



PSB H⁻ charge exchange injection

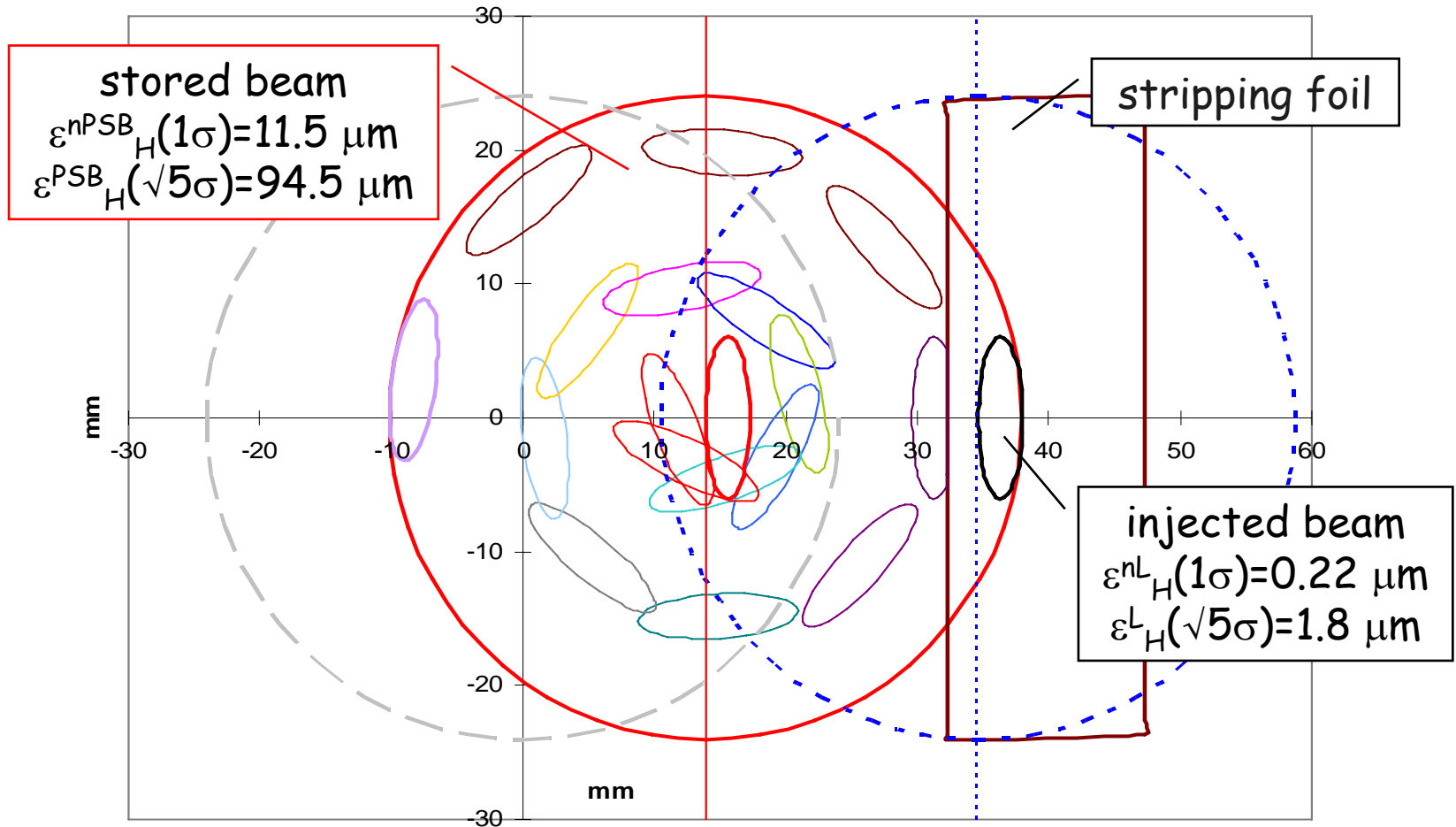
High intensity H⁻ charge exchange injection
in the PSB at 160 MeV: CNGS beam

M. Martini

PSB 160 MeV H⁻ injection (ACCSIM): 13 March 2006 simulation using the same input data as in 2004 (for comparison with the results published in EPAC'04 paper). The tracking is extended from 9000 turns to 15000 turns.

