1.1 LINAC

For the baseline design, we have chosen an Interdigital-H (IH) structure, as been used at CERN for the Pb linac, and at GSI. This will be a single-cavity, designed for a fixed output velocity, independent of the q/m of the desired beam (cavity gradient is adjusted for different q/m's, to maintain a fixed velocity profile). In the first year of the project, we will continue to investigate alternative structures, including independently phased superconducting cavities, similar to the ATLAS structure at Argonne, or the room temperature structure used for the TRIUMF rare-ion accelerator. Either of these would offer the potential advantage of allowing acceleration to higher energies for higher q/m ions.

1.1.1 Specification of parameters

As mentioned previously, we have selected a minimal final energy of 2 MeV/amu into the AGS booster, to reduce the space charge tune shift and the electron capture cross section at injection. The linac frequency is chosen to be 101.28 MHz, which is in the same as the CERN Pb IH linac. This design is an extension of CERN Pb linac in which the beam dynamics concept of "combined zero degree synchronous particle sections" is used.

The linac has one tank, 4 meters long, with two quadrupole triplets inside for focusing. The maximum field on the axis will be 13.5 MV/m. The gap voltage distribution is adjusted by changing the capacity distribution between the adjacent drift tubes to match the velocity profile. Table 3.5.1.1 shows the main parameters of the IH linac.

Table 3.5.1.1: Main parameters of the IH linac

Parameters	**BNL**	**CERN Tank 1**	**Units**
Q/m	0.16-0.5	0.12	
Input energy	0.300	0.250	MeV/amu
Output Energy	2.0	1.87	MeV/amu
Frequency	101.28	101.28	MHz
Max rep rate	10	10	Hz
Length	4.0	3.57	Meters
Input emittance	0.55		pi mm mrad, norm, 90%
Output emittance	0.61		pi mm mrad, norm, 90%
Output energy spread	20.0		keV/amu
Transmission	100		%

1.1.2 Beam Dynamics

We have used the computer code LORAS [3-3] to design and simulate the IH linac. Figure 3.5.2.1 shows the beam profiles (x, and y) along the linac. figure 3.5.2.2 shows the phase width and energy width profiles along the linac. Figure 3.5.2.3-5 show the input and output phase space projections in the x, y, and phase-energy planes, respectively.

