Beam Dynamics for a new 160 MeV H^- Linac at CERN (Linac4)

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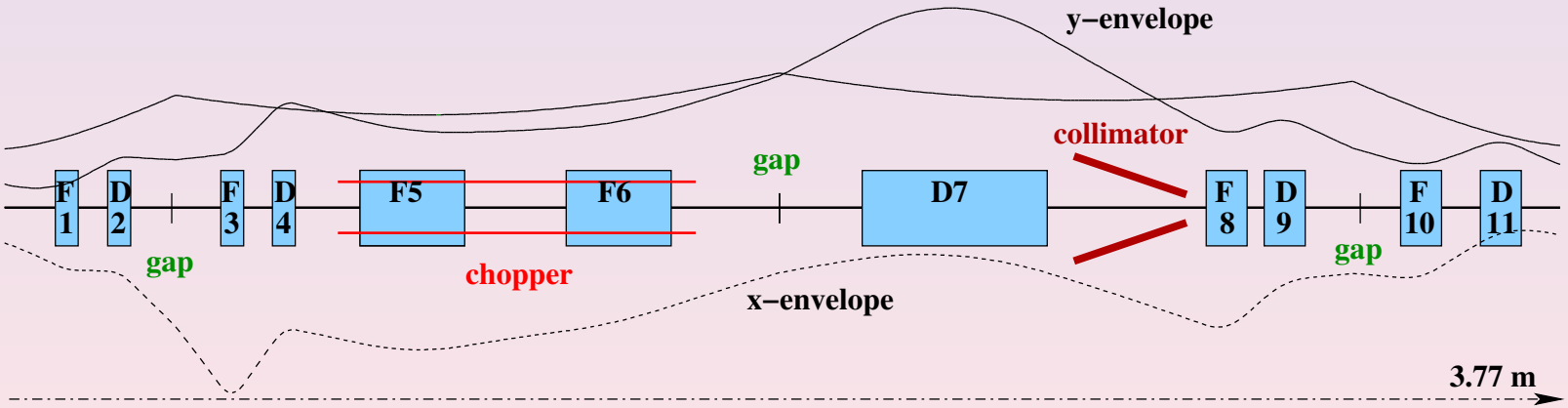
LEBT & RFQ

- 95 keV beam from source with 4% energy spread,
- 33% transverse emittance growth in LEBT,
- solenoid focussing into RFQ,
- IPHI 3 MeV RFQ designed and constructed at CEA for 100 mA CW,
- 14% transverse emittance growth,
- what the source energy spread does to your beam.

Chopper Line

- Design driven by hardware considerations rather than optimum beam dynamics: max. voltage 400 kV per plate,
- amplification of separation through clever beam optics,
- beam dump acts as collimator for nominal beam.



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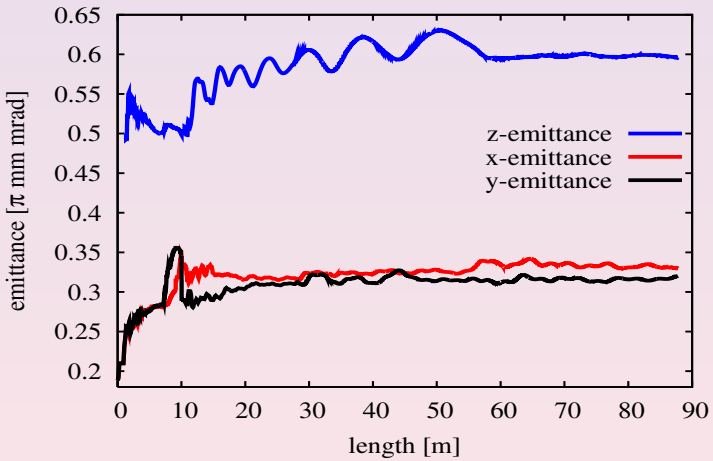
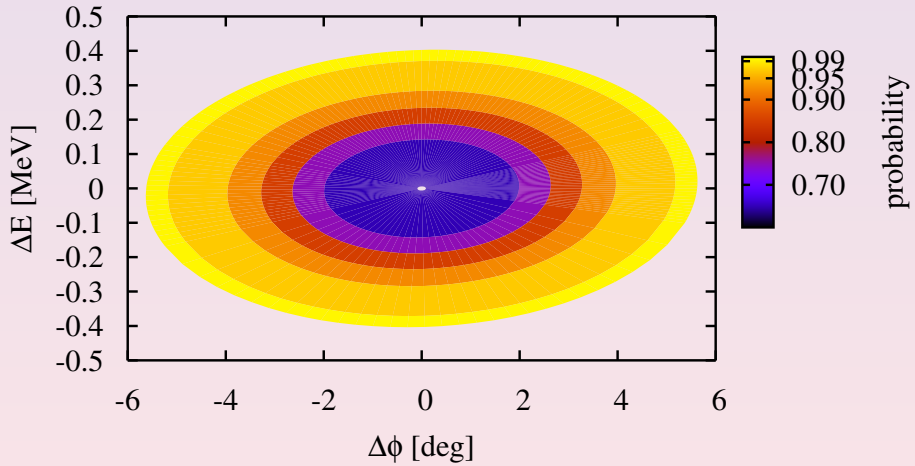
75% transverse emittance growth and still happy?

- 33% in the LEBT and we know how to reduce the rest by 50%,
- smooth phase advance per metre across all transitions,
- no emittance exchange between the planes,
- reasonable RF jitter, despite frequency jump.



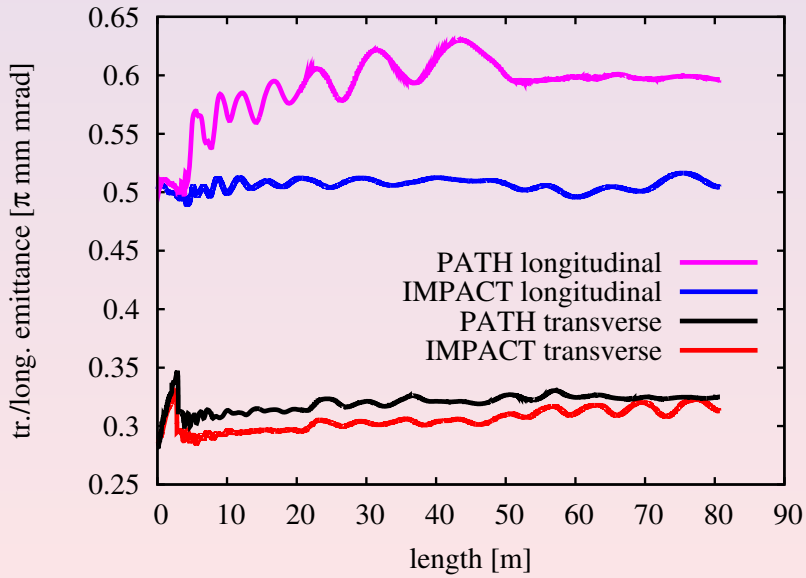
Rms emittance (end to end)



Energy/Phase jitter (0.5%, 0.5 deg)

PATH versus IMPACT

- unexplained 20% difference in longitudinal plane,
- unexplained long. emittance increase in 1st DTL tank,
- different emittances for two different IMPACT particle-advance algorithms,
- we have some ideas but a more systematic effort is needed!!



For details see our poster:

TUP05