PSB 160 MeV H⁻ injection: CNGS beam

PSB working point: $Q_H=4.28$ $Q_V=5.47$

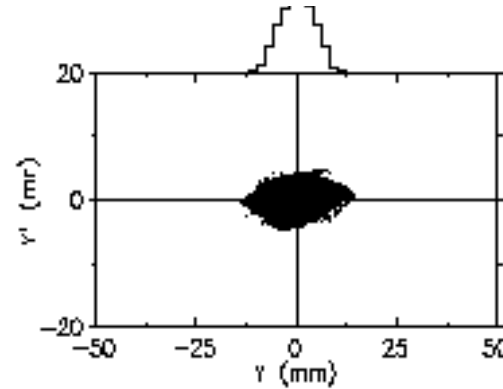
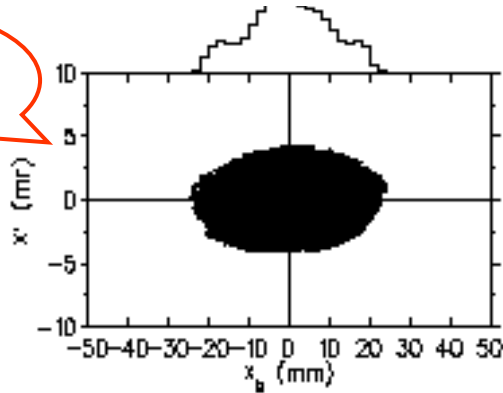


Horizontal distribution: elliptical (parabolic profile)
Longitudinal distribution: uniform (phase) gaussian (energy)

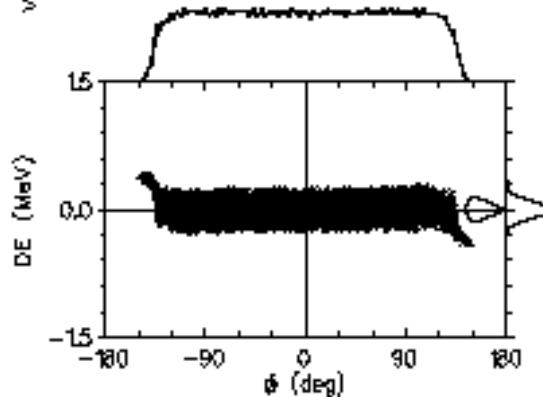
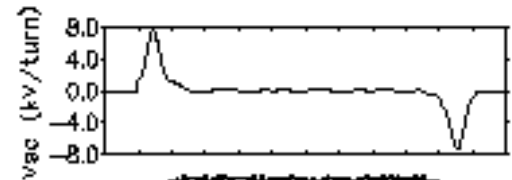
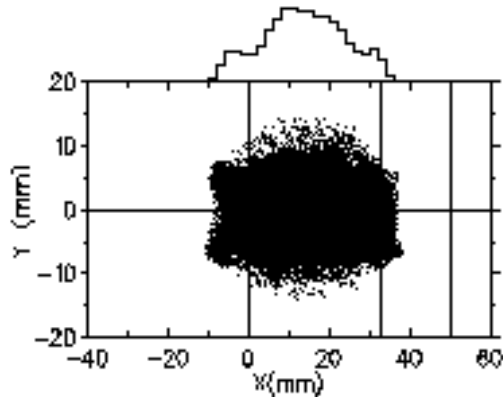
PSB 160 MeV H⁻ injection: CNGS beam

PSB working point: $Q_H=4.28$ $Q_V=5.47$

ACCSIM
simulation



160 MeV: end of injection
 $V_{RF}=0.62$ kV $\approx 0\%$ lost

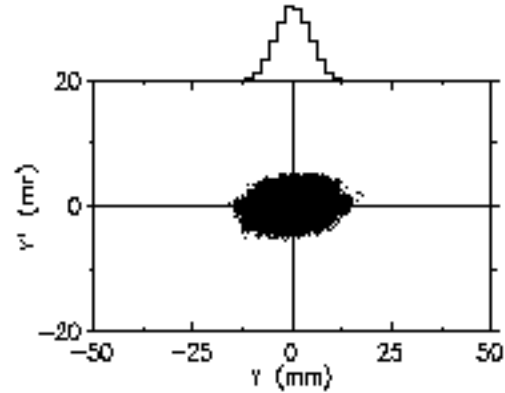
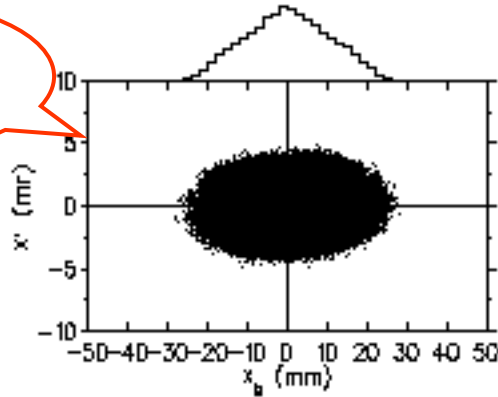


