



SPACE CHARGE COMPENSATION IN THE LINAC4 LEBT FOR THREE INJECTED GAS TYPES

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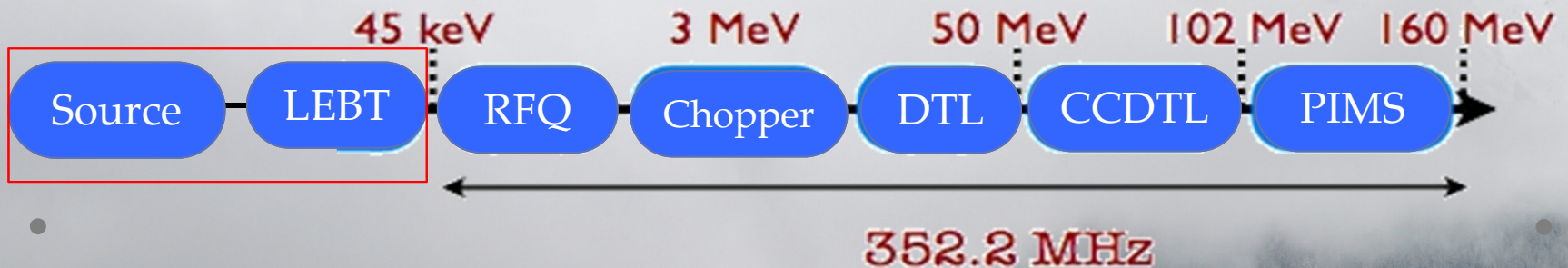
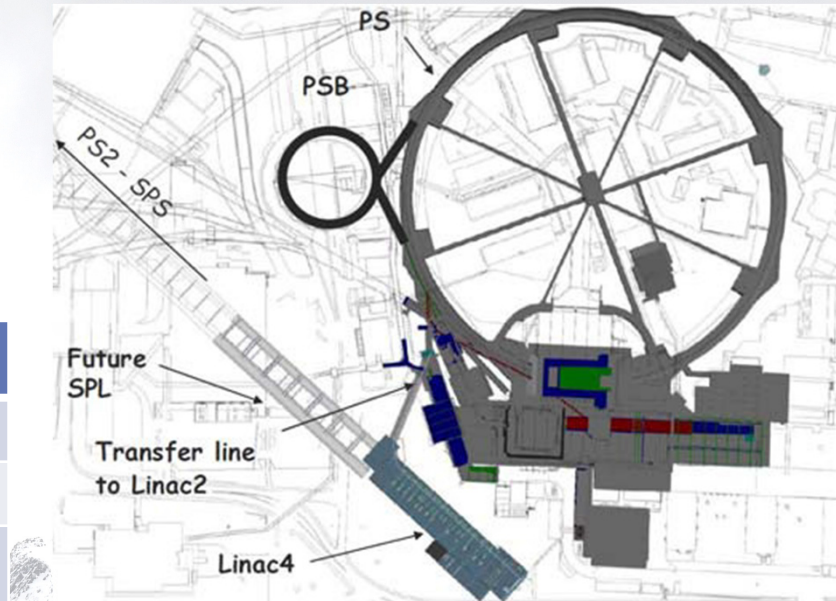
R. Scrivens. CERN, Geneva, Switzerland.



