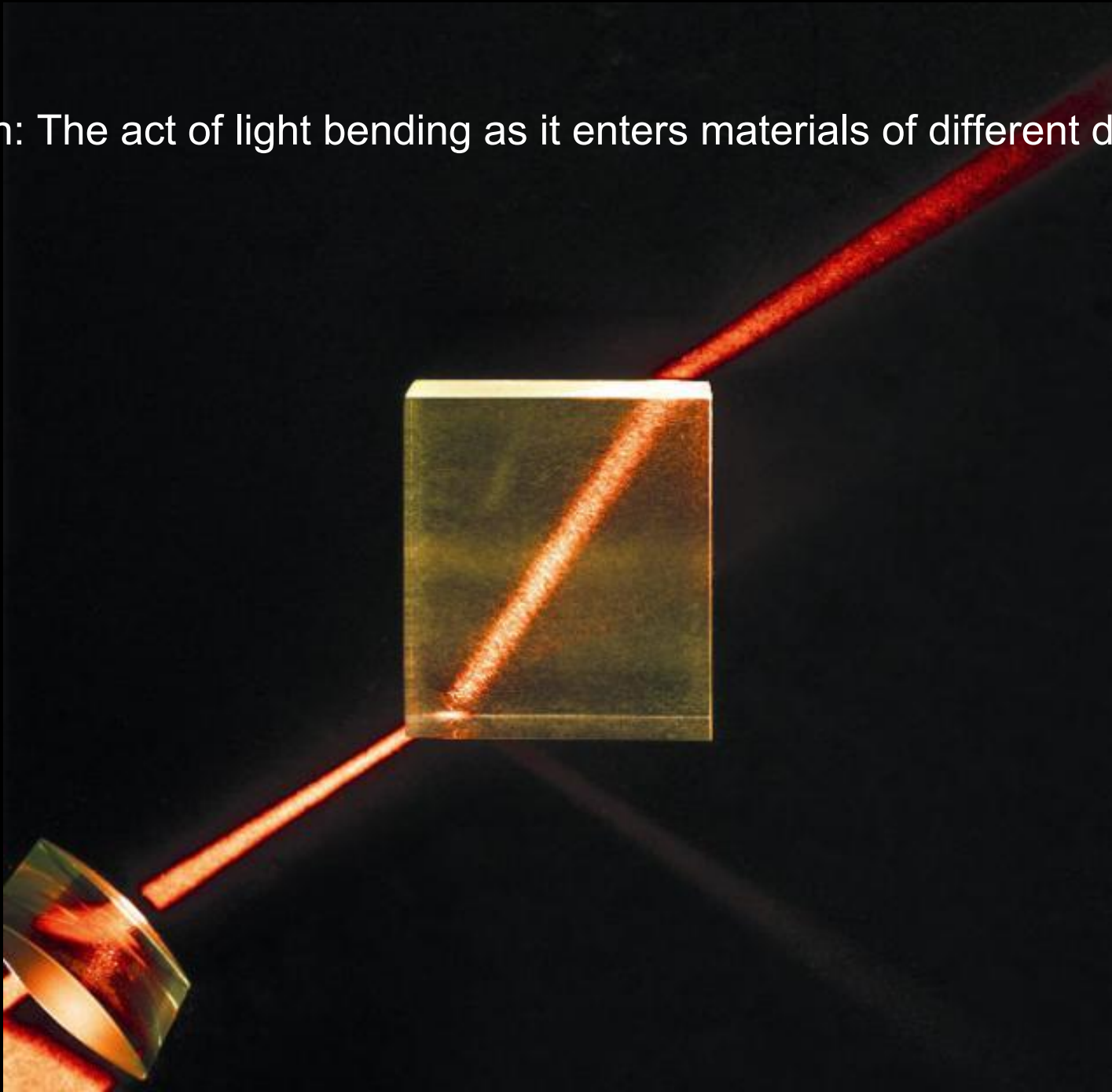
Reflection

- Reflection: The act of light bouncing off of a smooth surface.
 - Angle In = Angle Out



Refraction

Refraction: The act of light bending as it enters materials of different densities.



Diffraction

- Diffraction: The scattering of light.

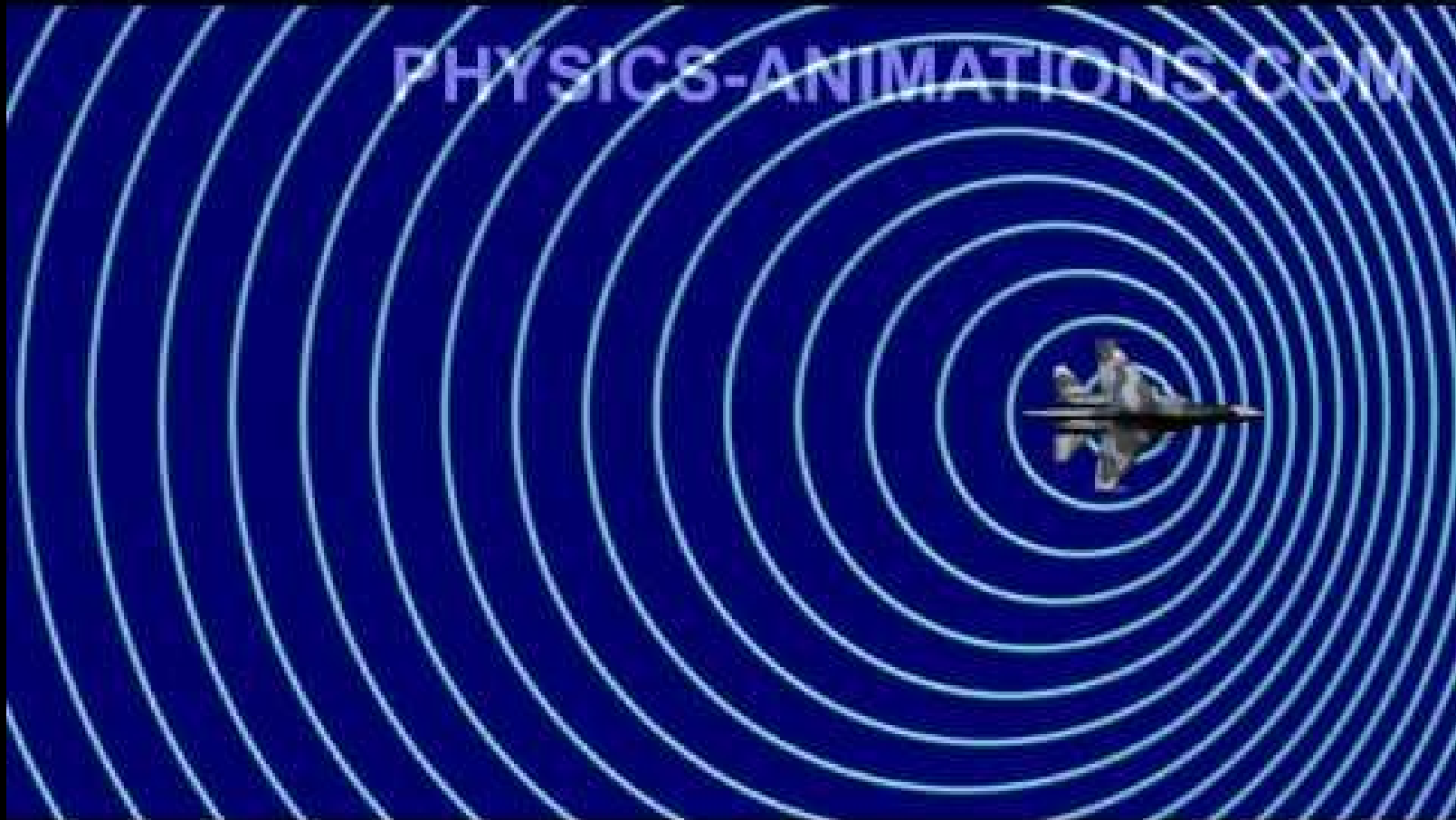
Shadows on the moon vs. shadows on Earth



Why the difference? We have an atmosphere that scatters light.