66th turn (66.5 ms): scatter-plots of particle positions in the planes X-X', Y-Y', X-Y and f-DE

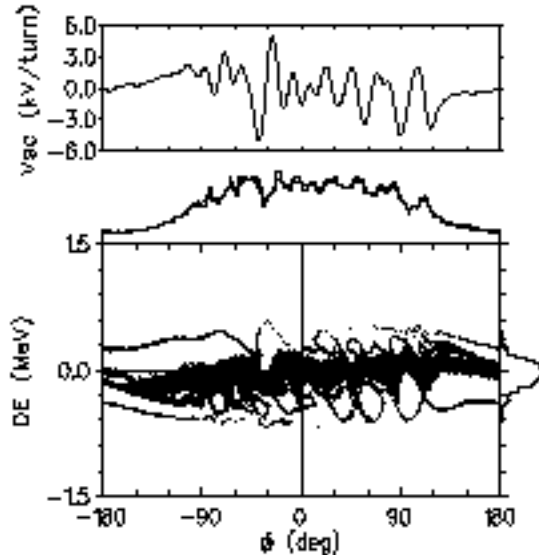
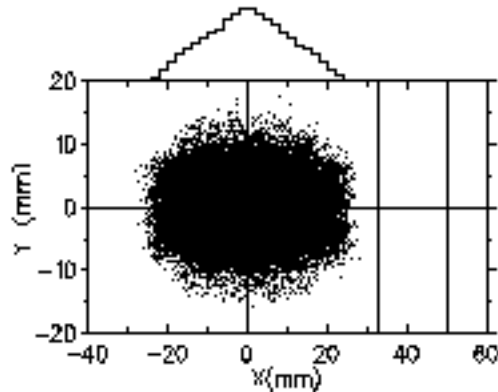
PSB 160 MeV H⁻ injection: CNGS beam

PSB working point: $Q_H=4.28$ $Q_V=5.47$

ACCSIM
simulation



160 MeV: $V_{RF}=1.3$ kV

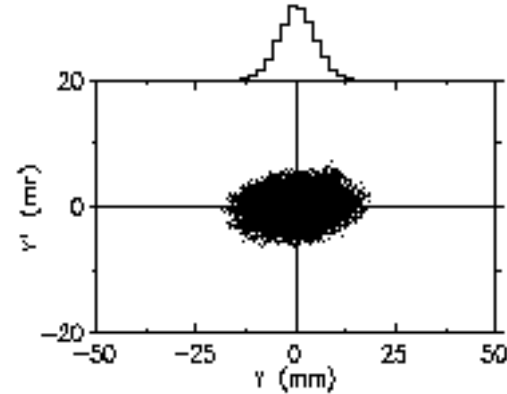
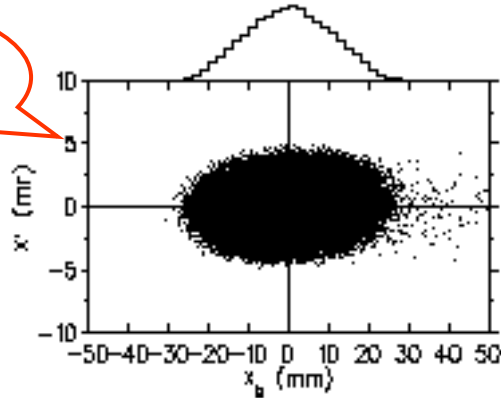


1150th turn (1.152 ms): scatter-plots of particle positions
in the planes $X-X'$, $Y-Y'$, $X-Y$ and $\phi-\Delta E$

