PALMER DESIGN FRONT-END: STUDY 2-A

APS Neutrino Study
Machine Design Group Meeting
ANL
March 3-4, 2004
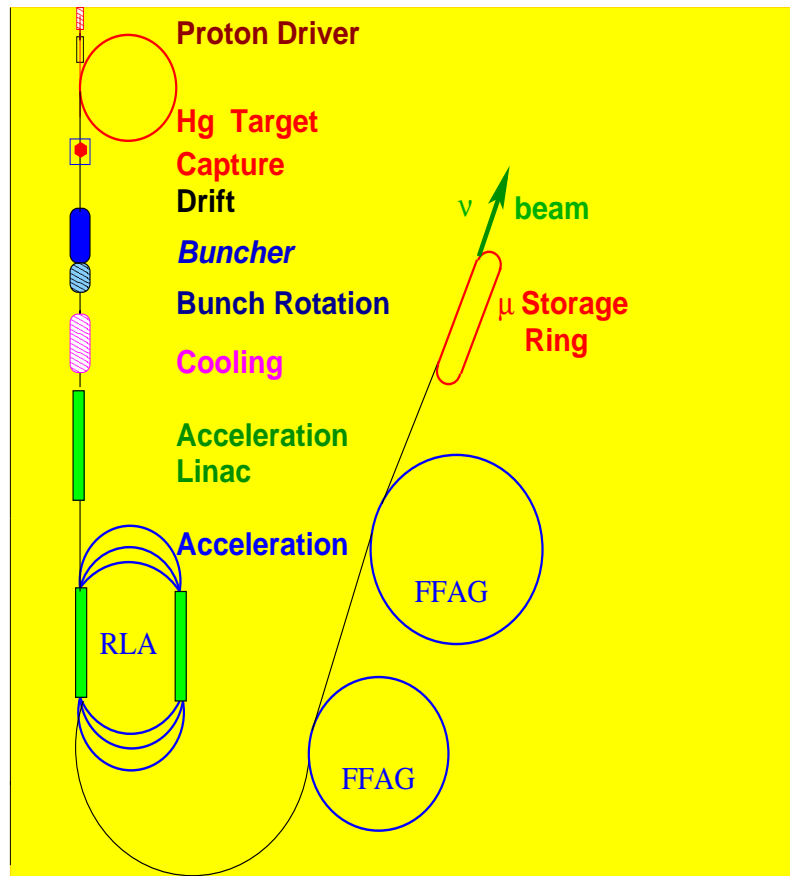
R. Fernow, J. Gallardo, R. Palmer; D. Neuffer

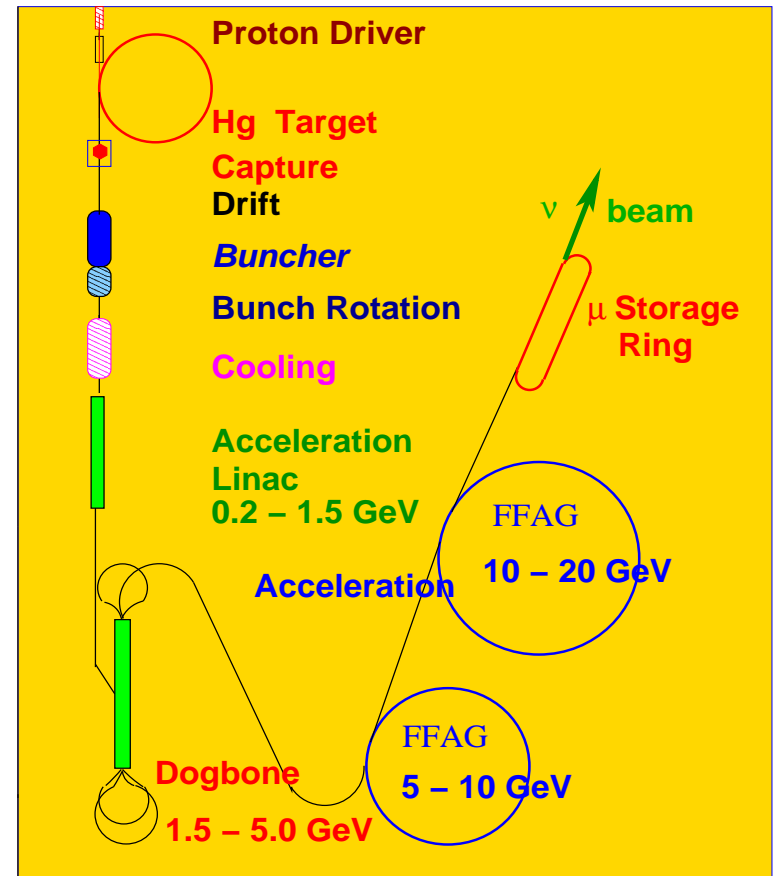Brookhaven National Laboratory; Fermilab

Outline

- Schematics of a Neutrino Factory

- Schematics of the Front-End