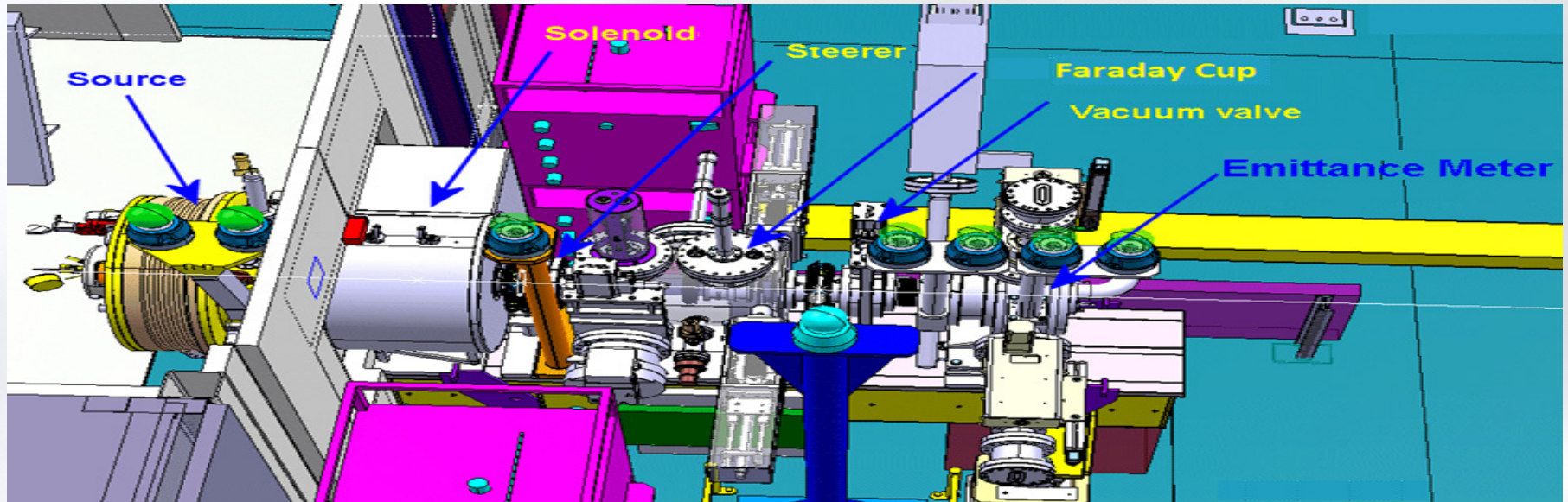
Linac 4

The goal of the project is to build a linear accelerator of 160 MeV H⁻ to replace Linac2 like the injector of the PS Booster

	Linac 4
Ions	H ⁻
Energy	160 MeV
Emittance	0.4 mm mrad
Frequency	352.2 MHz
Beam Current	40 mA
Beam pulse	500 μ s



Linac4 Test stand

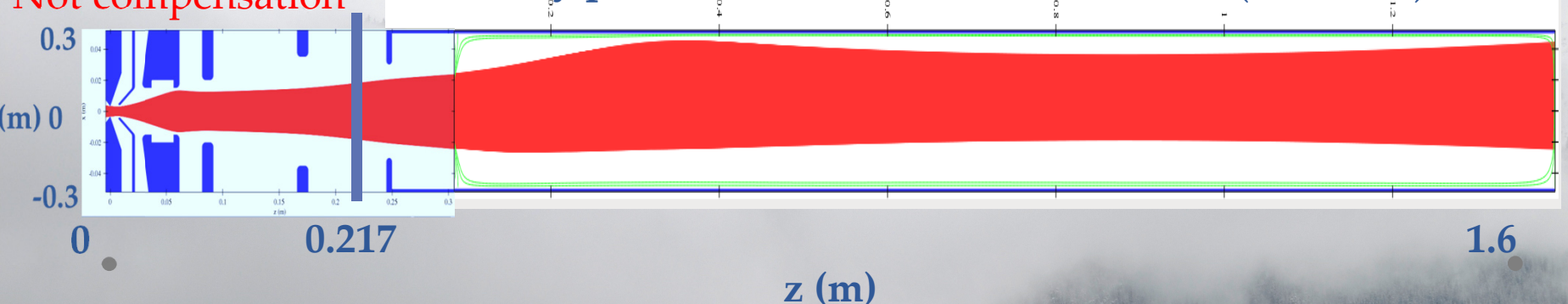


- 45 keV
- Unbunched Beam
- Secondary Ions Trapped in beam
- Measurement of beam phase space
- Injection of H₂, N₂, Kr gases
- Comparison to simulation