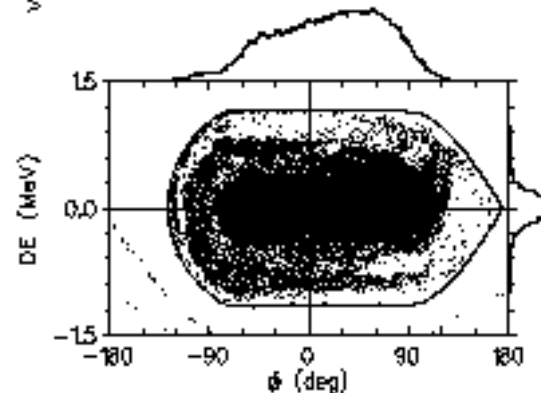
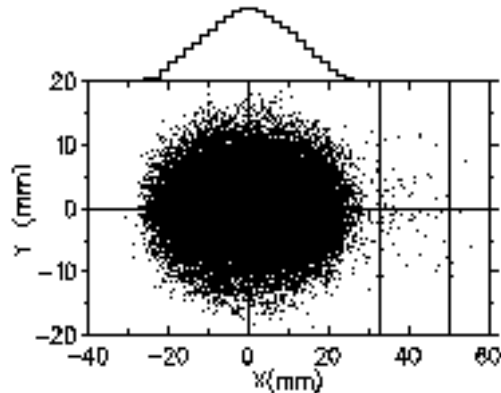
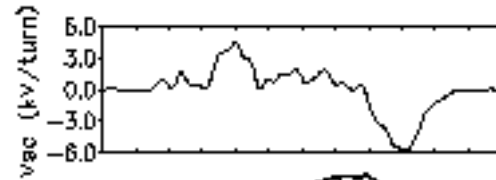
PSB 160 MeV H⁻ injection: CNGS beam

PSB working point: $Q_H=4.28$ $Q_V=5.47$

ACCSIM
simulation



160 MeV: $V_{RF}=8.0$ kV $\approx 0\%$ lost

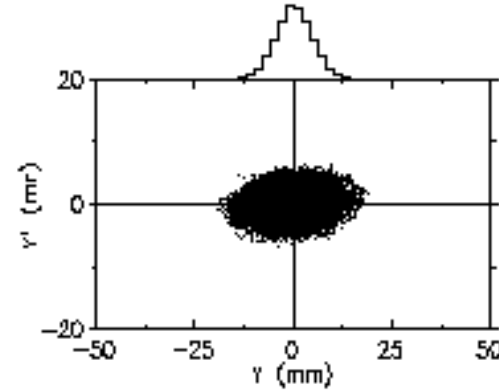
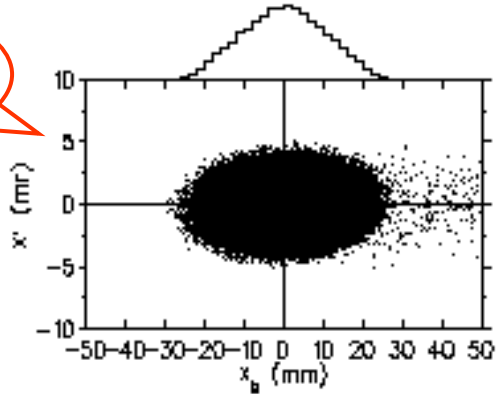


12000th turn (12.03 ms): scatter-plots of particle positions in the planes X-X', Y-Y', X-Y and ϕ - ΔE

PSB 160 MeV H⁻ injection: CNGS beam

PSB working point: $Q_H=4.28$ $Q_V=5.47$

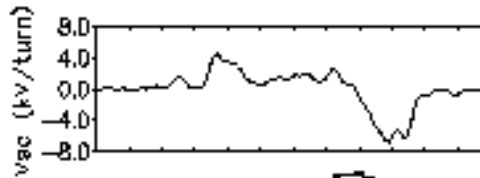
ACCSIM
simulation



$$\varepsilon_H^n(1\sigma) = 10.9 \mu\text{m}$$
$$\varepsilon_V^n(1\sigma) = 4.8 \mu\text{m}$$

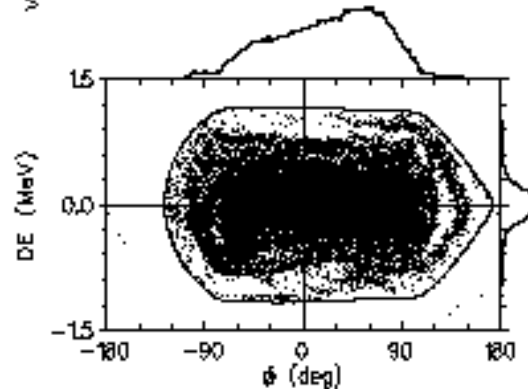
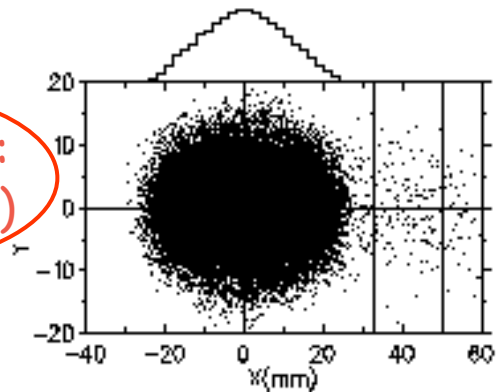
$$\Delta Q_H = -0.49$$
$$\Delta Q_V = -0.82$$

