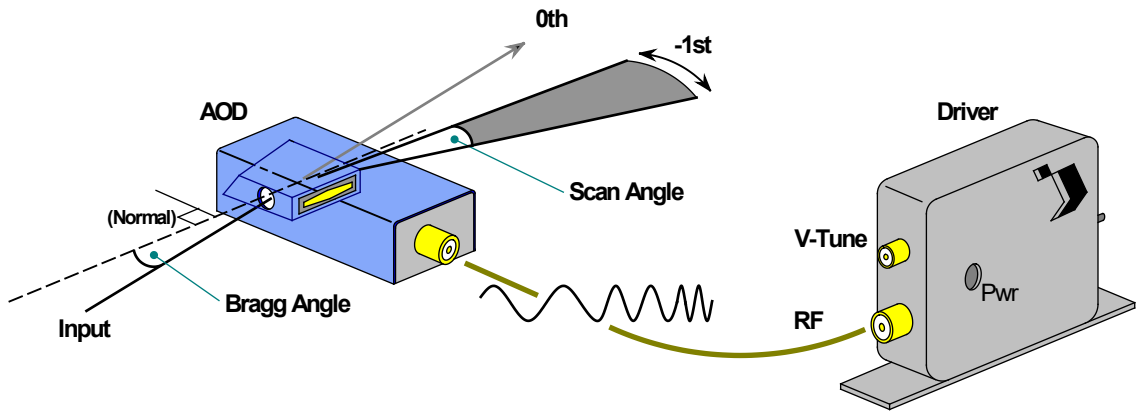
## Basic AO Scanner Equations




Input Bragg angle

$$\theta_{Bragg} = \frac{\lambda . fc}{2.V}$$

Scan angle

$$\theta_{scan} = \frac{\lambda . \Delta f}{V}$$

Access time

$$\tau = \frac{d}{V}$$

Resolvable angles (spots)

$$N = \tau . \Delta f$$

Optimum RF drive power

$$P_{sat} = \frac{k . \lambda^2 . H}{2 . L . M_2}$$

Diffraction Efficiency

$$DE = \frac{I_{1st}}{I_{0th}}$$

Insertion Loss

$$IL = 1 - \frac{I_{0th}}{I_{Laser}}$$

Key:

| | |
|---|---|
| $\lambda$ | = wavelength |
| $d$ | = 1/e$^2$ beam diameter |
| $f$ | = RF frequency |
| $fc$ | = centre frequency |
| $\Delta f$ | = RF bandwidth |
| $V$ | = acoustic velocity<br>TeO2 (L): 4.2mm/us<br>TeO2 (S): 0.62- 0.65 mm/us<br>PbMoO4: 3.63mm/us<br>Quartz: 5.7mm/us<br>Ge: 5.5mm/us |
| $L$ | = interaction (electrode) length |
| $H$ | = active aperture (electrode) height |
| $M_2$ | = AO Figure of Merit |
| k | = transducer conversion loss |
| $I_{1st}$ | = diffracted laser power |
| $I_{0th}$ | = zero order (no RF) laser power |
| $I_{Laser}$ | = input laser power |