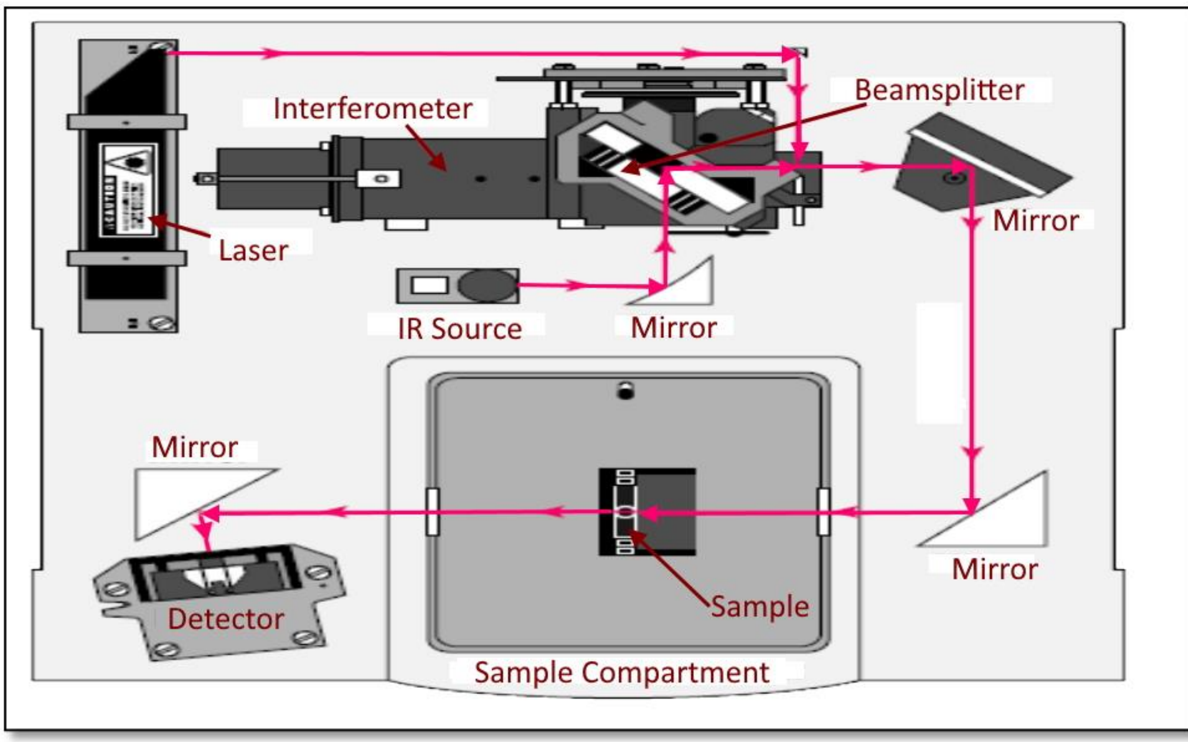
FTIR Theory

In FTIR analyses, infrared light (4000-30 cm^{-1}) from the light source passes through a Michelson interferometer along the optical path. The Michelson interferometer comprises a beam splitter, moving mirror, and fixed mirror. The light beam is split into two by the beam splitter (prism) is reflected from the moving mirror and fixed mirror, before being recombined by the beam splitter. As the moving mirror makes reciprocating movements, the optical path difference to the fixed mirror changes, such that the phase difference changes with time. The light beams are recombined in the Michelson interferometer to produce interference light. The intensity of the interference light is recorded in a time-domain interferogram, with the optical path difference recorded along the horizontal axis. The energy is converted to frequency-domain spectra for determination of bond correlations. The advent of the technology has spurred the development of several attachments for use with the FTIR (i.e. ATR, DRIFTs). Furthermore, the FTIR has several advantages over the older 'dispersive' instruments (i.e. Connes, Fellgett, Jacquinot). The typical Mid-IR FTIR has a range from 4000-400 cm^{-1}. A Far-IR instrument has a range from 600-30 cm^{-1}. The latter is well suited for geological, mineralogical, and inorganic samples. More information is available from your TA about the process, transformation, and advantages of FTIR.



<u>Why FTIR Spectroscopy?</u>

1. Multiplex advantage; all source wavelengths are measured simultaneously
2. Throughput advantage; energy throughput consistent and higher than dispersive instruments.
3. Internal laser advantage; laser acts as an internal reference for mirror and interferometer.