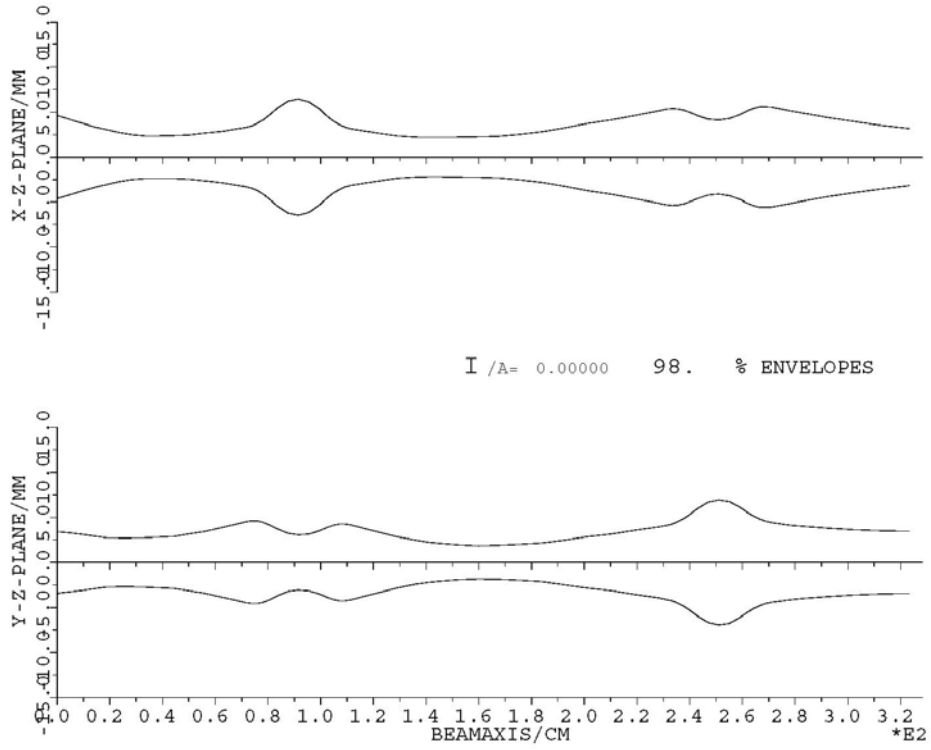

Fig. 3.5.2.1 x and y beam profiles along the linac

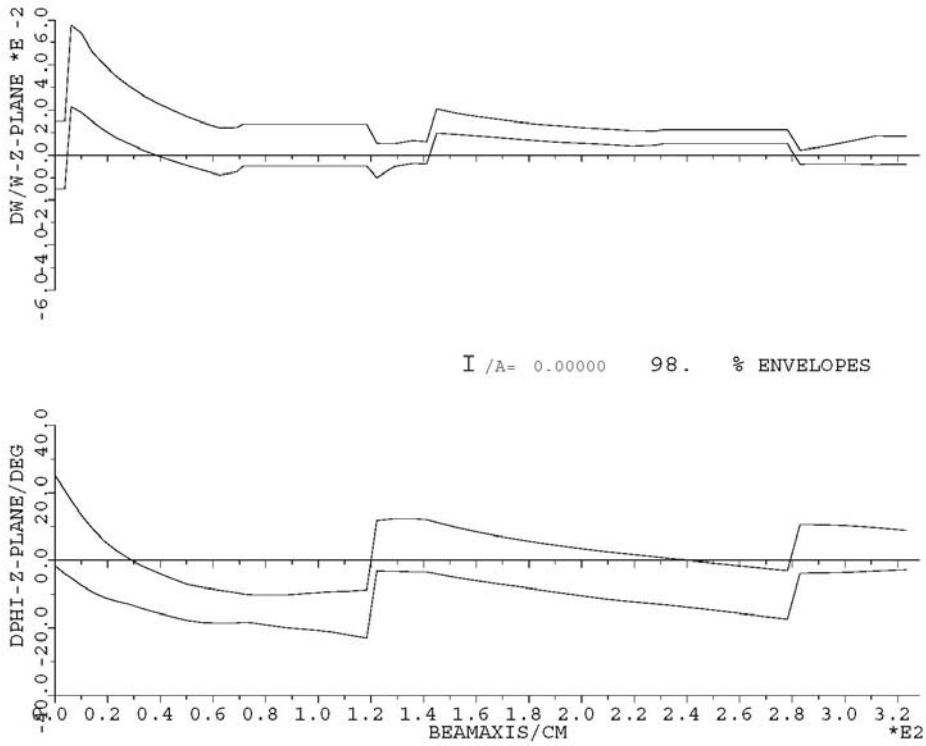

Fig. 3.5.2.2 Phase width and energy width along the linac

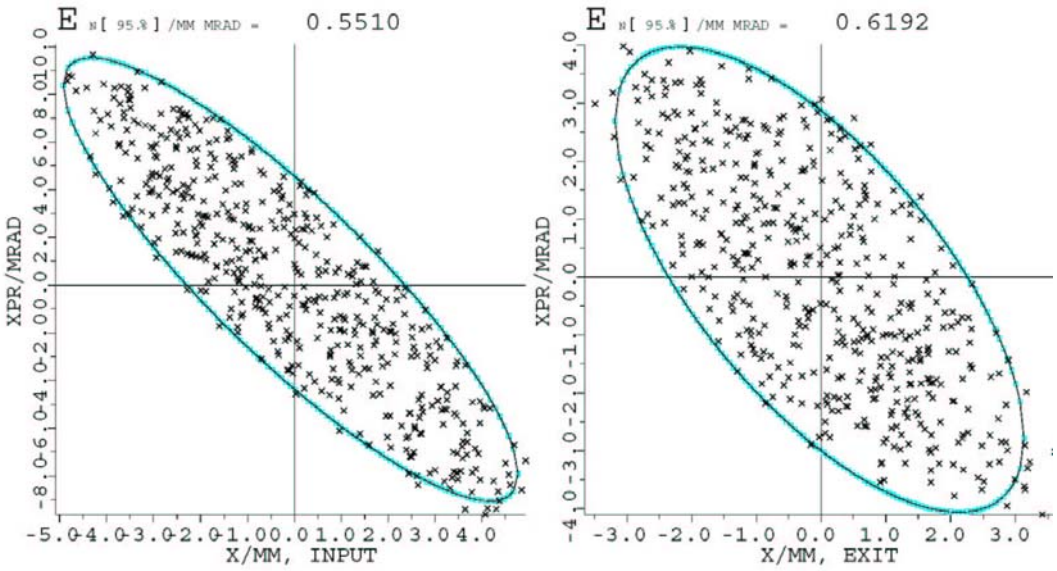

