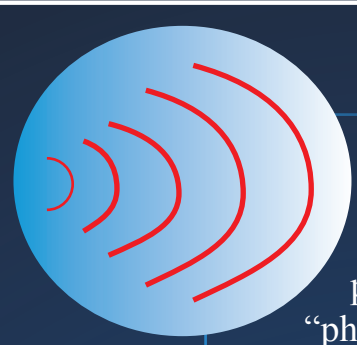
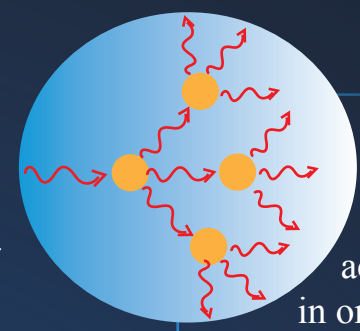
# *A Basic Guide to Lasers*

L-ight
A-mplification by
S-timulated
E-mission of
R-adiation



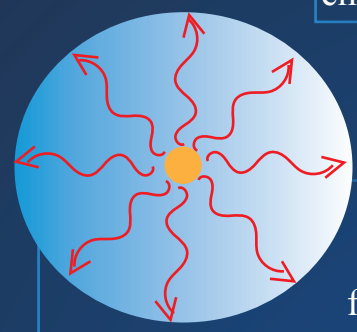
## Light Amplification-

Lasers' usefulness comes from their high power and precision. A single packet, or "photon", of light is not very strong on its own. Lasers generate large numbers of photons in order to dramatically increase, or amplify, the emitted light and power.



## Stimulated Emission-

Photons emitted by charged atoms in the lasers can interact with other charged atoms in order to release other identical photons. This process can continue in the laser like a chain reaction until there are many identical photons ready to be emitted from the laser.

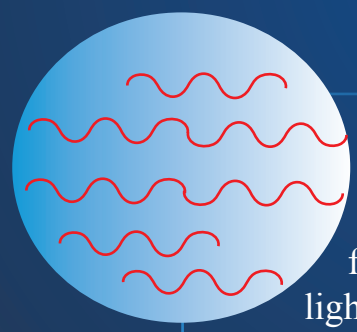


## Radiation-

Radiation is the emittance of electromagnetic waves from a source, such as a crystal or electrically charge gas. The photons emitted from the laser are a form of radiation. The photons radiate from the source atom and cause other atoms to radiate their own photons until there is enough radiation to emit light.

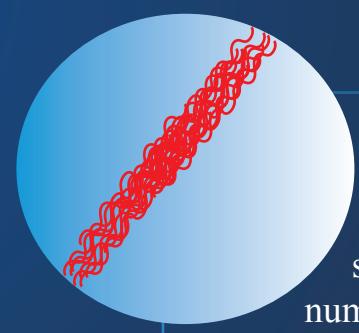
Laser Parameters- if a beam of light fails to fulfill these parameters, it is not considered a laser. The laser is designed to act as one, large, powerful photon

1) Single Frequency
2) High Intensity Beam
3) High Coherence
4) Polarized Light



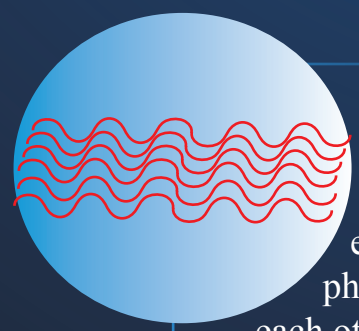
## 1) Single Frequency

The photons emitted from a laser must all have the same frequency. The frequency of light determines its color. That means that all of the light emitted must be of the same color. This allows lasers to be used in many types of measurements and characterizations.



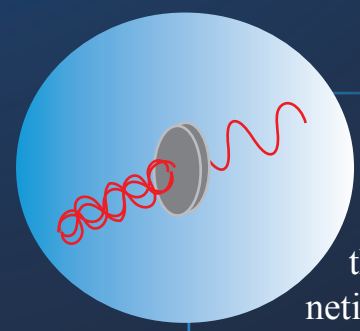
## 2) High Intensity Beam

The beam of light emitted from the laser must be of high intensity. Intensity is measured by the number of photons emitted. Therefore, lasers must emit large numbers of photons in quick succession in order to have enough power to give accurate readings of measurements or be used to cut materials.



## 3) High Coherence

The photons emitted by the lasers must be highly coherent. This means that the photons must be in phase with each other. The electric and magnetic fields that make up a photon oscillate. In order to be coherent, the fields must all oscillate together, making the entire beam act as one large photon.



## 4) Polarized Light

The light from a laser must be polarized. This means that not only must the magnetic and electric fields oscillate together, but they must all oscillate oriented in the same direction. This is related to coherence in that it allows the beam to act as one large photon.