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Space-charge compensation in low energy beam transport lines

The study of the dynamics of low energy beam transport line (LEBT) is one of the major challenges in the high intensity hadron accelerators field.

At low energy, this dynamics is dominated by the charge space field which in many cases is nonlinear and can induce a halo formation, emittance growth and beam losses along the accelerator.

However, a low energy ion beam induces ionization of the residual gas in a LEBT. Secondary particles (ions and electrons) from the ionization are repelled or confined radially by the space charge field according to their charge sign.

The progressive accumulation of these secondary particles contributes to the space charge field compensation.

In order to have a better understanding of this phenomenon, some simulations using « warp » code have been realized.

These results will be discussed with experimental results obtained on the LEBT of MYRRHA and IFMIF projects.

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