PH 521

Eqns to Memorize

ABCD Matrices

1) Propagation: $\begin{pmatrix} 1 & z \\ 0 & 1 \end{pmatrix}$

2) lens: $\begin{pmatrix} 1 & 0 \\ -\frac{1}{f} & 1 \end{pmatrix}$ for curved mirror $f = \frac{R}{2}$

$$\frac{1}{q} = \frac{1}{R} - i\frac{\lambda}{n\pi w^2}$$

$$z_R = \frac{n\pi w_0^2}{\lambda} \qquad w(z) = w_0\sqrt{1 + \left(\frac{z}{z_R}\right)^2}$$

Cavity eqns if loss is small

$$F = \frac{2\pi}{Loss}$$

$$\beta_e = \frac{4T_i}{Loss^2}$$

$$F = \frac{FSR}{FWHM}$$

$$I_t = \beta_e I_0 \frac{1}{1 + \frac{4F^2}{\pi^2}\sin^2\phi/2}$$

On-Resonance cross-section

$$\sigma = \frac{\lambda^2}{2\pi}$$

Saturation

$$\Gamma = \Gamma_0 \frac{1}{1 + I/I_s}$$