High voltage clear
secondary particles
Not compensation

Secondary particles included

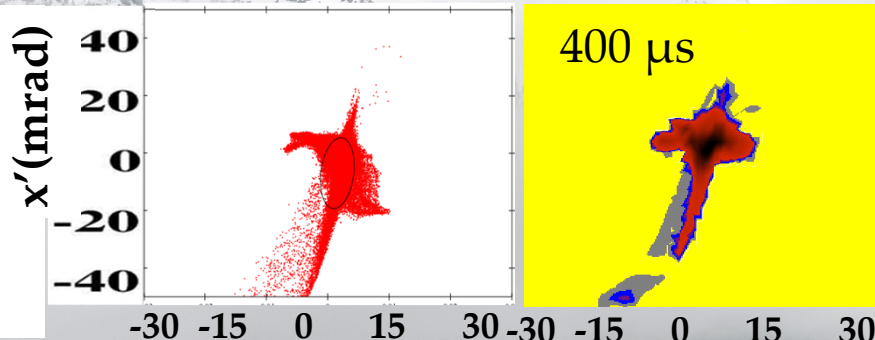
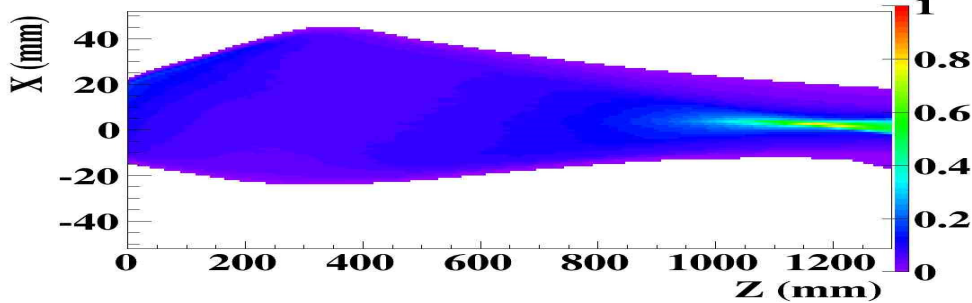
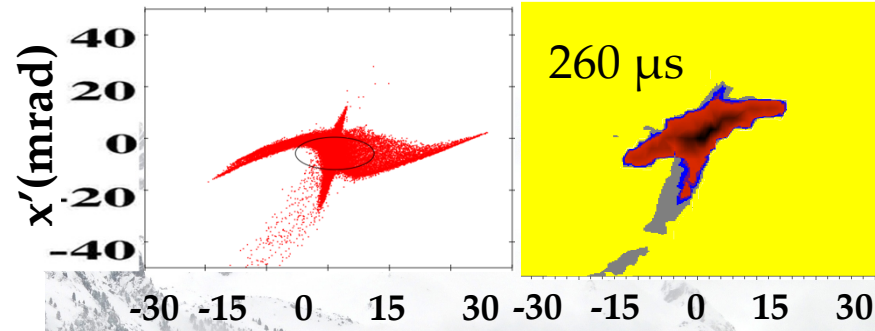
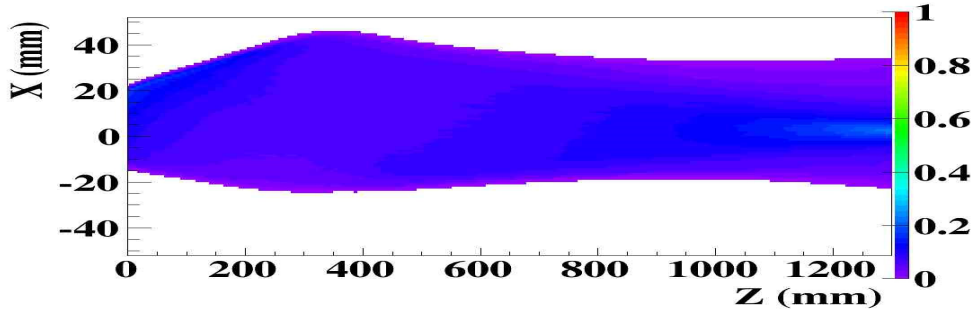
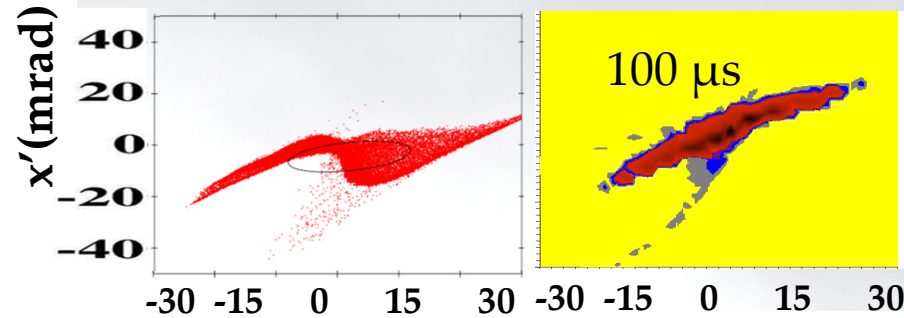
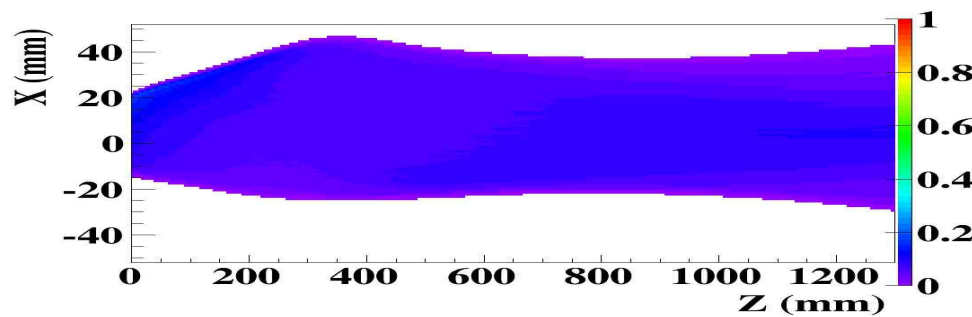
Red (H⁻ Beam)