- Schematic of the Cooling Lattice

- Performance of the Front-End

- Some Attempts towards a Realistic Channel (next talk)
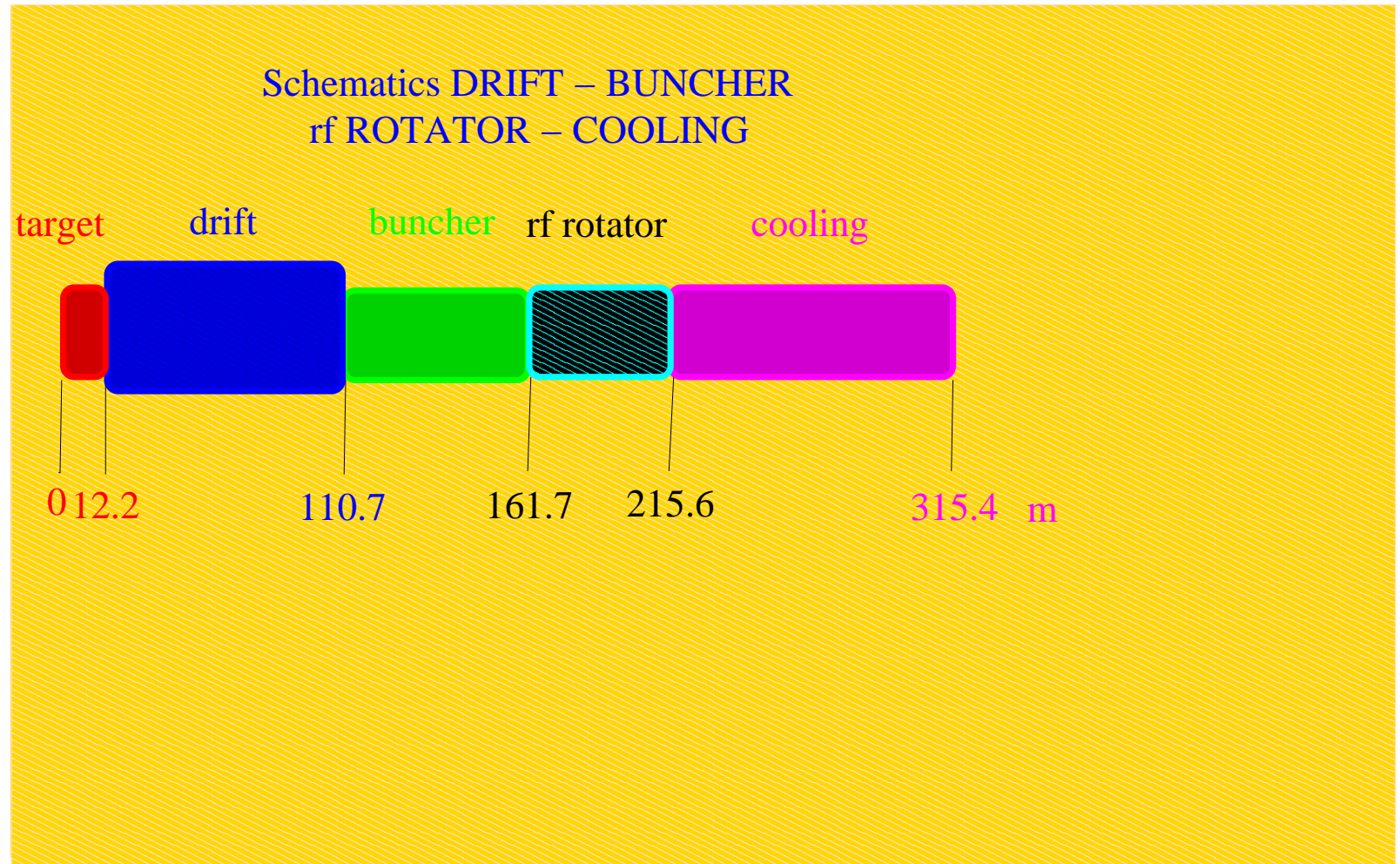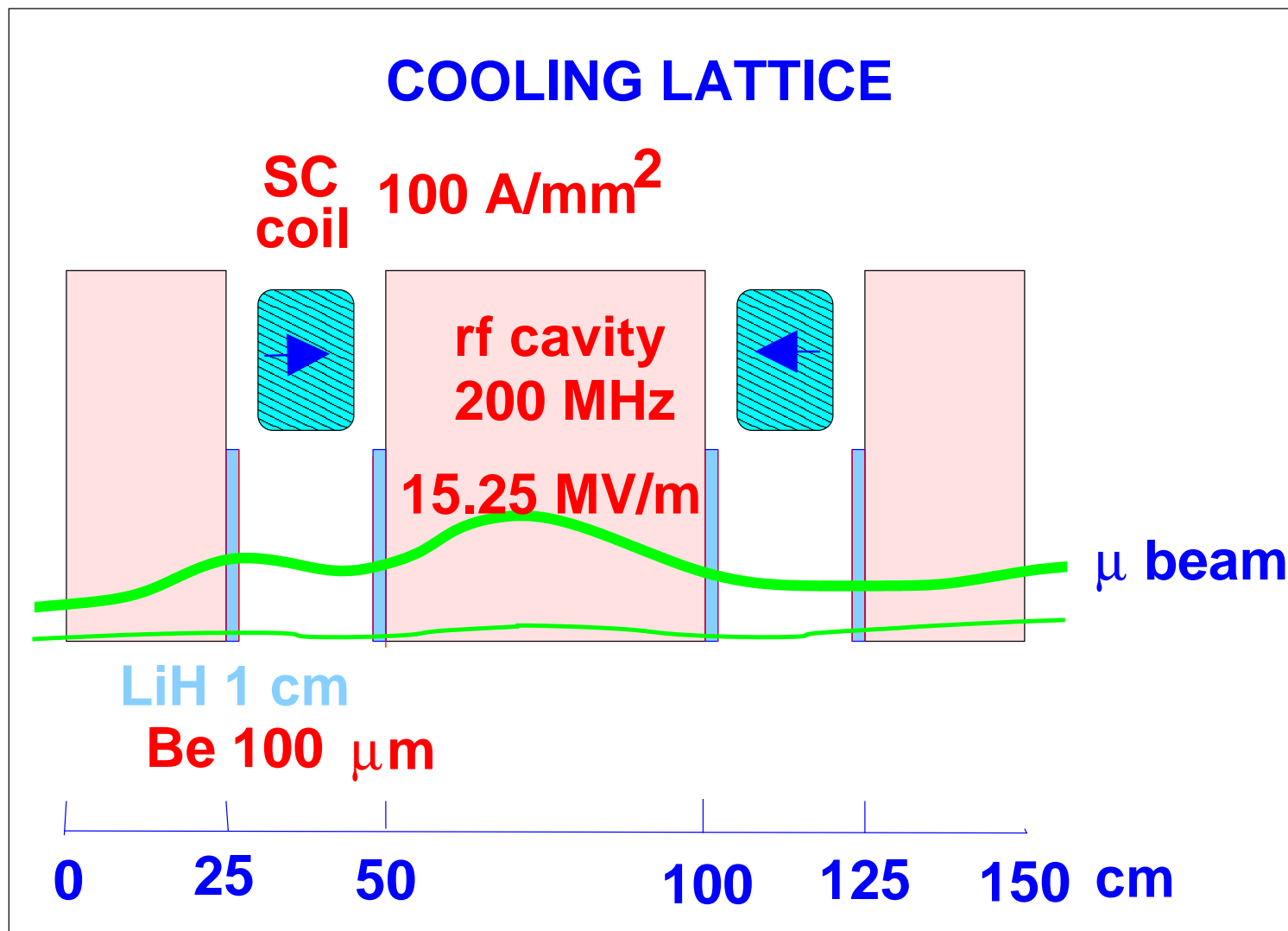
Schematics of Neutrino Factory
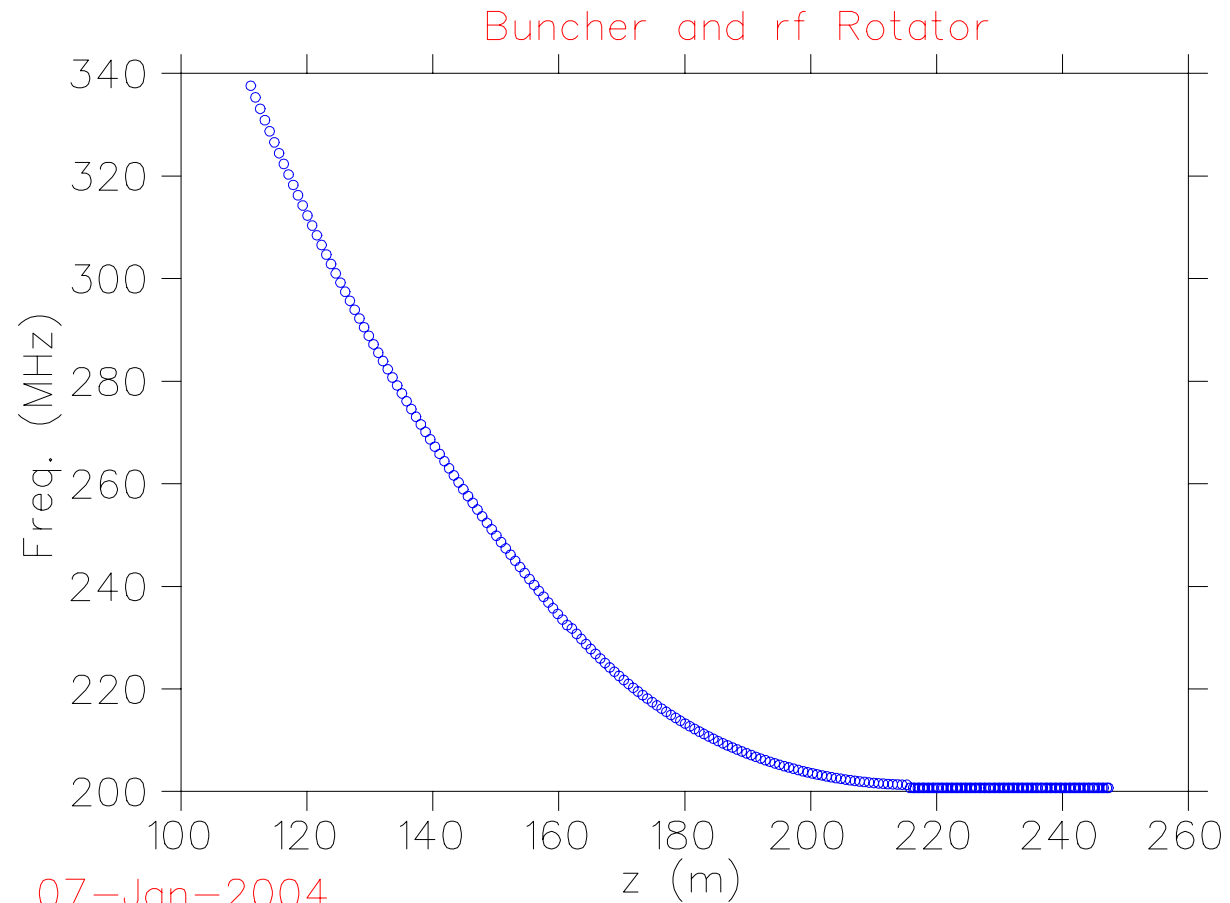