Doppler Shift

Doppler Shift: A moving wave source will have its waves bunch up in front of the wave and spread out behind it, increasing the frequency in front and decreasing the frequency behind.



Doppler Effect

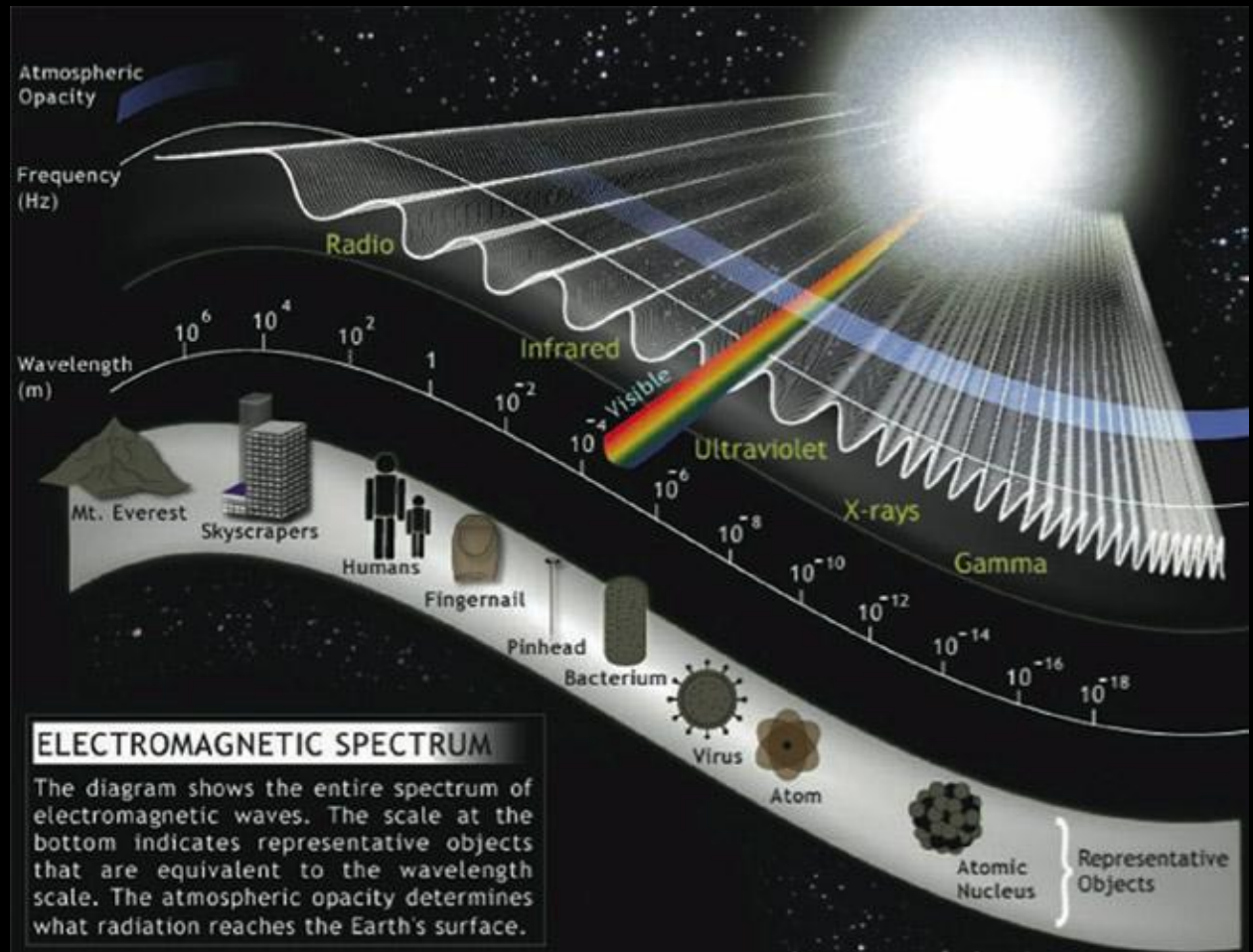


The nature of light.



