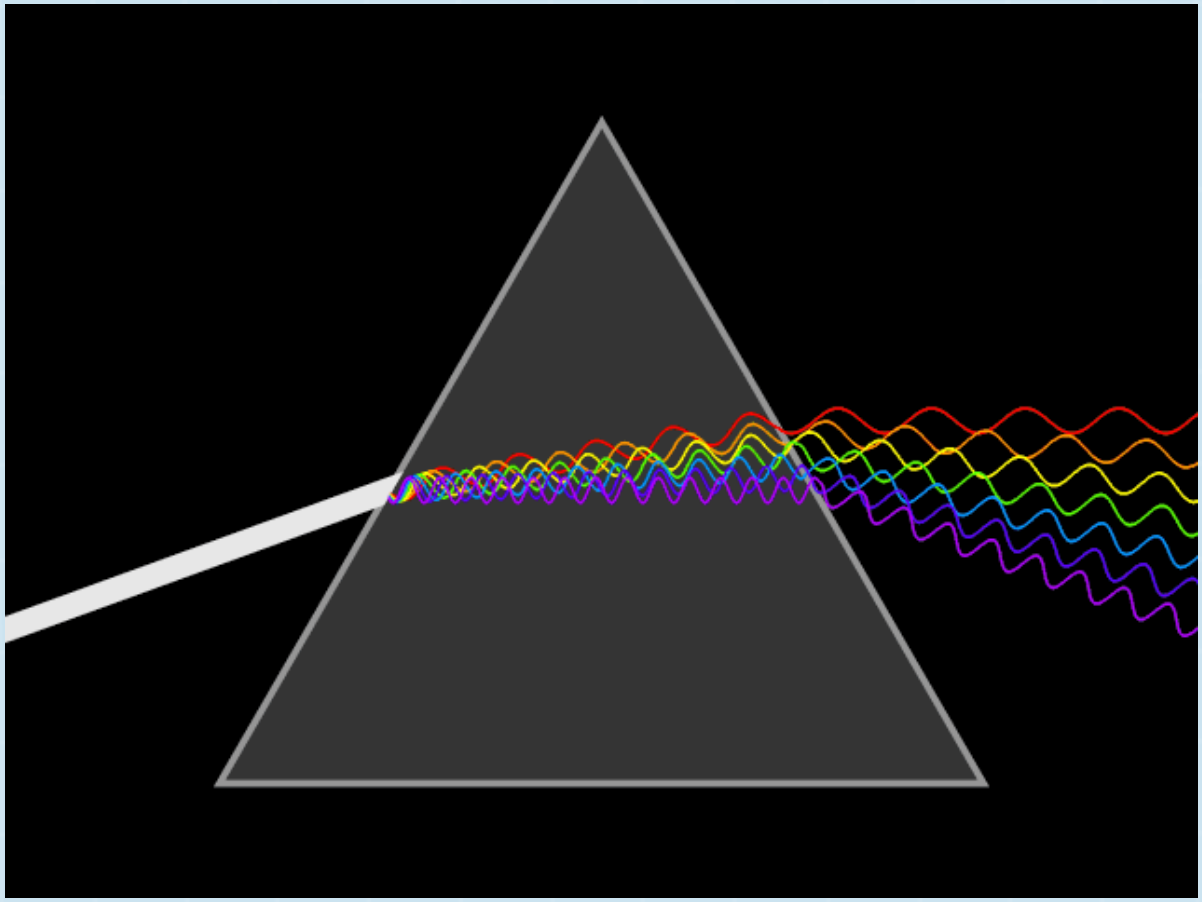
Physics of Waves: Light



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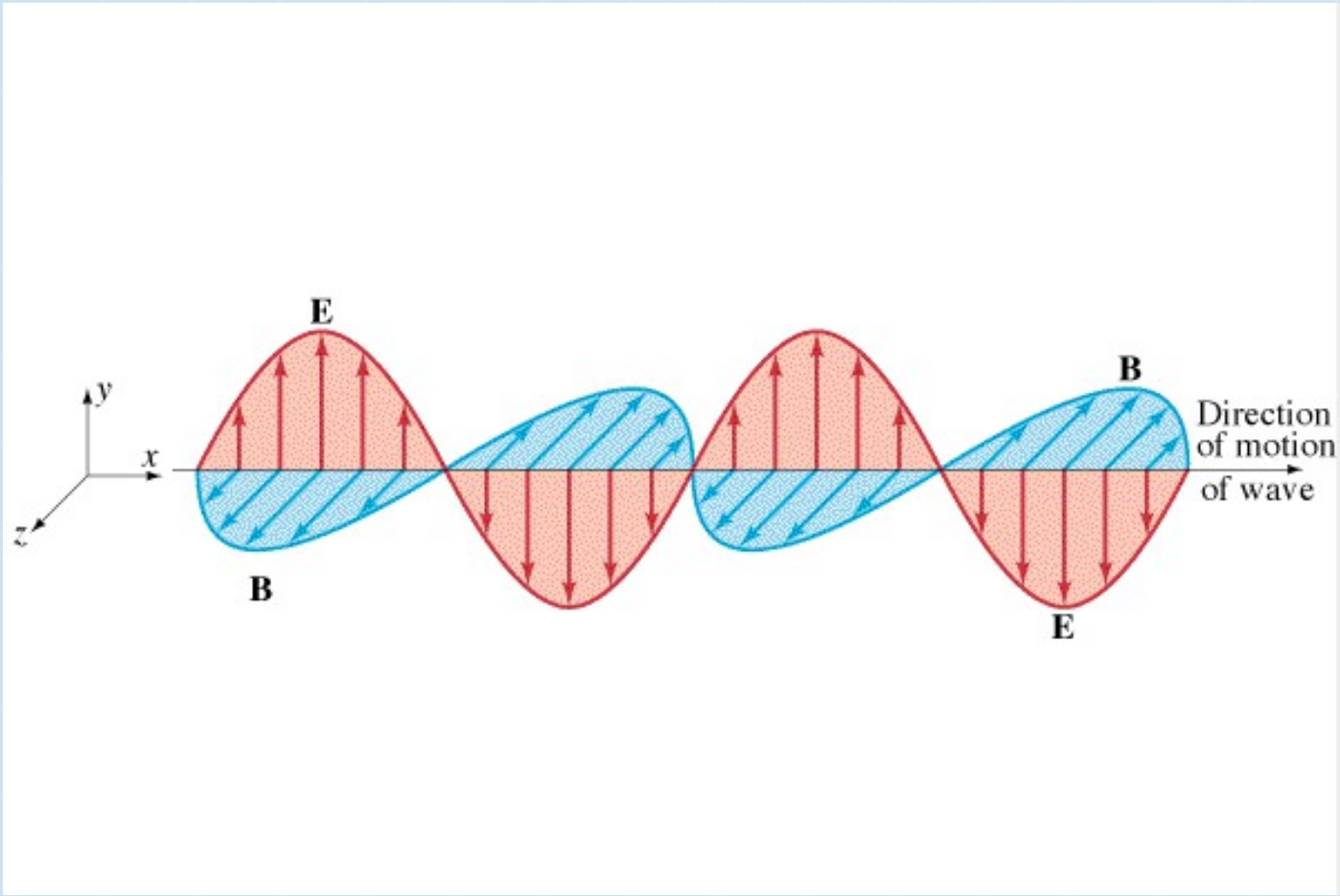
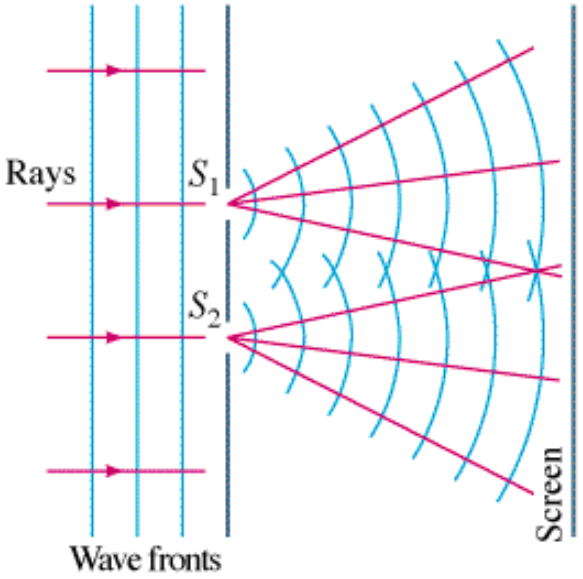
Light is a Wave:



- It's a special wave, no doubt. But it is a wave and has a lot of wave-like properties.

