

HW4

VELOCITY BUNCHING

1. In this homework you will reproduce some results of the paper: D. Stratakis, Nuclear Instruments and Methods A 821, page 1 (2016)
2. Open folder entitled HW4 and look for the file *ATFLinac.in*. This is your ASTRA main simulation file.
3. See if the elements (cavities, solenoids, etc) in the file follow the pattern in Fig. 1. Note: Quadrupoles and chicane are not included in your file.
4. Set the phases (ϕ) of Linac 1 and Linac 2 at zero degrees. Run a simulation and look at the final energy (second column in the file *atflinac.Sigma*, units are MeV)
5. Look at the emittance in x and y planes by opening the files *atflinac.Xemit* and *atflinac.Yemit*. The emittance is on the 6th column while z is on the first column. How does it vary with z?
6. Now you need to do “velocity bunching” by varying the phase of Linac #1.
7. By varying the phase, reproduce Fig. 2 and Fig 3 of the NIMA paper. See how the final energy changes as you vary the phase.
8. For some cases, plot the emittance vs z, too.
9. How does the emittance change with compression ratio?