Light

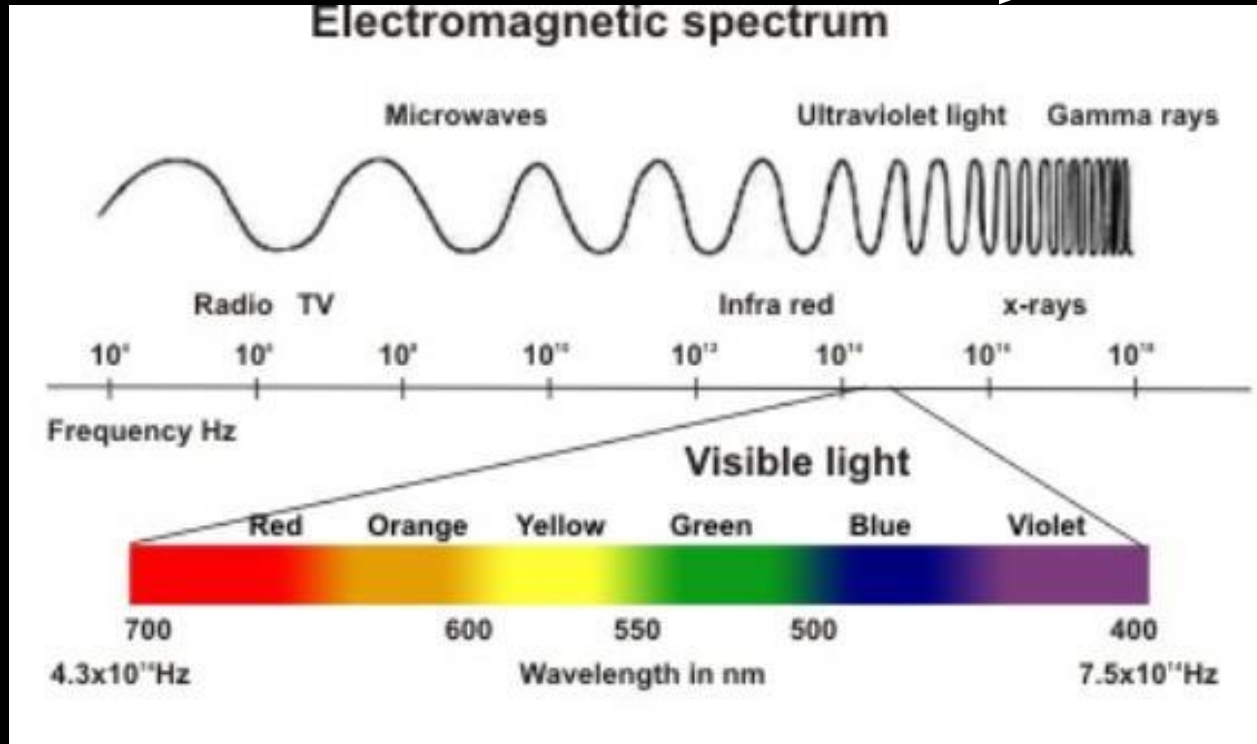
- Light is one of astronomers major tools for learning about things in space.



