5.2 $\bar{\beta}_x = 18\ m$ $K = 3.7$

$\epsilon_{x,n} = .4 \times 10^{-6}\ m$ $\lambda_u = .03\ m$

$E = 13.6\ GeV$ $k_{\beta x} = 1/\bar{\beta} =$

$m_0c^2 = .511\ MeV$

$$\gamma = \frac{E}{m_0c^2} = 26614$$

$$\epsilon_x = \frac{\epsilon_{x,n}}{\gamma} = \frac{.4 \times 10^{-6}\ m}{26614} = 1.5 \times 10^{-11}\ m$$

$$\sigma_x = \sqrt{\frac{\epsilon_x}{k_{\beta x}}} = \sqrt{\epsilon_x \bar{\beta}_x} = \sqrt{(.4 \times 10^{-6})(18)} = 2.7 \times 10^{-3}\ m$$

$$\sigma_x' = \sqrt{\epsilon_x k_{\beta x}} = \sqrt{\frac{\epsilon_x}{\beta_x}} = \sqrt{\frac{.4 \times 10^{-6}}{18}} = 1.5 \times 10^{-4}\ m$$

$$x_w(z) = \frac{K}{\gamma k_u} \sin(k_u z)$$

$$x_{w\,max} = \frac{K}{\gamma k_u} = \frac{(3.7) \cdot 18}{(26614)} = \frac{66.6}{26614} = 2.5e^{-3}\ m$$

$$\sigma_x \approx x_w$$

Matched beam size is approximately equal to the wiggle amplitude. This makes sense as both are functions of $\bar{\beta}_x$.