Space Charge compensation using H₂

- Pressure 1.2×10^{-6} mbar
- Current 35 mA

Simulation Measurements

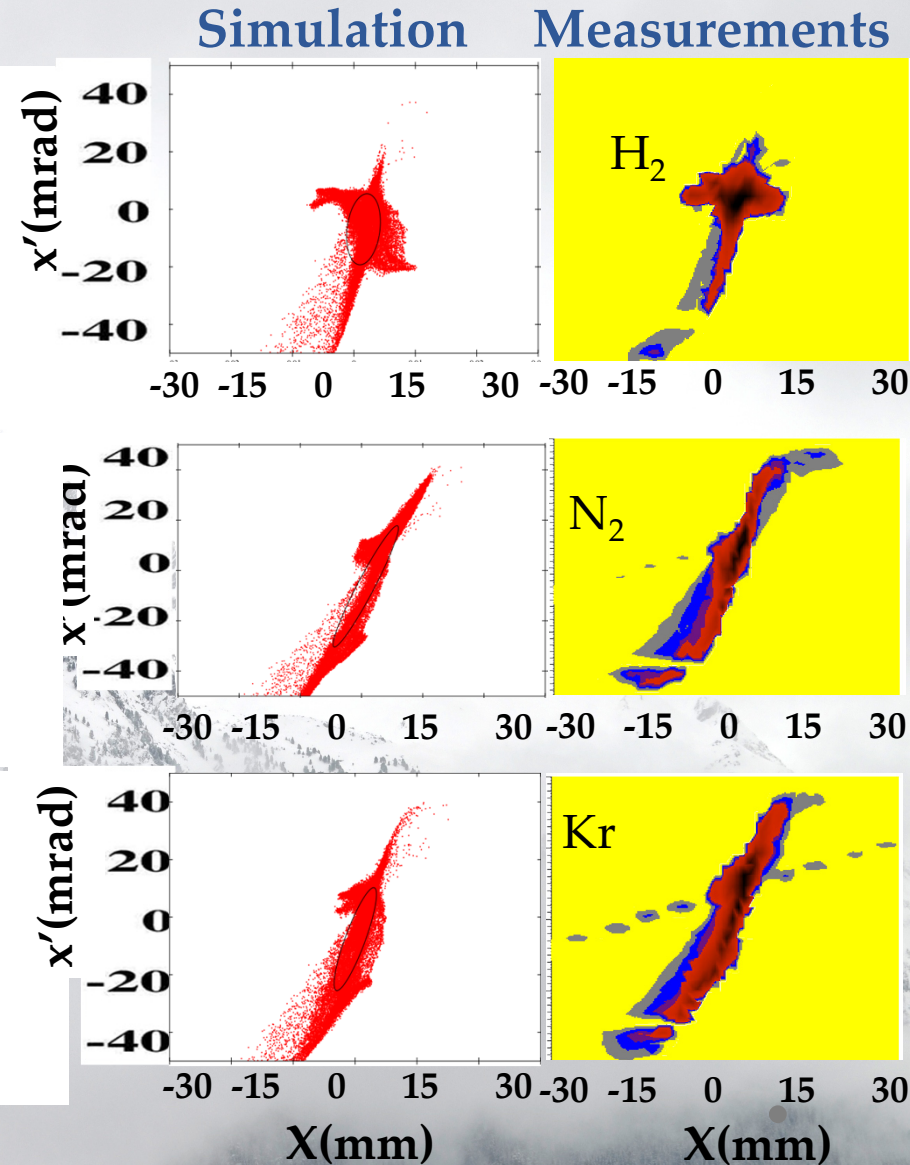