Light

- As the wavelength of light decreases its energy increases

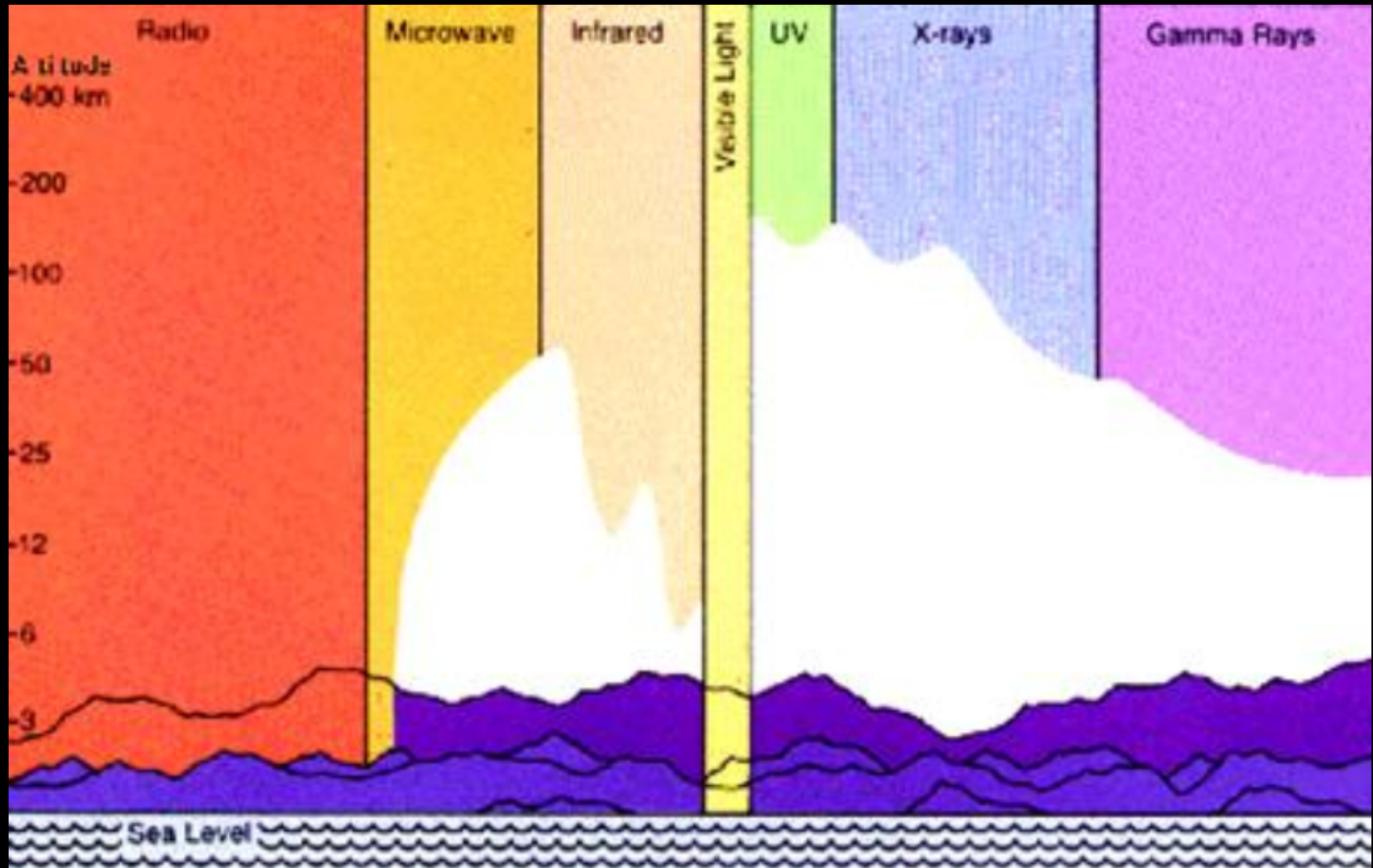
■ Energy



- Wavelength is the distance between two consecutive points on a wave.
- Frequency is the number of waves that pass by per second.

Light

- Earth's atmosphere blocks out much of the light from space, but we are able to see small sections of wavelengths.



Spectroscopy:

Every element has a unique distance between energy levels.

Light travels in packets of energy called photons.

Atoms can either emit or absorb light.

Every color carries a different amount of energy.

