# Prebuncher Voltage Vs Gun Volt.

$$\frac{d\theta}{dz} = \frac{1}{\lambda}\left(\frac{1}{\beta_0} - \frac{1}{\beta_e}\right)$$

$$= \frac{1}{\lambda}\frac{d\left(\frac{1}{\beta}\right)}{d\gamma}\cdot\Delta\gamma$$

$$\frac{d\left(\frac{1}{\beta}\right)}{d\gamma} = \frac{1}{\beta^3\gamma^3}$$

$$\frac{d\theta}{dz} = \frac{1}{\lambda}\frac{1}{\beta^3\gamma^3}\Delta\gamma$$

$$\Delta\theta = \frac{L}{\lambda}\frac{1}{\beta^3\gamma^3}\Delta\gamma \qquad \Delta\theta = \frac{L}{\lambda}\frac{\Delta\gamma}{\beta^3\gamma^3}$$

$$\lambda_p = \left(\frac{\beta^3\gamma^3 mc^2/e}{J z_0}\right)^{\frac{1}{2}} \approx 14\text{ cm}.$$

$$\left(\frac{I}{I_0}\right)^{\frac{1}{2}}/(\beta\gamma)^{\frac{5}{2}}$$

$$L \approx \lambda_p$$

$$\Delta\theta \approx \frac{L}{\lambda}\left(\frac{mc^2/e}{J z_0}\right)^{\frac{1}{2}}\frac{\Delta\gamma}{(\beta\gamma)^{\frac{5}{2}}} \qquad I_0 = 17\text{ kA}$$

$$\left(\frac{I_0}{I}\right)^{\frac{1}{2}}\frac{1}{(1+2\ln\frac{b}{a})^{\frac{1}{2}}}\frac{\Delta\gamma}{(\beta\gamma)^{\frac{5}{2}}}$$