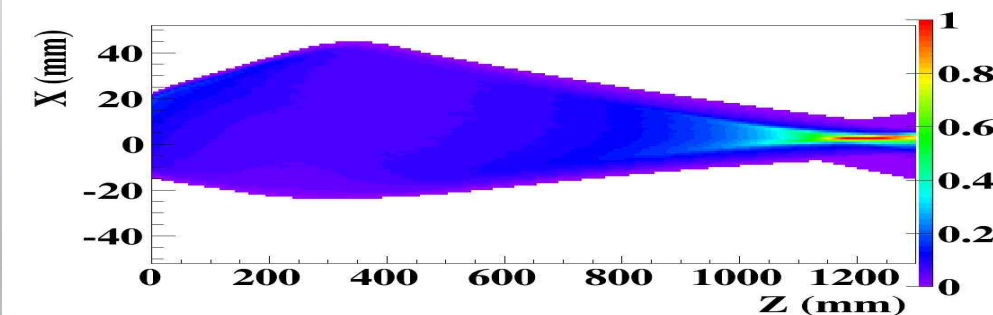
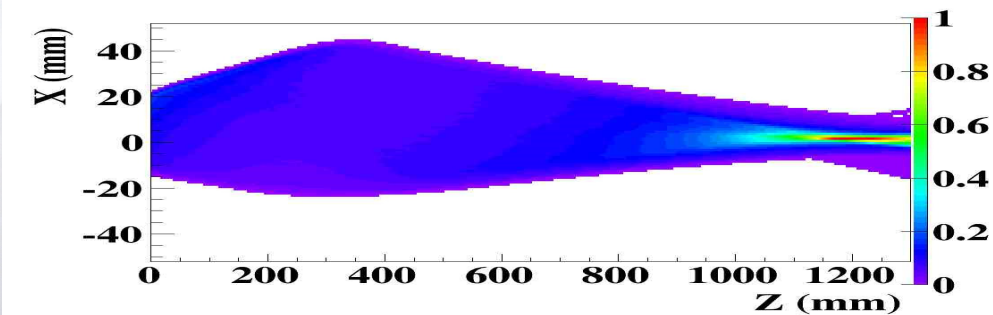
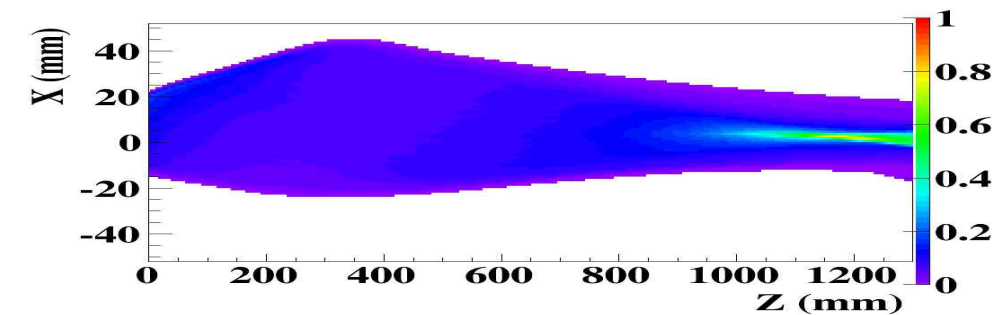