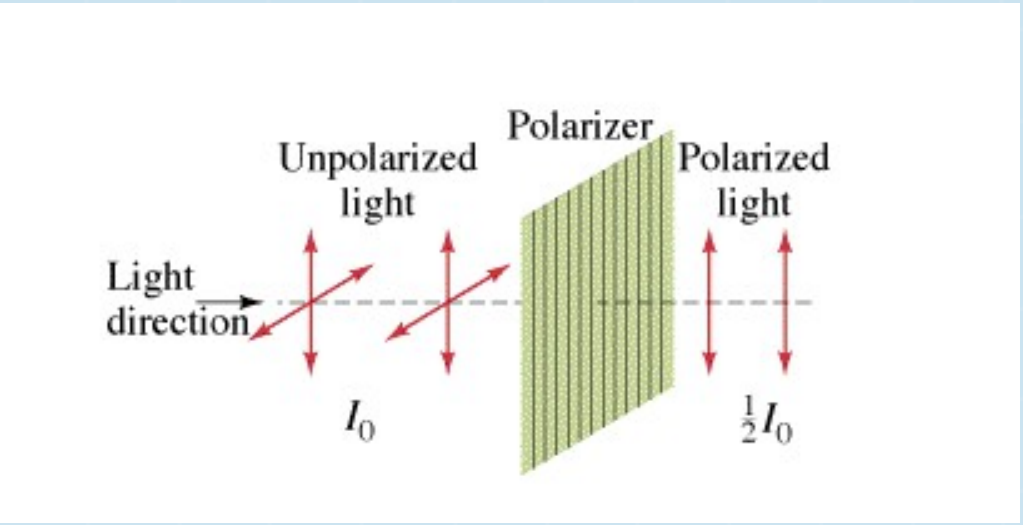
Double Slit with Light:

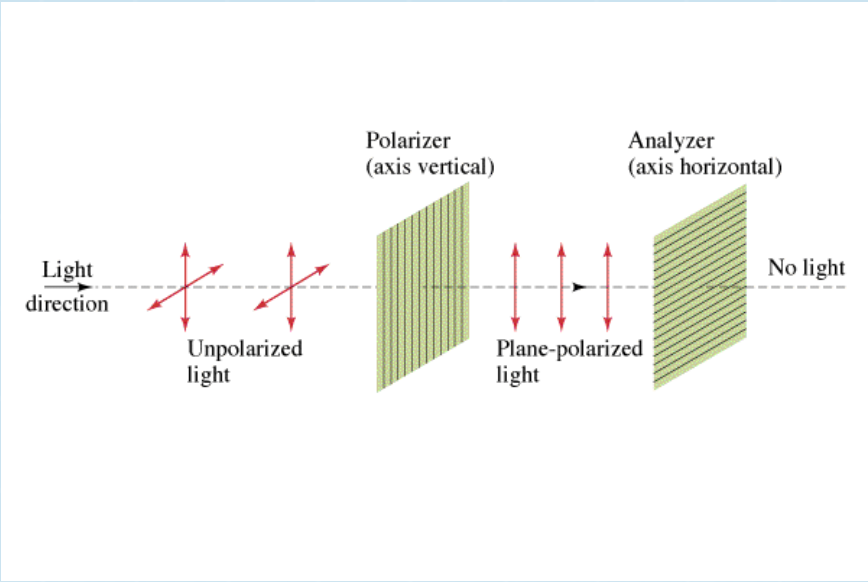


- Just like you saw with water, I can get a similar interference pattern with light.

Just like with the string…

- You're probably more familiar with this with light. Polarized sunglasses for example.





