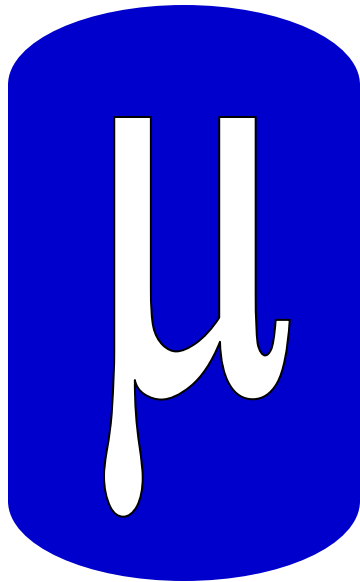


Using High-Pressure Gas in the Front End



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➤ Phase I: *Phase Rotation & Precooling*

Reverse Emittance Exchange

➤ Phase II: *High-Pressure RF*

High- T_c Superconductors

Helical 6D Cooling Channel

? MANX – 6D Cooling Demonstration

? Parametric Ionization Cooling

? H₂ Cryostat

Introduction / Intensions

➤ High-Pressure Gas-Filled RF:

3 kilpatrick with 100 atm / 300 K GH_2

$$\lambda_I = 59.4 \text{ m} \quad \text{vs} \quad c\tau_\pi = 7.4 \text{ m}$$

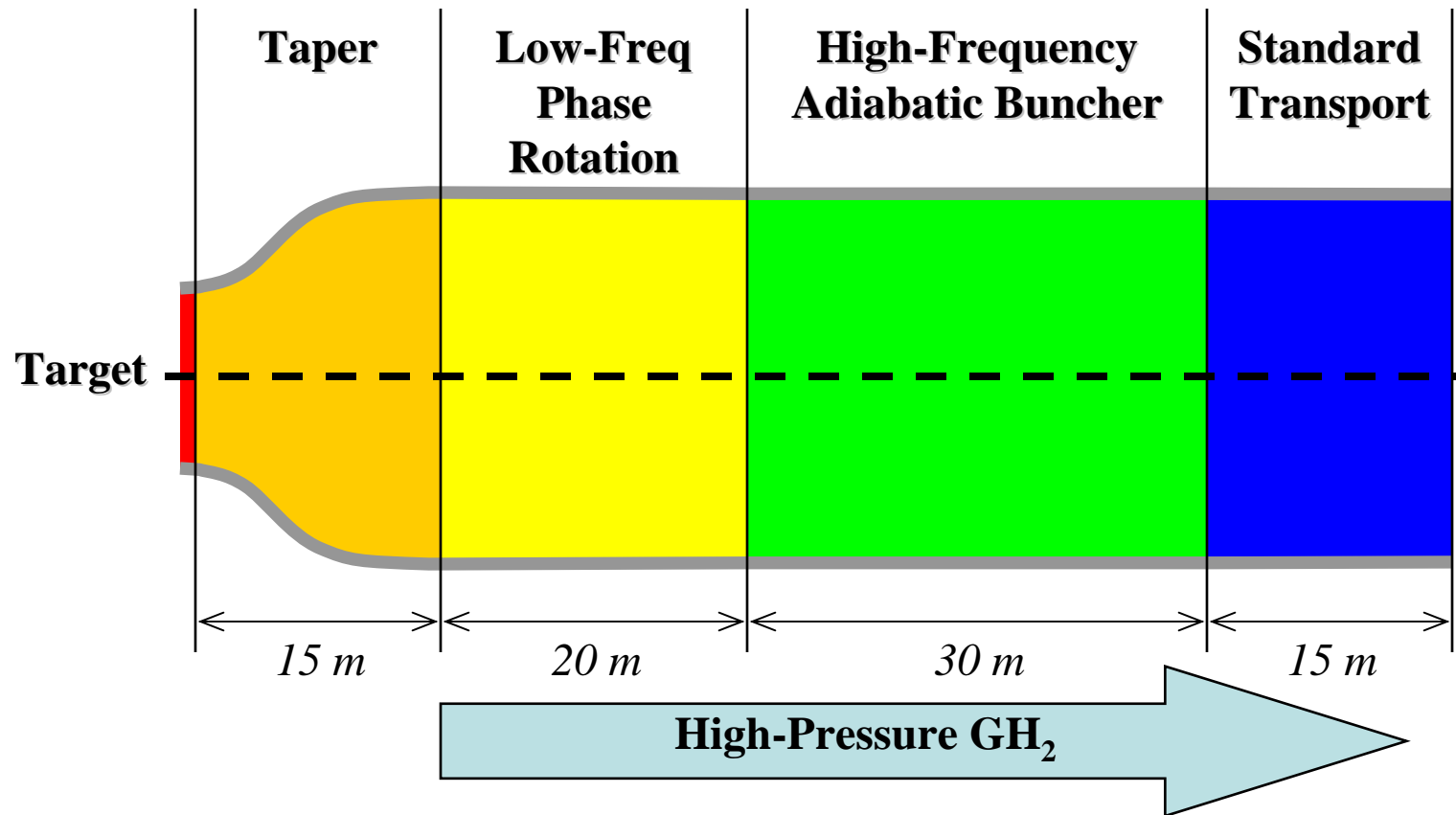
➤ Helical Cooling Channel:

Large transverse acceptance: $|x'|, |y'| < 0.4$

Large momentum acceptance: $\pm 25\%$

Large cooling factors: $\sim 10^3$

“The Front End”



Pion Production & Capture

Proton Pulse:

25 GeV /

1 MW / 1 ns

20 T Solenoid

Radiation Shielding

*100
mrad*

80 cm

7.5 cm

Carbon Target
(1.5 cm diameter)

**20 T captures
particles with
 $p_T < 225 \text{ MeV}/c$**

Radiation Shielding

20 T Solenoid

Tapered Solenoid

20 T Coils

5 T Coils

Radiation Shielding

7.5 cm

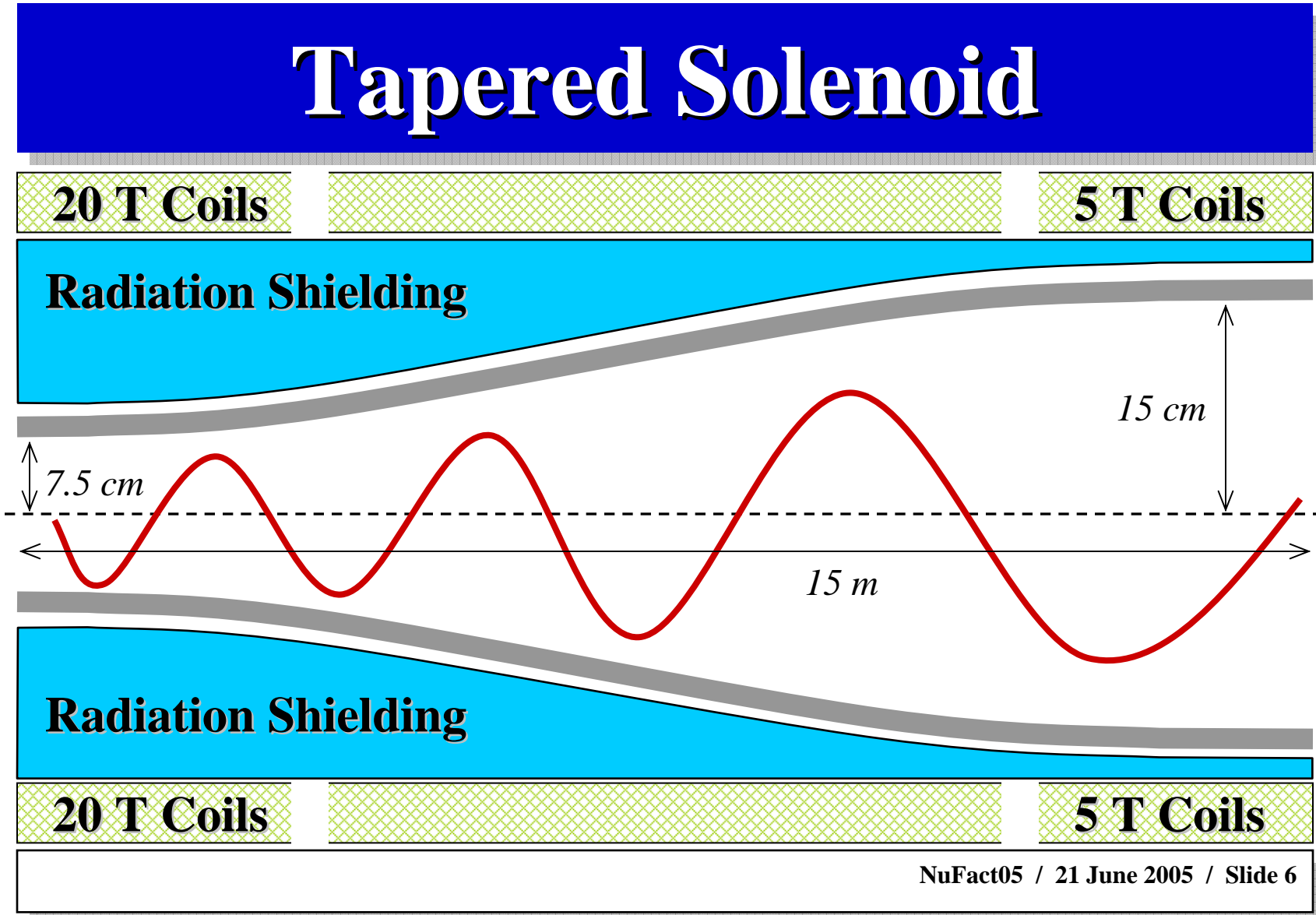
15 cm

15 m

