Laser spectroscopy

Various fields in which laser is applied:

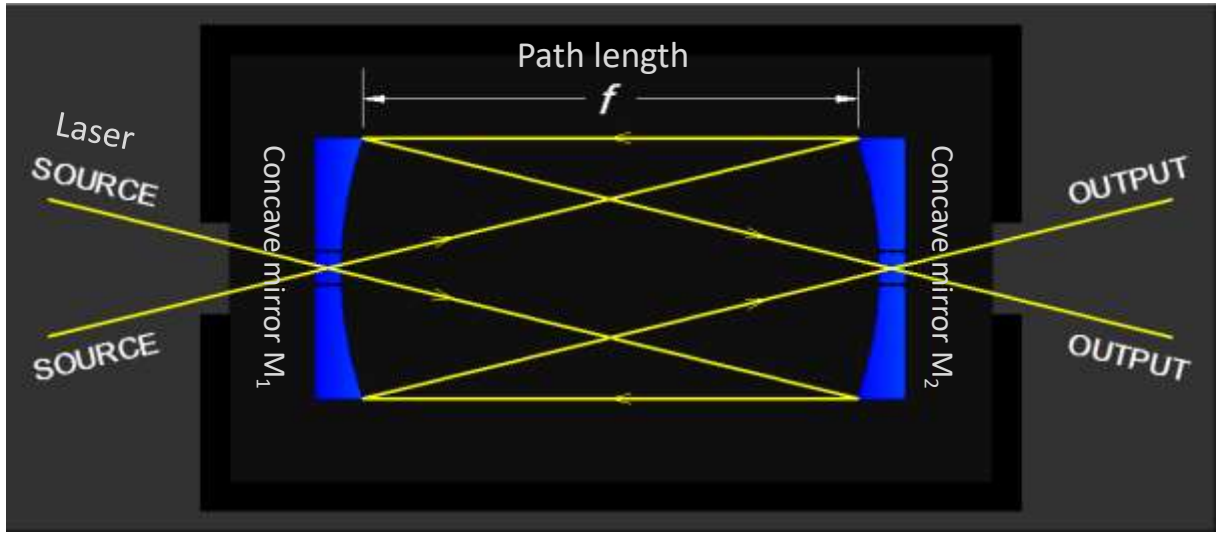
- Absorption spectroscopy
- Fluorescence spectroscopy
- Laser induced breakdown spectroscopy (LIBS)
- Raman spectroscopy
- Isotopic enrichment

Absorption Spectroscopy

Conventional light source can't be use to measure very low absorbance values.

Utilizing the highly convergent nature of laser very low absorbance values can be measured by using a multipass cell. Effective path length is: 2f x n

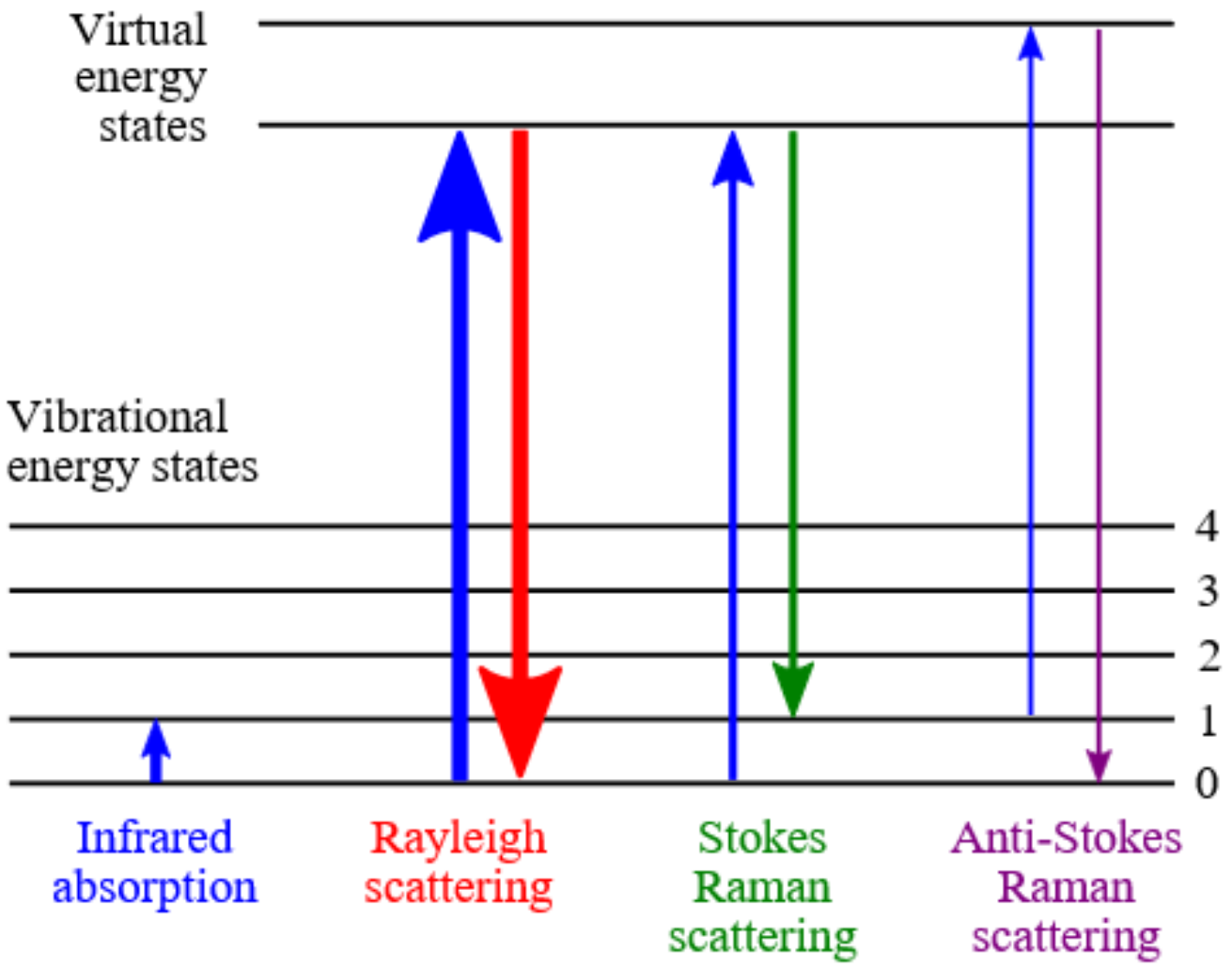
where, n = no of round trip.



Multipass Cell

Raman Spectroscopy

- Raman spectroscopy is based upon Raman scattering which is observed due to shift in frequency of scattered light. The shift can be Stokes shift or Anti Stokes shift depending upon whether the frequency of scattered light is lower or greater than incident light respectively. This is in contracts to the Rayleigh scattering in which the incident and scattered light have same frequency. Various modes of Raman spectroscopy:
  - Resonate Raman Spectroscopy
  - Stimulated Raman
  - Coherent Anti Stokes Raman Spectroscopy (CARS)
  - Hyper Raman



Schematic diagram showing Raman and Rayleigh Scattering

Isotopic Separation

Laser can be used for isotopic enrichment by utilizing the selective response of isotopes towards laser action. This is done using following laser schemes:

- Selective ionization
- Selective photo-dissociation
- Photo chemical reactions
- Selective photo-deflection