Bends and refracts:

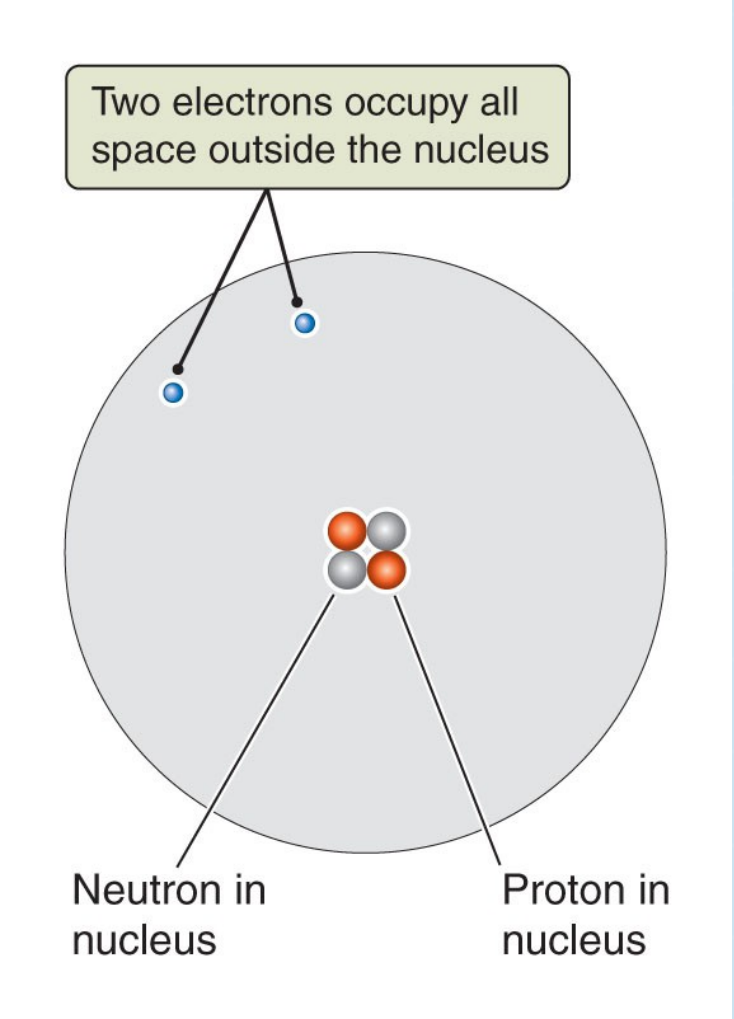
- Just like matter waves reflect and refract going from one medium to another, light does as well. There is however a bit of a catch:
  - Now we're talking about more than one wavelength.
  - Those different wavelengths interact differently with matter.

Exploit!

- These properties of waves let us pull some pretty neat tricks.
- Ever wonder why diamond rings look so sparkly?

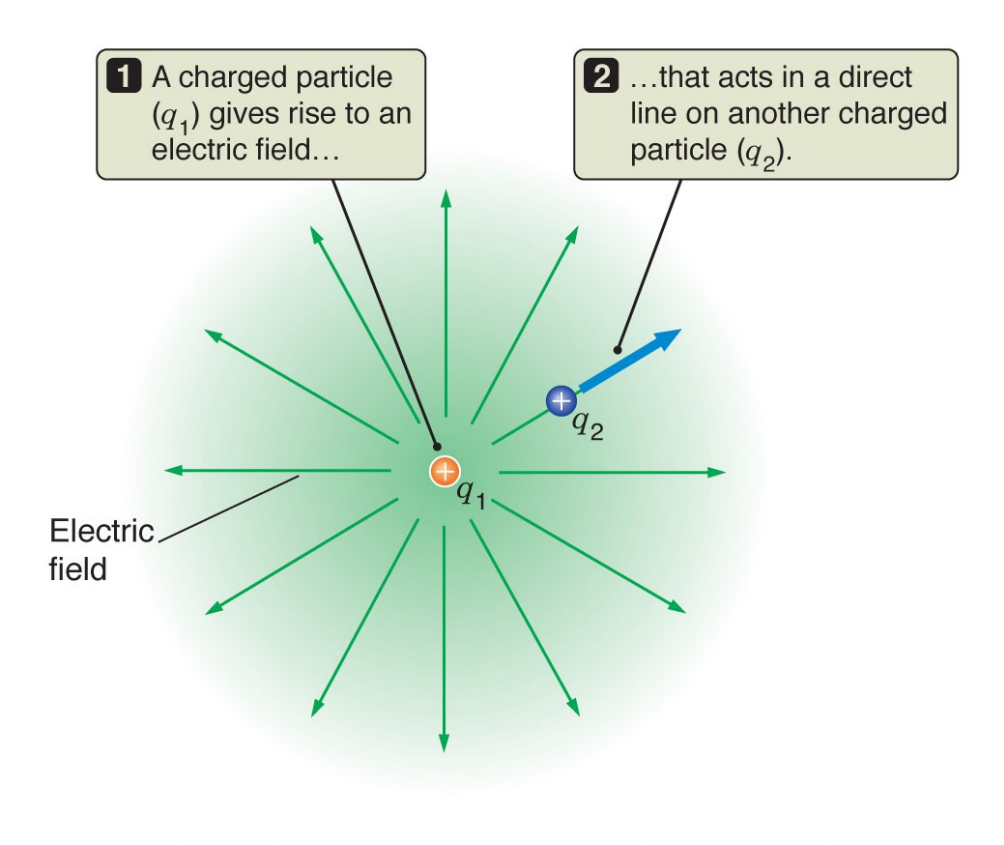
Matter:

- Matter is most of the stuff that you're familiar with:
  - Atoms which are made up of protons, neutrons and electrons.
  - Protons and Electrons have "electric charge", meaning that.
  - Matter made up entirely of a single type of atom is known as an element.



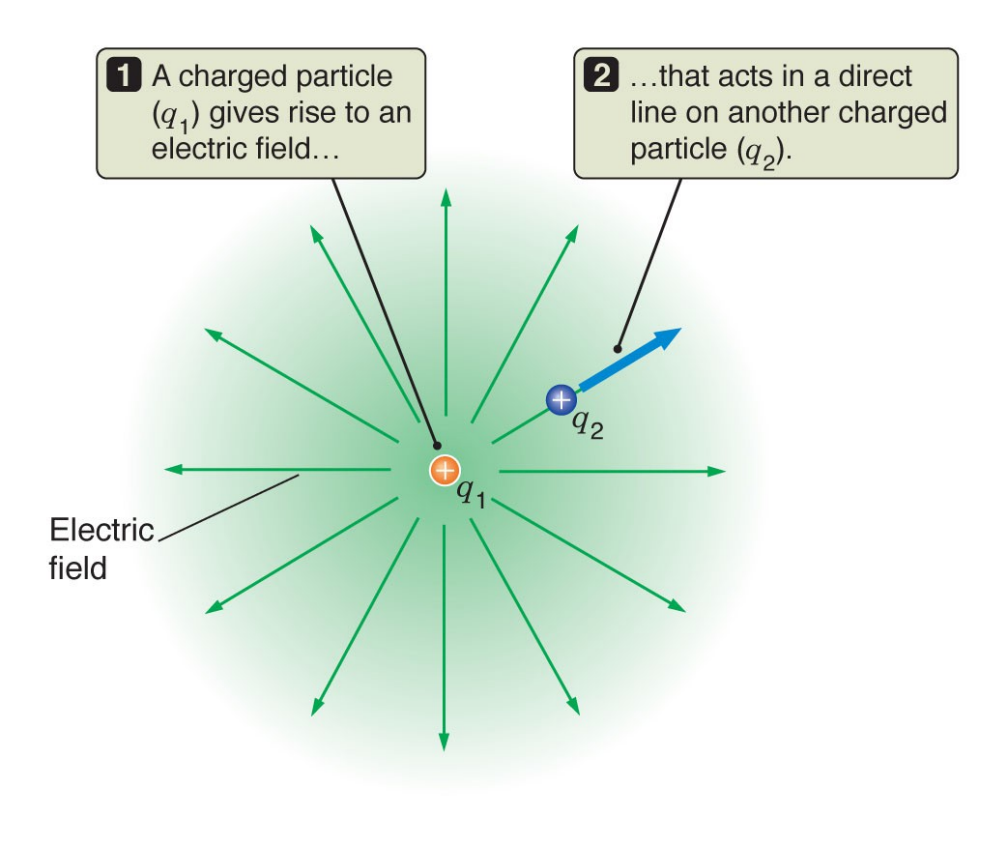
Electric and Magnetic Fields:

- Any charged particle creates an electric field.
- This field creates a force on other charged particles in the area
  - Like repels like
  - Opposites attract



Electric and Magnetic Fields:

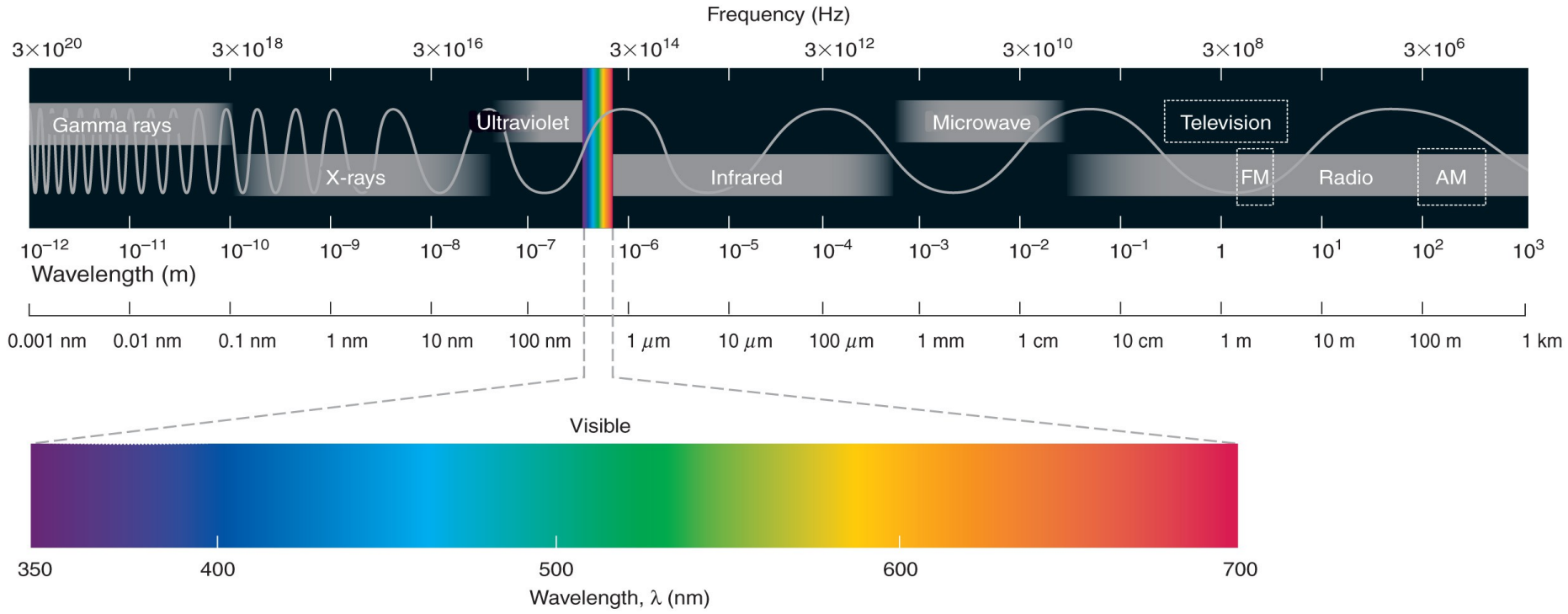
- Moving charged particles create a magnetic field, with a corresponding magnetic force.
- Electric and Magnetic fields are inextricably linked. A changing electric field causes a magnetic field, and vice versa.



Wave or Particle?

- Though light appears continuous, it actually is discrete little packets or quanta. One of the easiest ways to see this is with these tubes!

Electromagnetic Spectrum:



- **Visible light is only around 400-700 nm in wavelength. As you can see, there's a LOT outside of that range. There is also a lot we can do IN this spectrum.**

Waves:

- We’re continuously surrounded by waves, both mechanical and electromagnetic!
- The more you look, the more you see them!