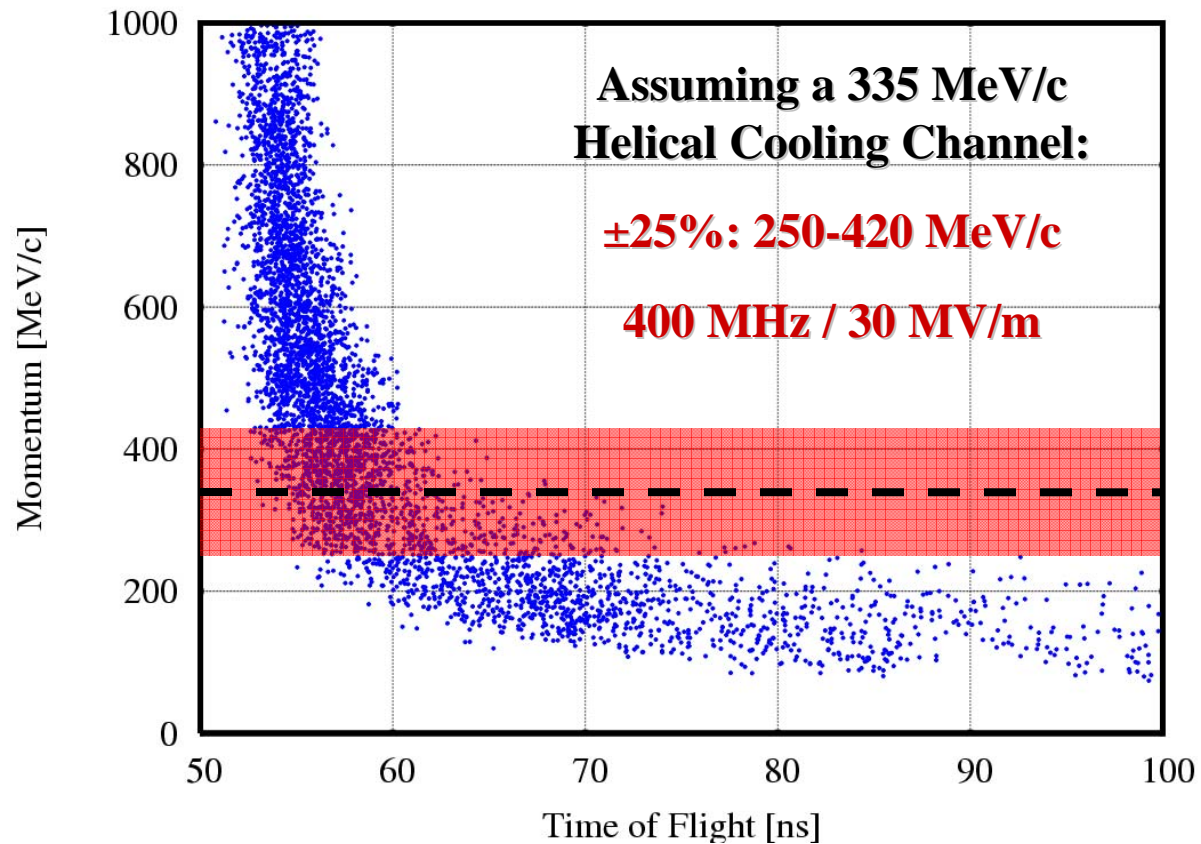
Radiation Shielding

20 T Coils

5 T Coils

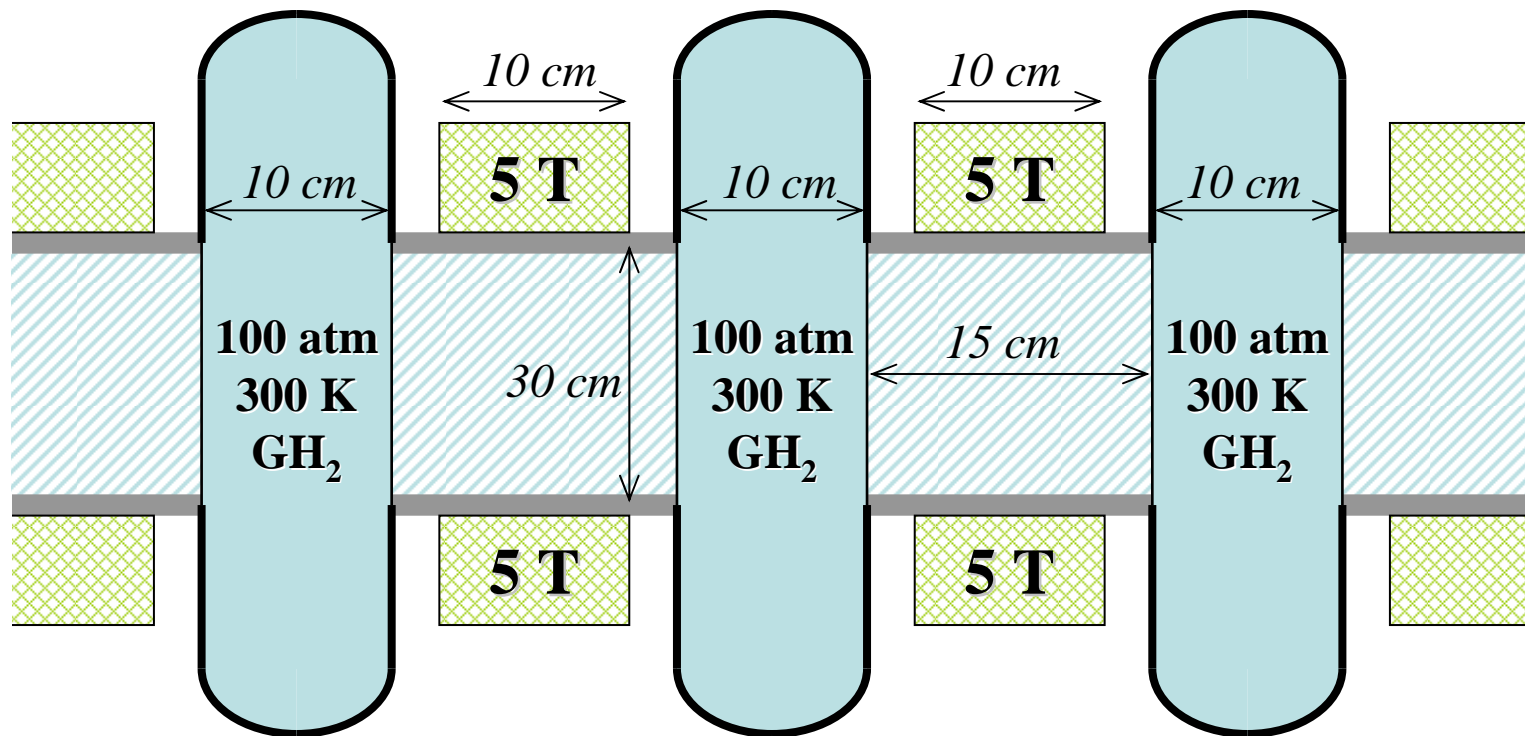


After Taper: 15 m

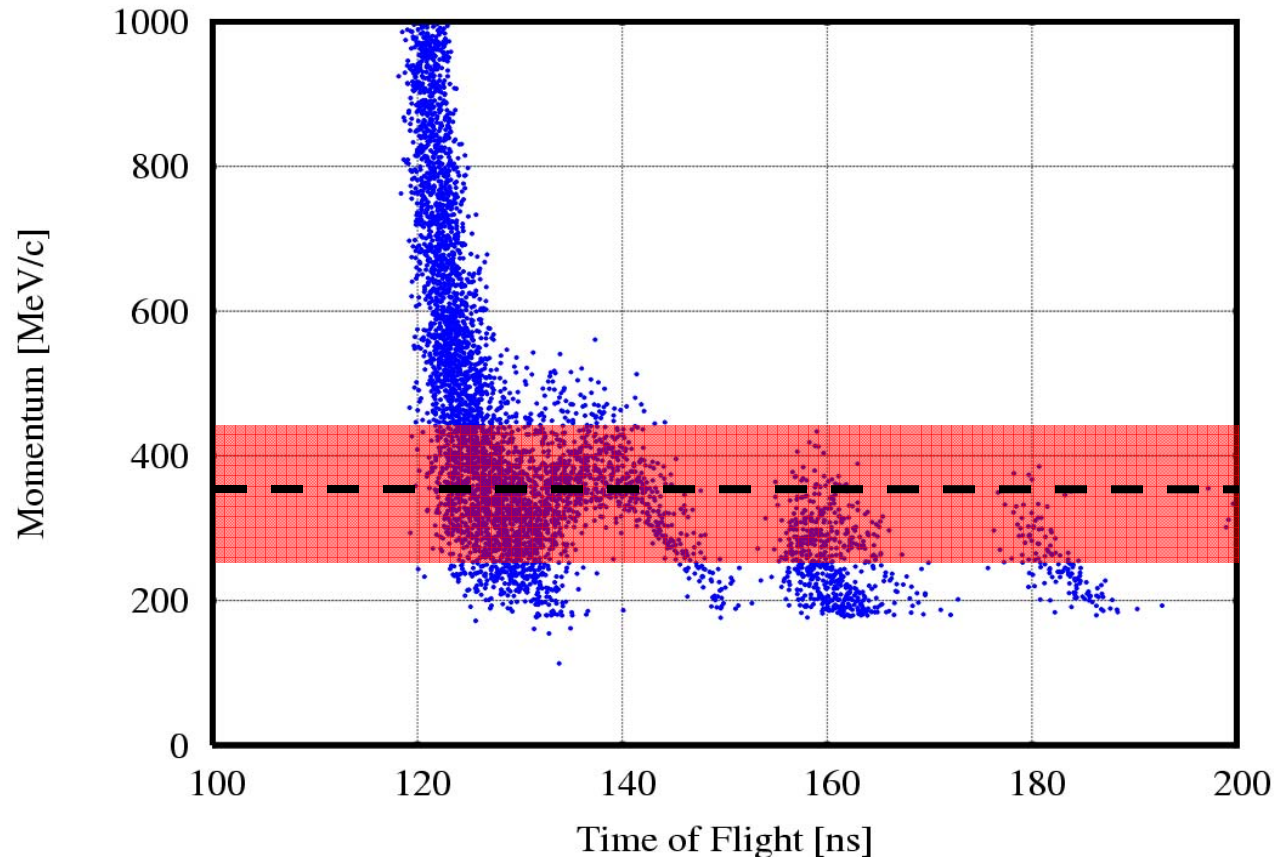