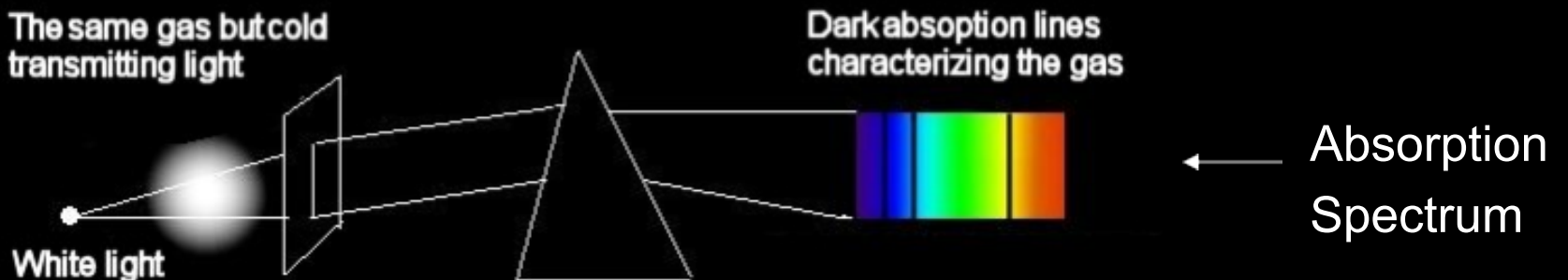
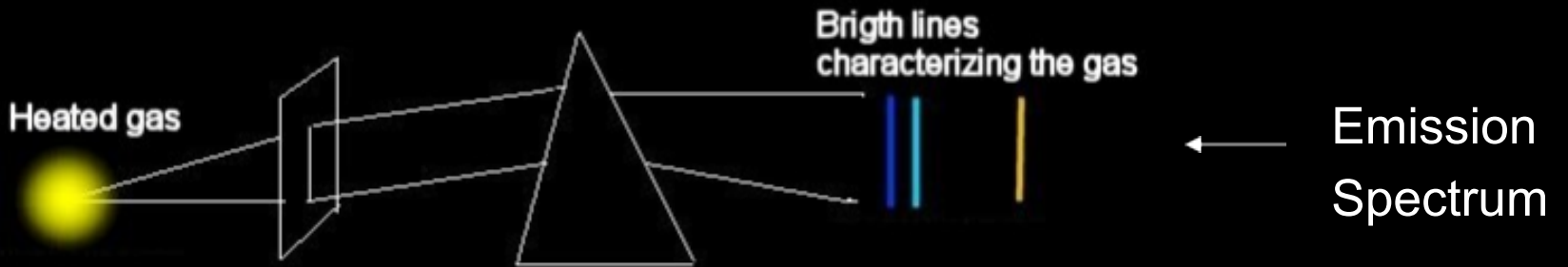
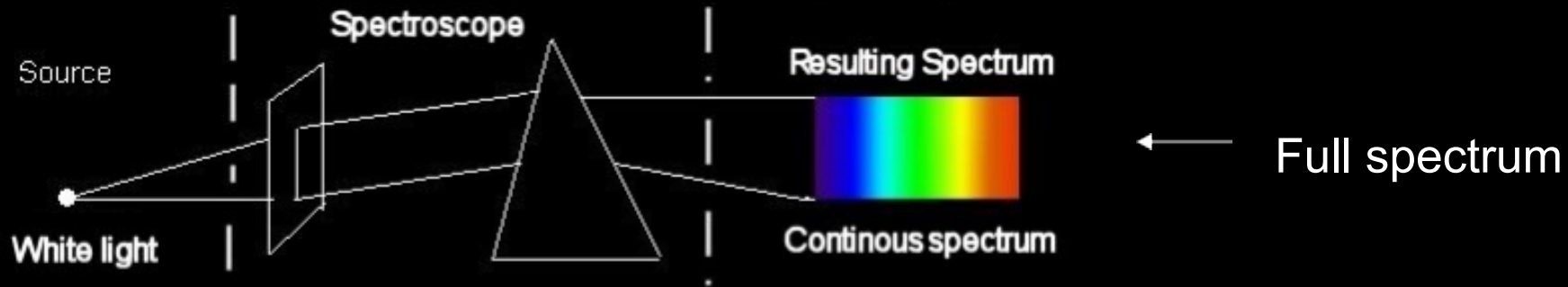
If an atom is exposed to every color of light it will only absorb the light that corresponds to the energy difference in its energy levels.