160 MeV: $V_{RF}=8.0$ kV $\approx 0\%$ lost



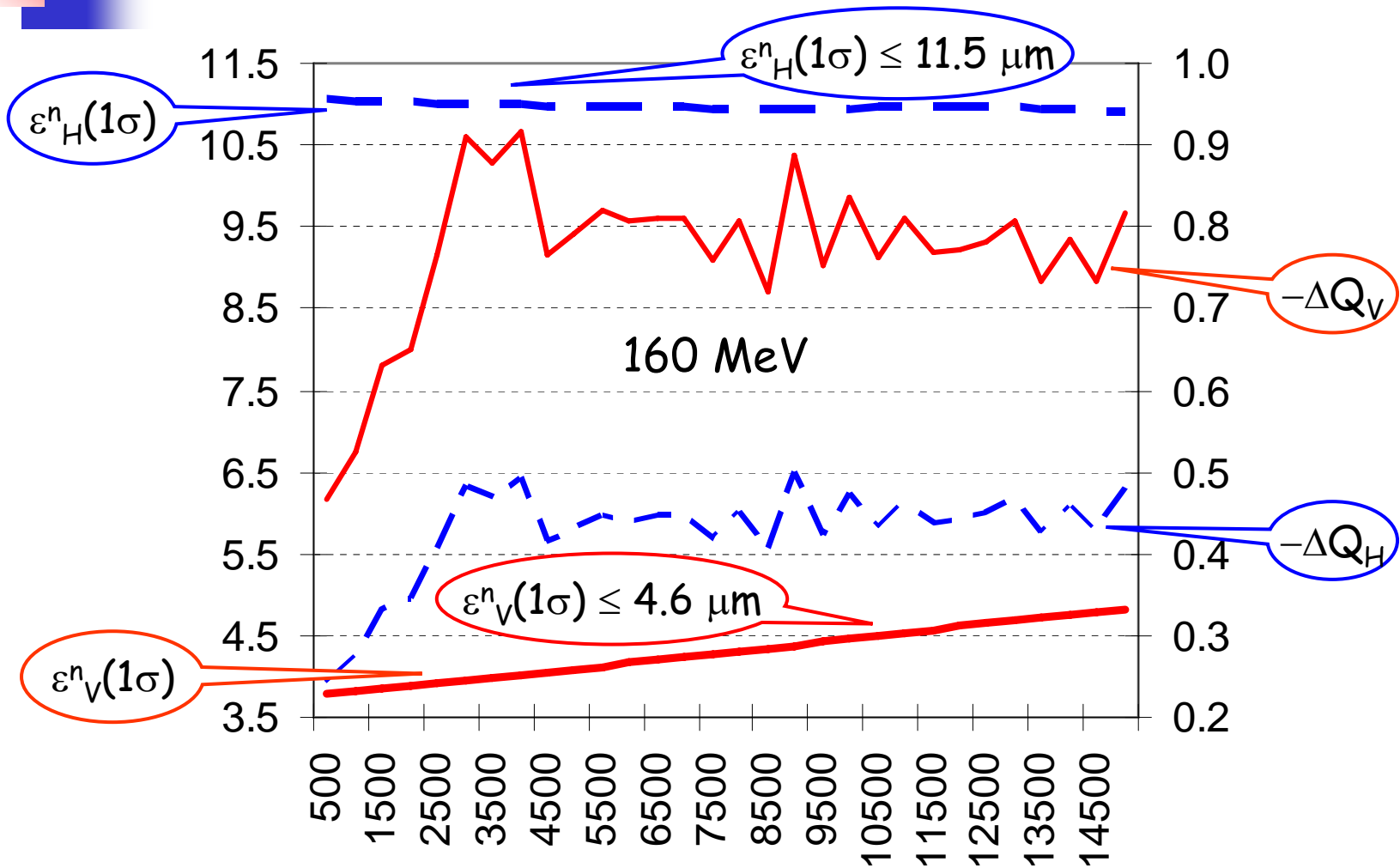
Required:
 $\varepsilon_H^n(1\sigma) \leq 11.5 \mu\text{m}$
 $\varepsilon_V^n(1\sigma) \leq 4.6 \mu\text{m}$

Running time:
118 h (5 days)



15000th turn (15.004 ms): scatter-plots of particle positions in the planes X-X', Y-Y', X-Y and ϕ - ΔE

PSB 160 MeV H⁻ injection: CNGS beam



PSB emittances and tune shifts vs turns
 1.25×10^{13} H⁻ injected per PSB ring