25 MHz / 25 MV/m

Phase Rotation

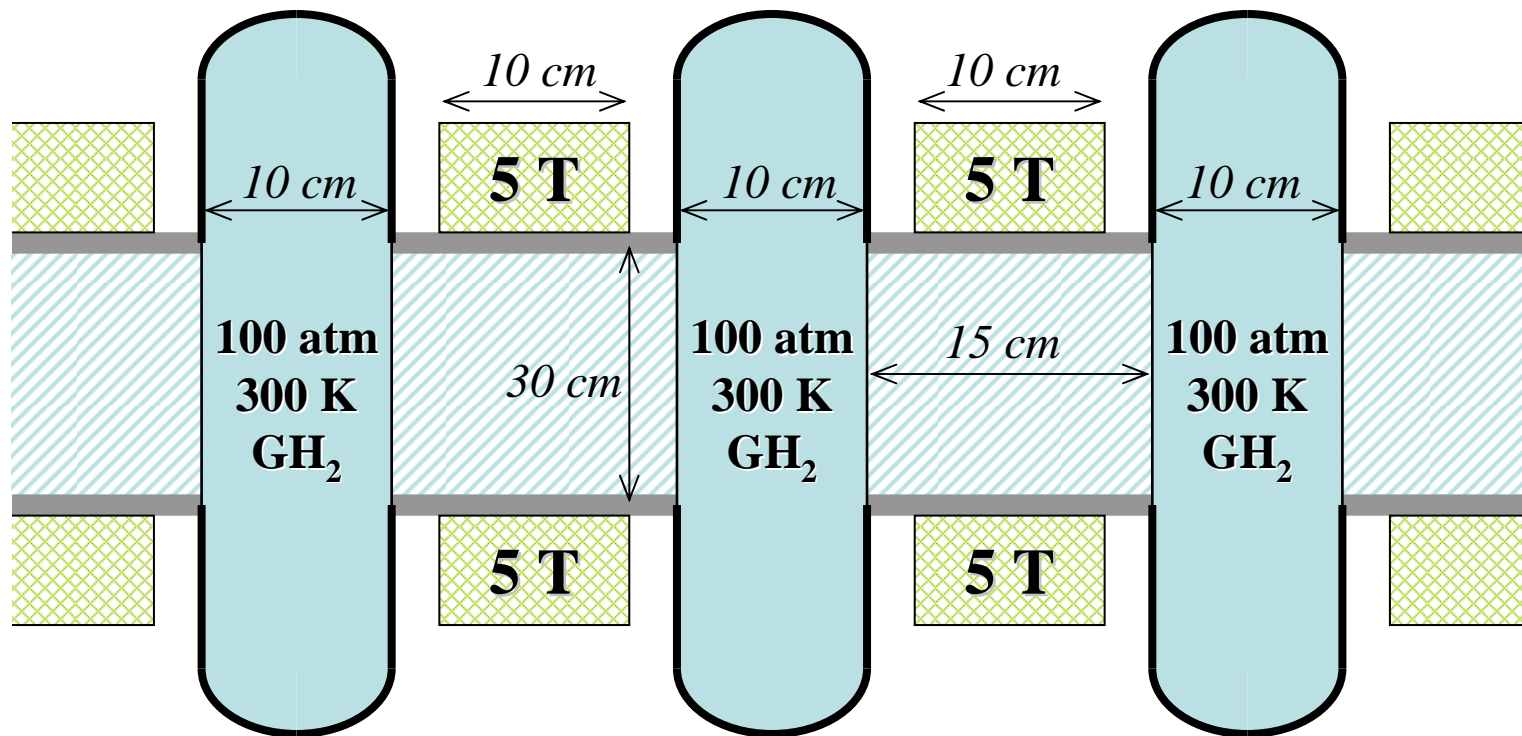


After Rotation: 35 m

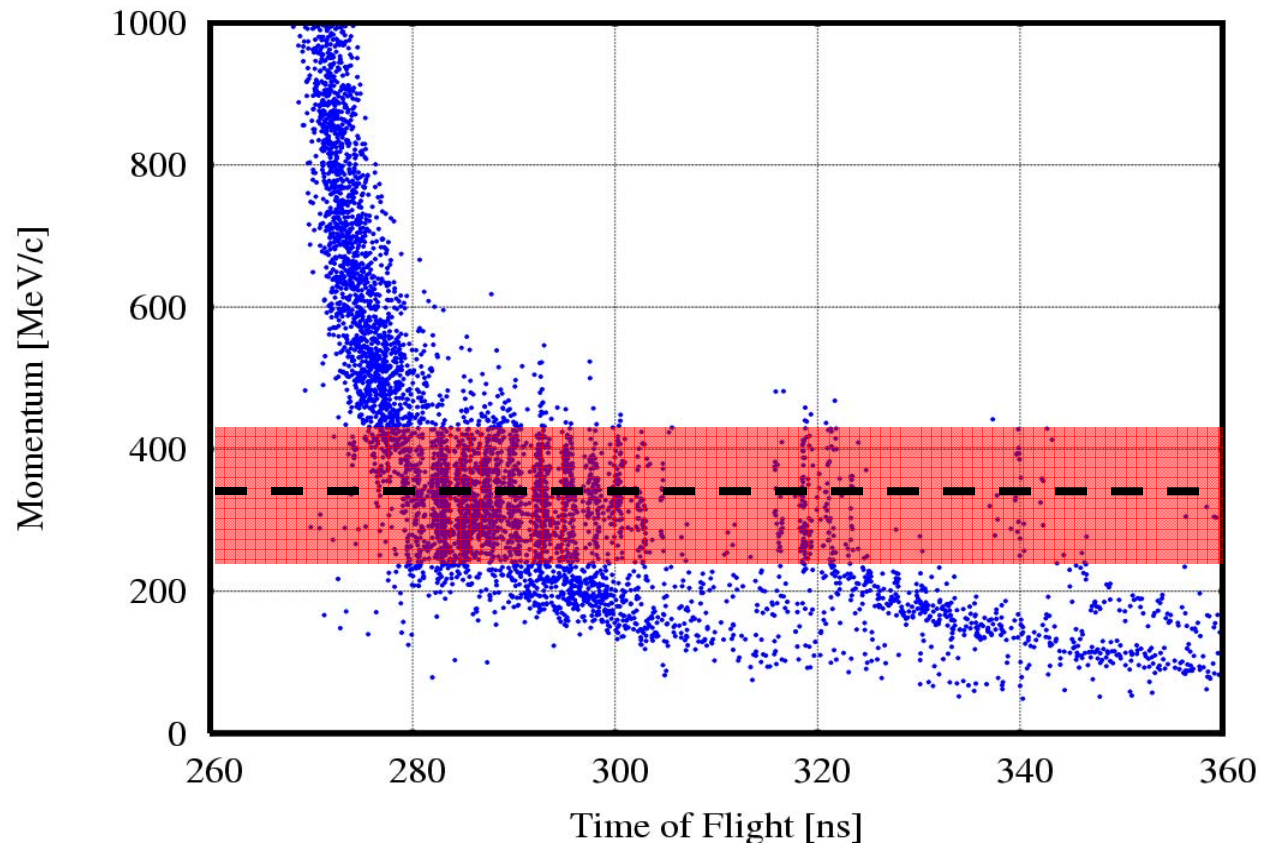


400 MHz / 30 MV/m

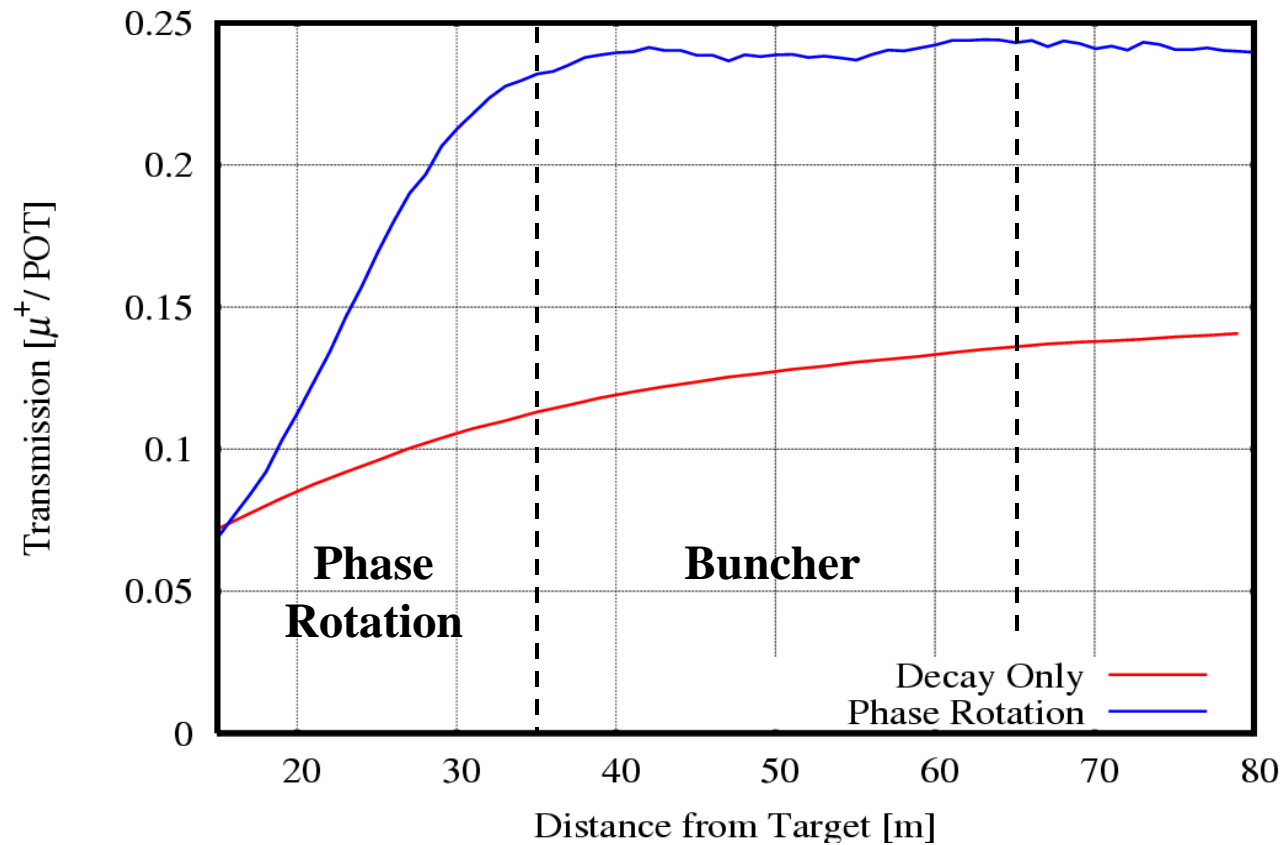
