Simulations of a Curved Linac

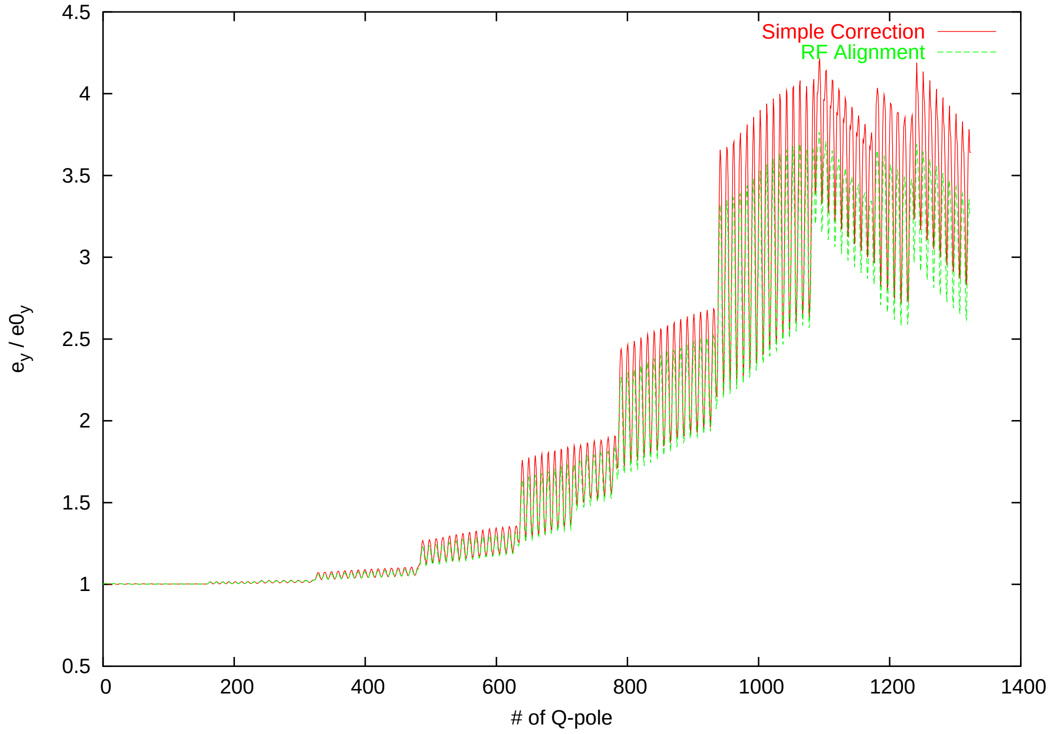
A. Latina

- Simulations were performed with PLACET
- Simulation procedure:
  - The curved Linac was simulated by introducing bending elements along the lattice
    - **CLIC**: 6267 elements $\times$ $\Delta y' \simeq 0.35$ μrad
    - **ILC**: 319 elements $\times$ $\Delta y' \simeq 5.24$ μrad
  - Subsequently, dipoles were inserted in order to compensate the bending
  - Correction methods were applied (dispersion bumps)

Correction Methods Tested

- Simple Correction:
  - One-to-One correction, each q-pole is moved to center the beam in a downstream BPM
- Dispersion Bumps at the beginning and at the end of the linac
  - Minimization of the emittance by scan method...
  - ...in the range:
    - $\Delta x, y = \pm 1000\ \mu$m
    - $\Delta x', y' = \pm 20\ \mu$rad

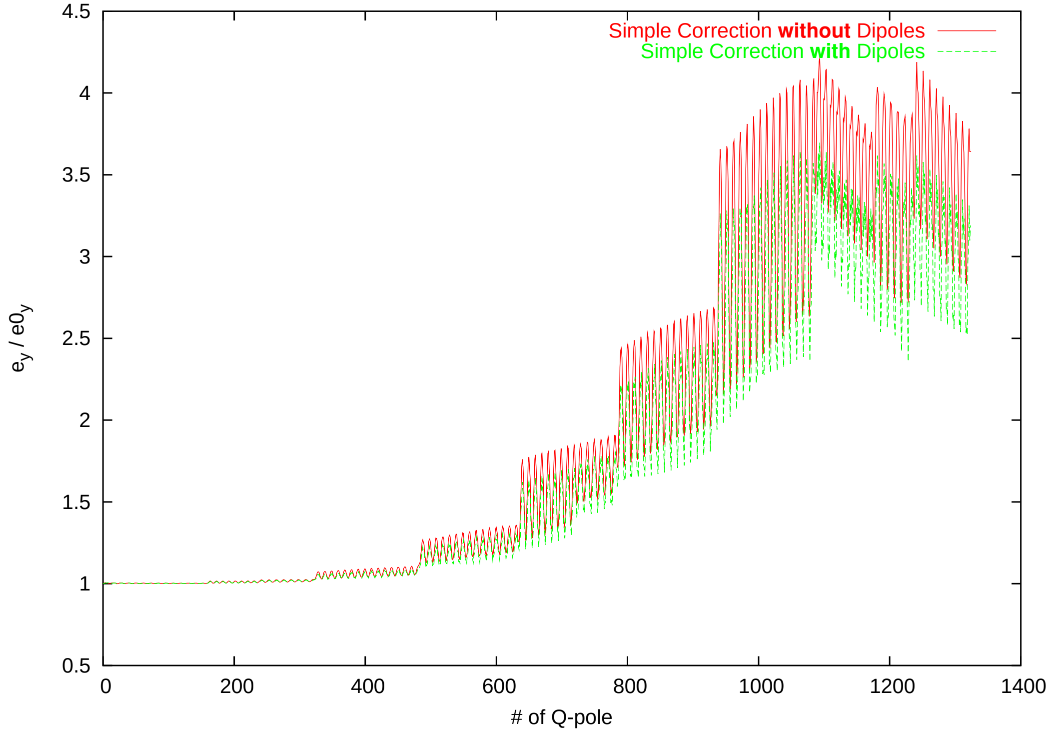
CLIC. Emittance Growth with One-to-One correction



- Curved Linac
- Emittance growth reduced by
  - One-to-One Correction
  - RF Alignment
- Final vertical emittance:

$$\epsilon/\epsilon_0 \simeq 3.2$$

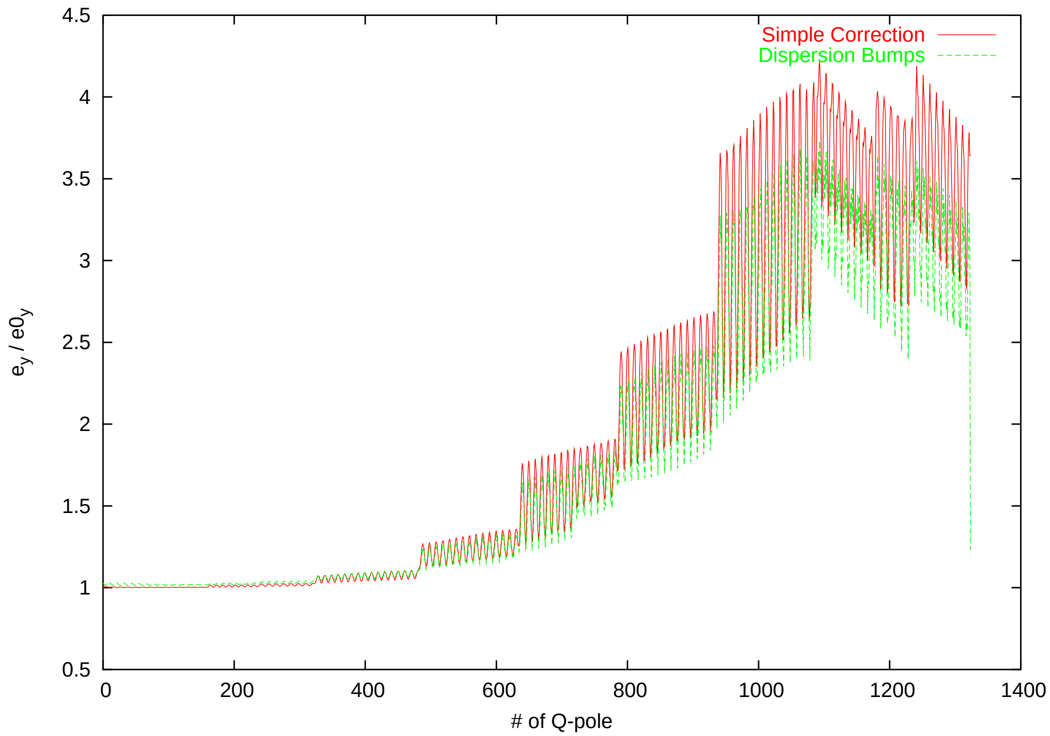
CLIC. Emittance Growth for a Curved Linac with Bending Dipoles



- Emittance growth reduced by
  - One-to-One Correction
- Final vertical emittance:

$$\epsilon/\epsilon_0 \simeq 3$$

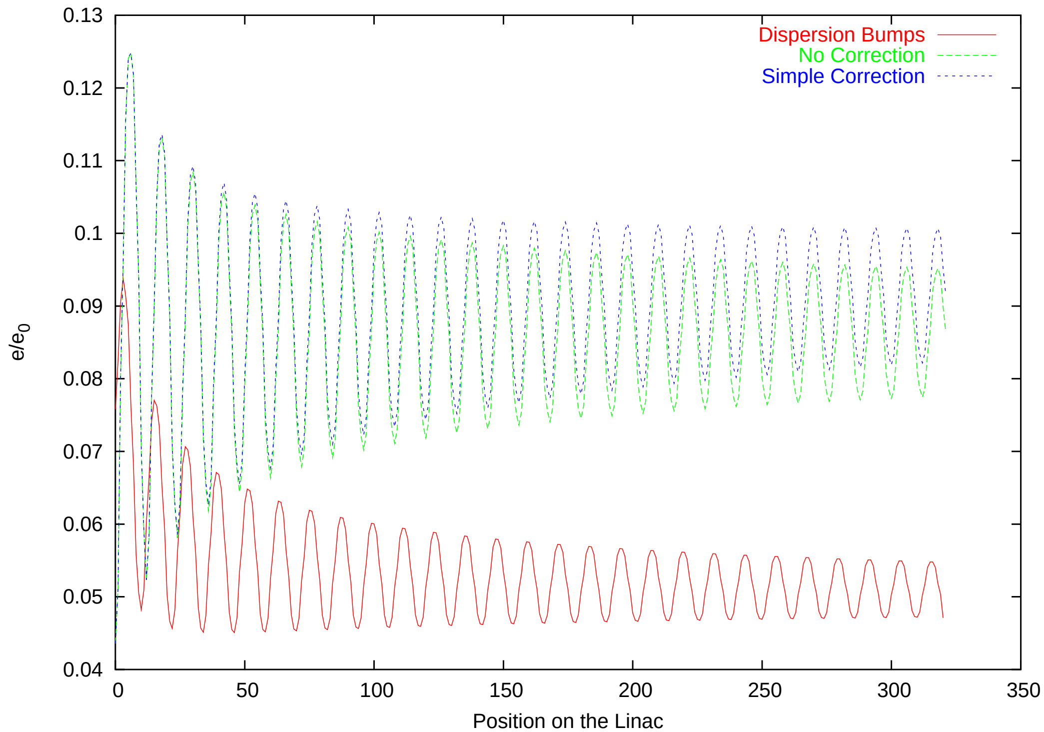
CLIC. Emittance Growth for a Curved Linac with Bending Dipoles



- Emittance growth reduced by dispersion bumps
- Final vertical emittance:

$$\epsilon/\epsilon_0 = 1.22$$

ILC. Emittance Growth for a Curved Linac with Bending Dipoles



- Emittance growth reduced by dispersion bumps
- Final vertical emittance:

$$\epsilon/\epsilon_0 = 0.04$$