

Problems Lecture 1: Linac Basics

- 1) Calculate the relative longitudinal motion of two particles with an energy of 9 GeV and a difference of 3% over a distance of 21 km.
- 2) Calculate $\beta(s)$ for the Hill's equation with $K(s) = K_0 > 0$. Verify that this is a harmonic oscillator (use $x(s) = x_0$ and $x'(0) = 0$).
- 3) Calculate $\beta(s)$ for the Hill's equation with $K(s) = 0$, assuming $\beta(s=0) = \beta_0$ and $\beta'(s=0) = 0$.
- 4) How much energy is roughly stored in one ILC cavity at nominal gradient?