Adiabatic Buncher



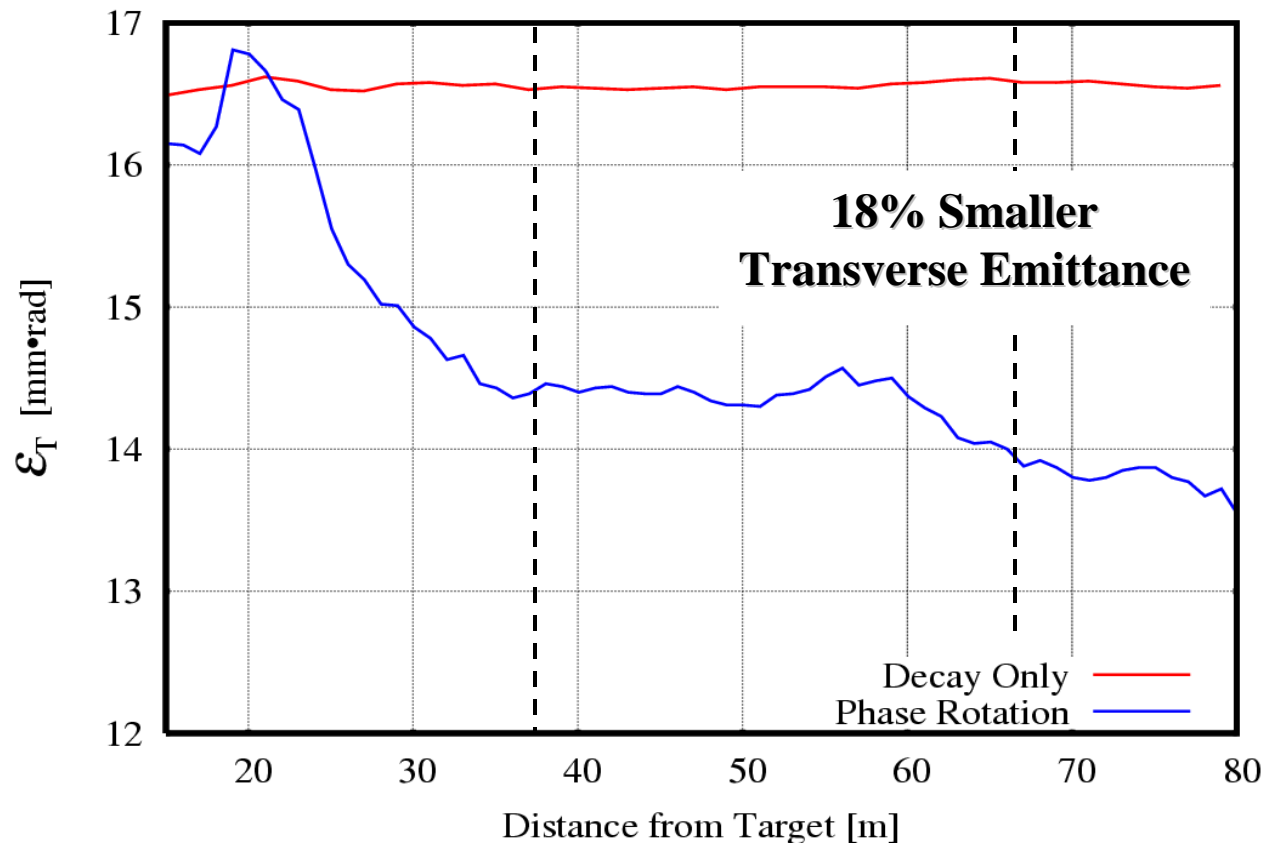
After Buncher: 65 m



Transmission



Precooling



Future Plans

➤ Realistic Simulation:

Lower field strength (?)

HP gas throughout channel

➤ Alternatives & Considerations:

Track polarization

Simulate target and taper in G4Beamline

Frequencies / Solenoids / Helical Magnets