

- Show that the (beam size 2) varies quadratically with distance in a drift section with no quadrupoles.

- What is the diffraction limited optical synchrotron light monitor vertical resolution at the KEK ATF test damping ring?
 - $E=1.3$ GeV
 - $B= 0.7$ T
- By what factor is the 5 nm-rad vertical emittance, 5 m beta function beam image increased?

- Energy deposition

- Single 'minimum ionizing' particle energy deposition is 2MeV/gm/cm^2 in carbon. Find the energy deposition of a $1\ \mu\text{m}$ sigma nominal intensity (3.5nC) bunches in a $4\ \mu\text{m}$ carbon wire and estimate the temperature rise. (carbon density $2.2\ \text{gm/cm}^3$, specific heat $0.7\ \text{J/gm/deg}_\text{C}$). Assume that the specific heat is constant. Assume the beam is round.
 - Include the effects of latent heat of vaporization / melting ($20000/300\ \text{J/gm}$)
- Do the same for the beam at the ILC IP,
- for the full number of bunches with $1\ \mu\text{m}$ sigma

- Peak current

- FEL bunch lengths can be as low as $10\ \mu\text{m}$ rms. Find the peak current using the nominal ILC bunch charge.

- What is the shortest beam size that can be measured with the TTF bunch length monitor?

- The scan observed using a wire scanner is the quadrature sum of the actual beam size and the effective wire size. What fraction of the wire diameter should be used for this correction?

TTF Deflector Parameters

- $\text{sig}_z = 25 \mu\text{m}$
- $E = 600 \text{ MeV}$
- $\text{sqrt}(\beta \cdot \beta) = 51 \text{ m}$
- $\text{norm emittance} = 5 \mu\text{m}$
- $\text{phase advance} = 15 \text{ degrees}$
- $\text{phi} = 0$
- $\text{lambda} = 105 \text{ mm}$
- $\text{nominal size} = 317 \mu\text{m}$
- $L = 3.66 \text{ m}$
- $V = 25 \text{ MV}$
- $P = 18 \text{ MW}$