X(mm)

X(mm)

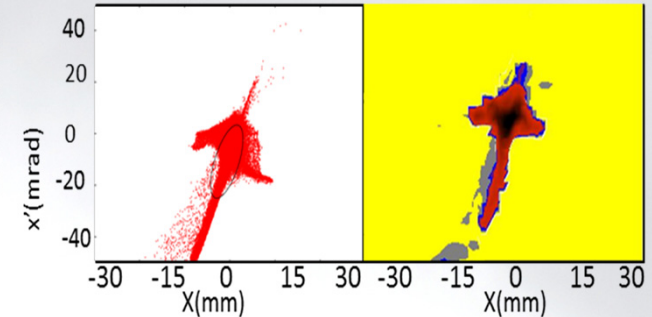
Compensation using different gases

- H_2 N_2 and Kr
- Several pressures were used



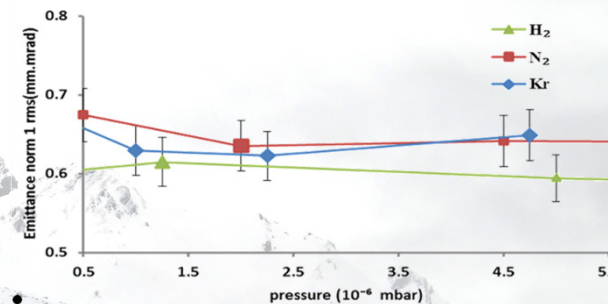
At the poster ...

The simulations show a very good correspondence to the measured phase space.

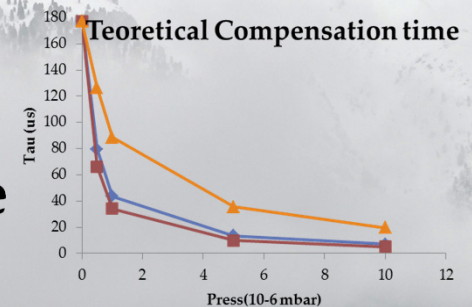


The matching parameters can be predicted in a really accurate way taking in to account its time dependence.

For measurements within these pressure ranges there is no significant improvement in the emittance.



The choice of gas can be based strongly on the pumping efficiency of the system.



Thank You !