This is like a “fingerprint” for that specific element.

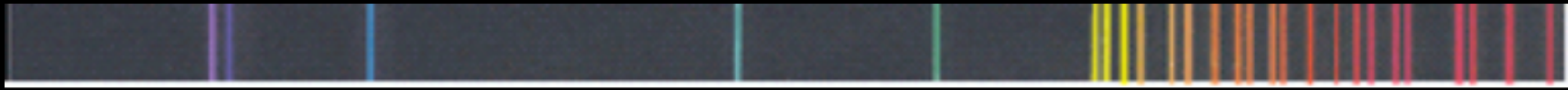
Light

- How are we able to tell what elements are in a planet's atmosphere?

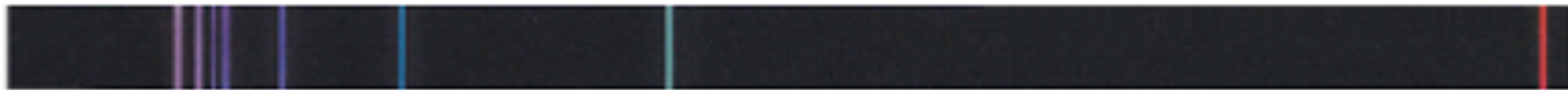
--Spectroscopic Analysis--



Unknown Spectrum:



Using the known emission spectra below, decide which elements are in the unknown spectrum.



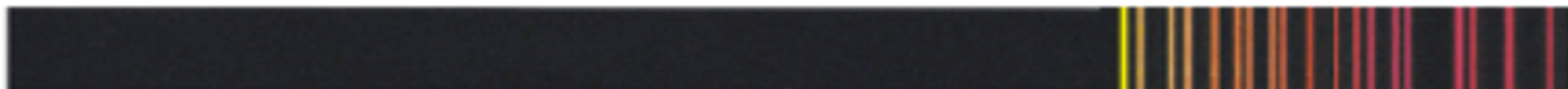
Hydrogen



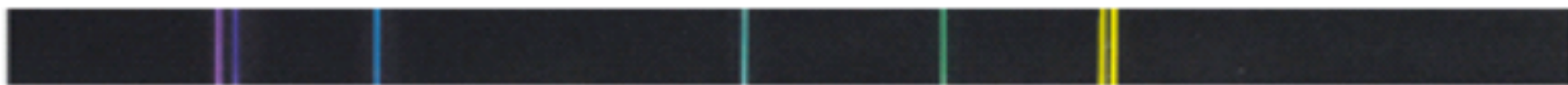
Sodium



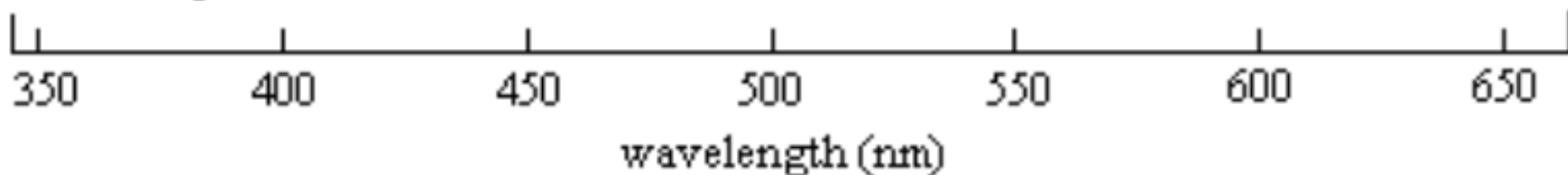
Helium



Neon



Mercury



Doppler Shift (revisited)



UNSHIFTED



REDSHIFTED



BLUESHIFTED