



Everything in life is vibration.

The word vibration comes from Latin 'vibratio' ("shaking") and it is used to describe mechanical oscillation. E.g. swinging pendulum, helical spring  
Oscillations occur also in dynamic systems in virtually every science area of science:

The swing

Alternating Current

Cepheid variable stars

The economic cycle

$F_{spring} = -kx$

Heart sinusoidal beat

Vibrating strings

Climate oscillation

Pray-Predator Cycles

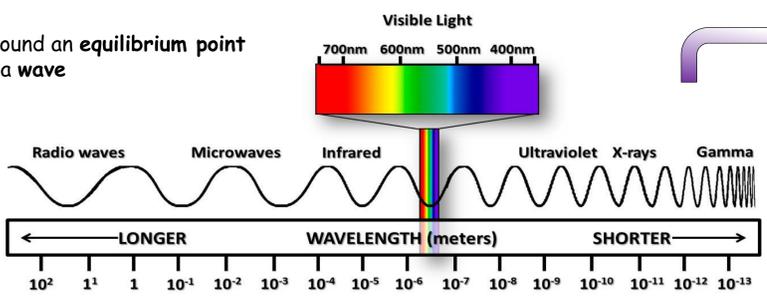
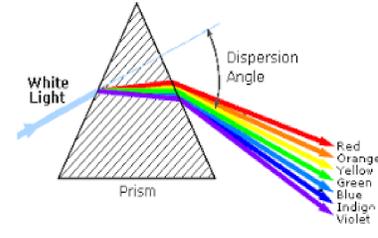
Oscillation of a sequence n

Nerve firing

Oscillations at different frequencies:

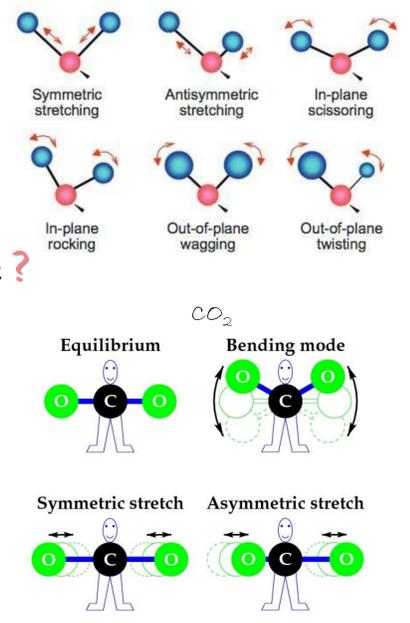
But... What is a vibration ?

- A vibration is a periodic oscillation in time around an equilibrium point
  - A periodic oscillation in both space & time is a wave
- E.g. **Sound**, mechanical wave which needs a medium  
**Light**, electromagnetic wave which needs no medium

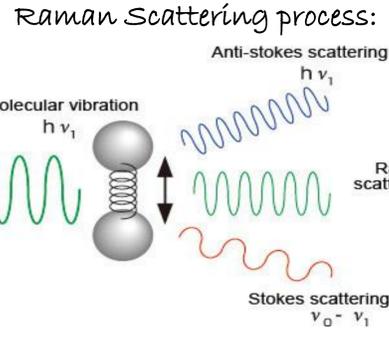
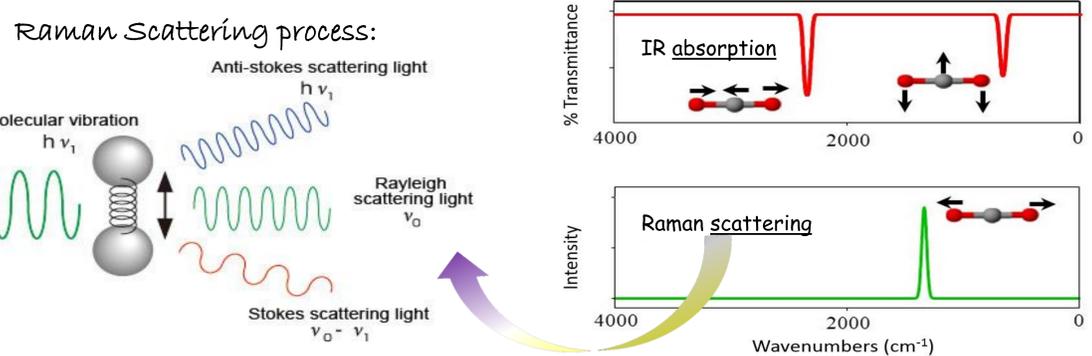


A molecular vibration is excited when the molecule absorbs a quantum of energy, E, corresponding to the vibration's frequency,  $\nu$ :  
 $E = h\nu$

Vibrational motions:



How to probe the vibrational state of a molecule ?



Raman setup, Laser Equipment and Cryostation at UCY:

Raman Application: