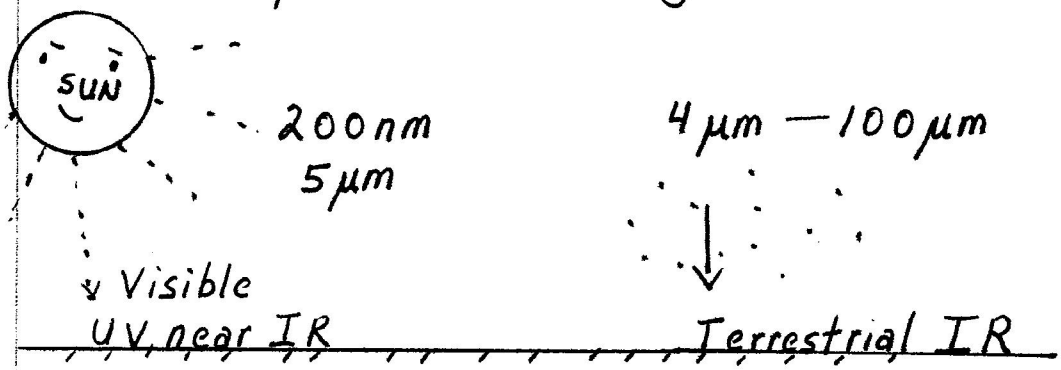
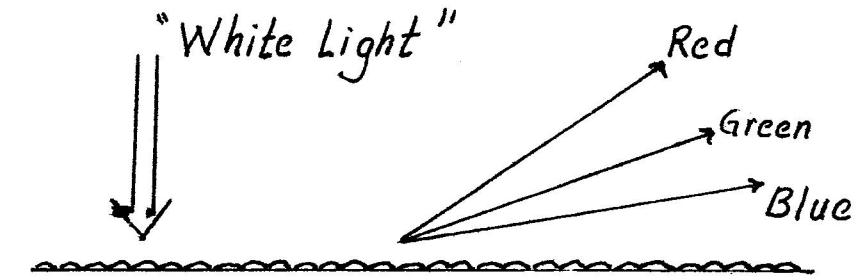
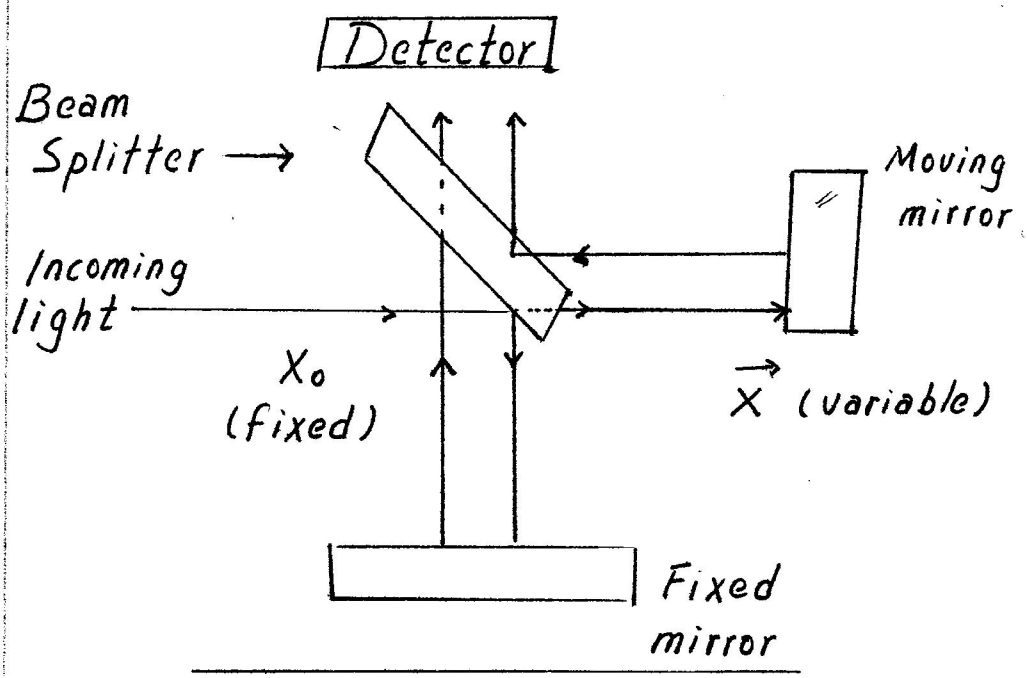
Spectrum Analysis





Diffraction Grating:

Separates colors in space



MICHELSON INTERFEROMETER

Basic Optics:

For certain wavelengths of incoming light,

$$X - X_0 = m\lambda$$

$m = \ldots, -2, -1, 0, 1, 2, 3, \ldots$
$\uparrow$ ZPD*

Constructive Interference Condition for maximum signal at the detector.

* ZPD = Zero Path Difference

Interferometer Requirements

1) Detector must respond to IR radiation
(Mercury Cadmium Telluride, MCT Detector)

2) Detector must respond fast enough to characterize variations in $X - X_0$.
(Not a problem - nice feature)

3) High spectral resolution is achieved by making the range of $X - X_0$ large.

$$\Delta\lambda \, \Delta X \approx 1$$

$$\Delta\lambda = \frac{1}{\Delta X}$$ High Resolution

Comparison:

Diffraction Gratings are fast:
you get the whole spectrum all at once, but must change the optics to get different resolution.

FTIR: Can achieve variable and high resolution, but slow.