Fig 3.5.2.3 Input and output x-phase space

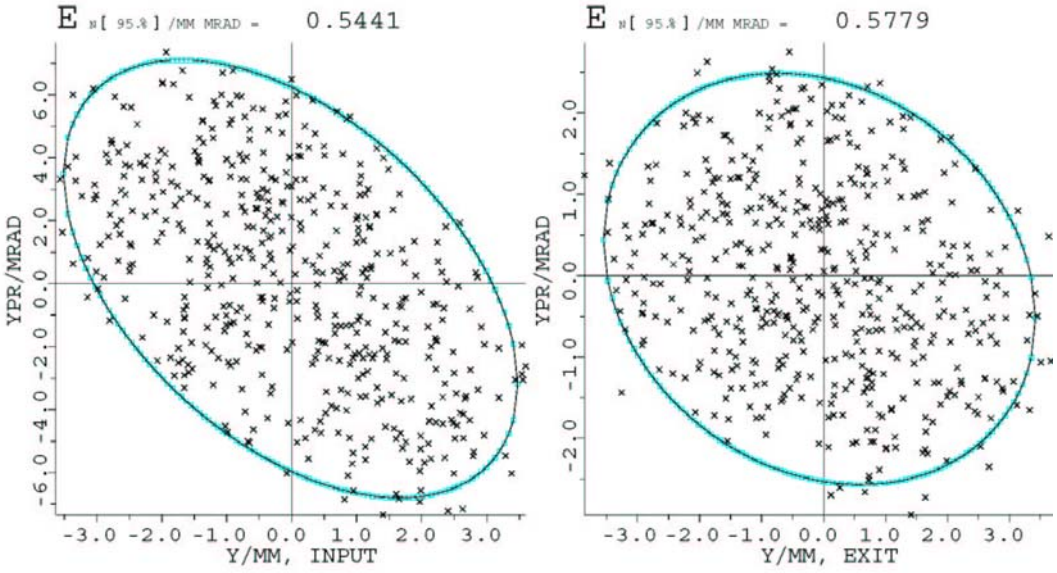

Fig. 3.5.2.4 Input and output y-phase space

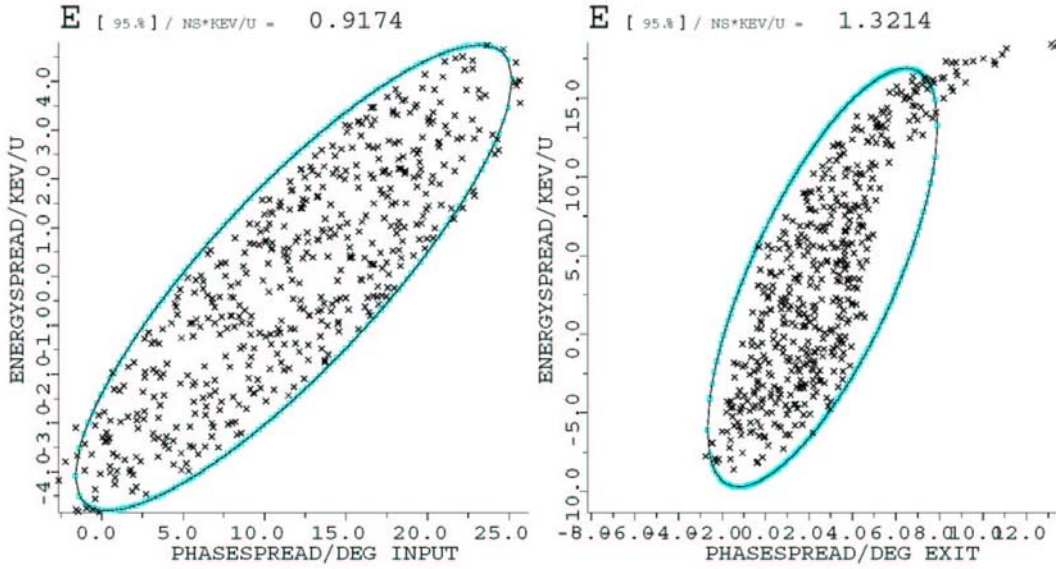

Fig. 3.5.2.5 Input and output longitudinal phase space