RLA based

Dogbone based.

Schematics of the Front End

Schematics DRIFT – BUNCHER
rf ROTATOR – COOLING

target   drift   buncher   rf rotator   cooling

0 12.2   110.7   161.7   215.6   315.4   m

Cooling Lattice

COOLING LATTICE

SC coil **100 A/mm^2**

rf cavity 200 MHz

15.25 MV/m

μ beam

LiH 1 cm

Be 100 μm

0   25   50   100   125   150 cm

Muon Collaboration

rf-Frequency

Buncher and rf Rotator

07-Jan-2004

Need to be ≈ 10 frequencies.

ϵ_T **VS.** z

07-Jan-2004

ϵ_L **vs.** z

62.48

p_z vs. z

07−Jan−2004

β-function *vs.* z

07−Jan−2004

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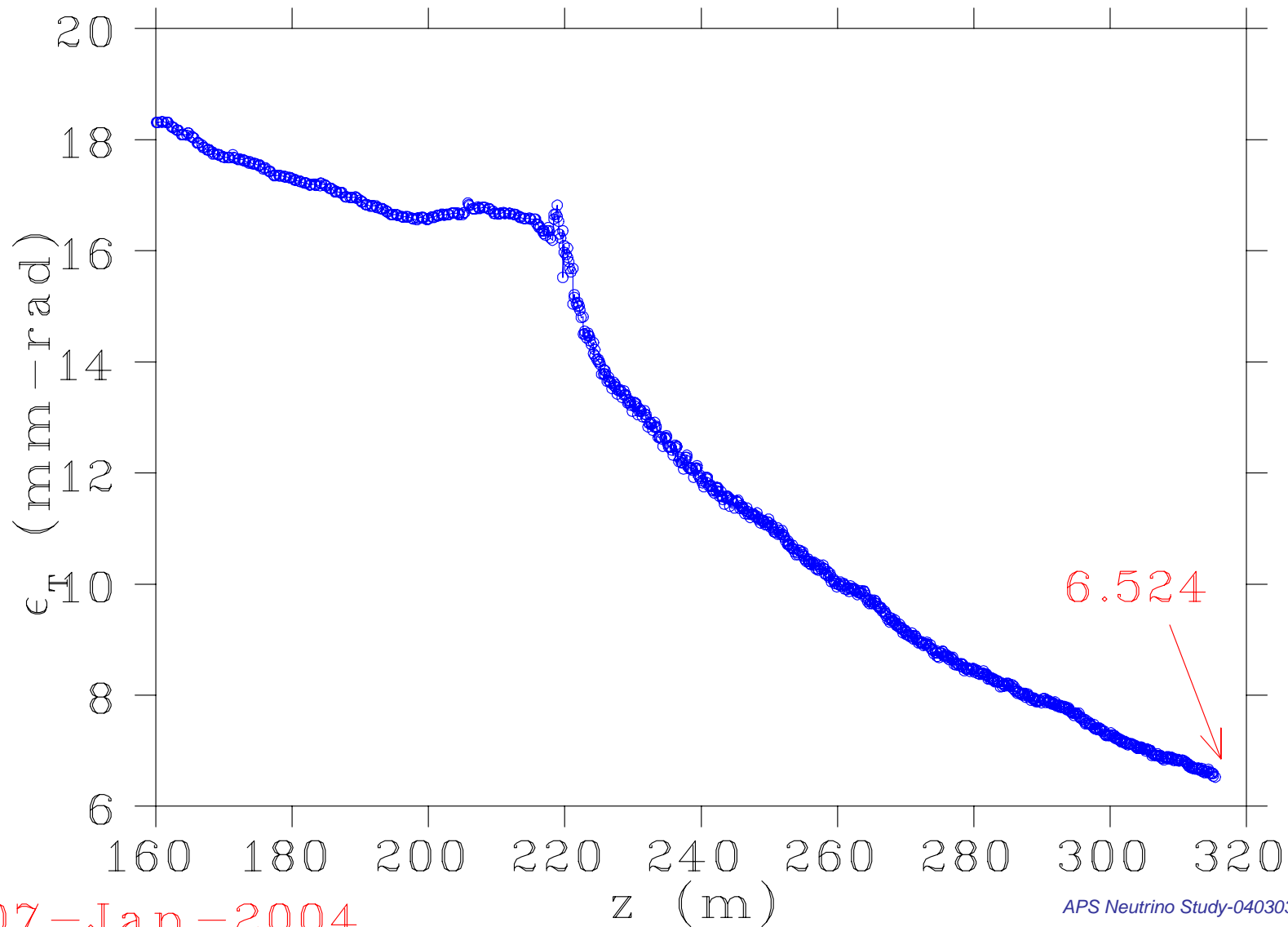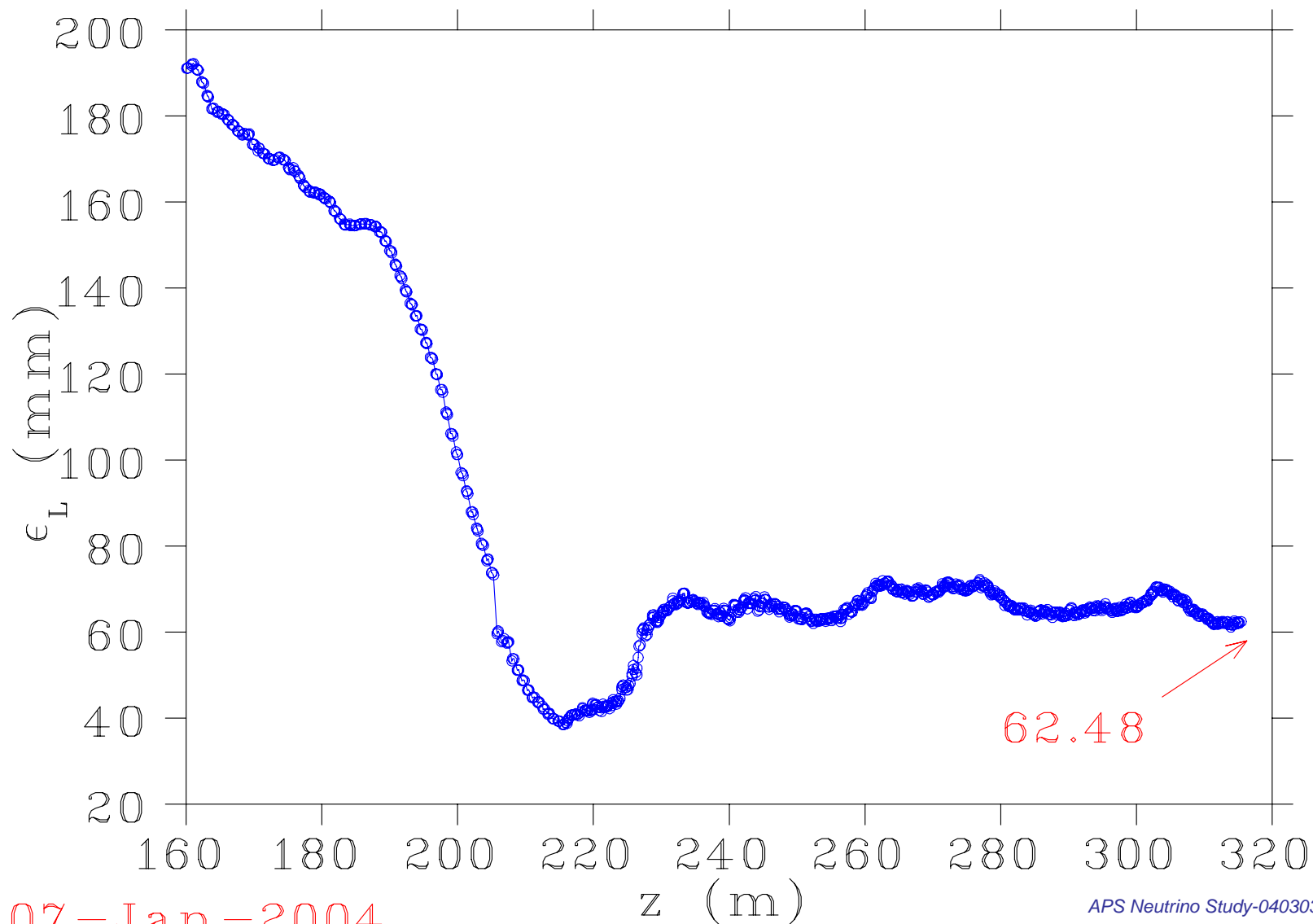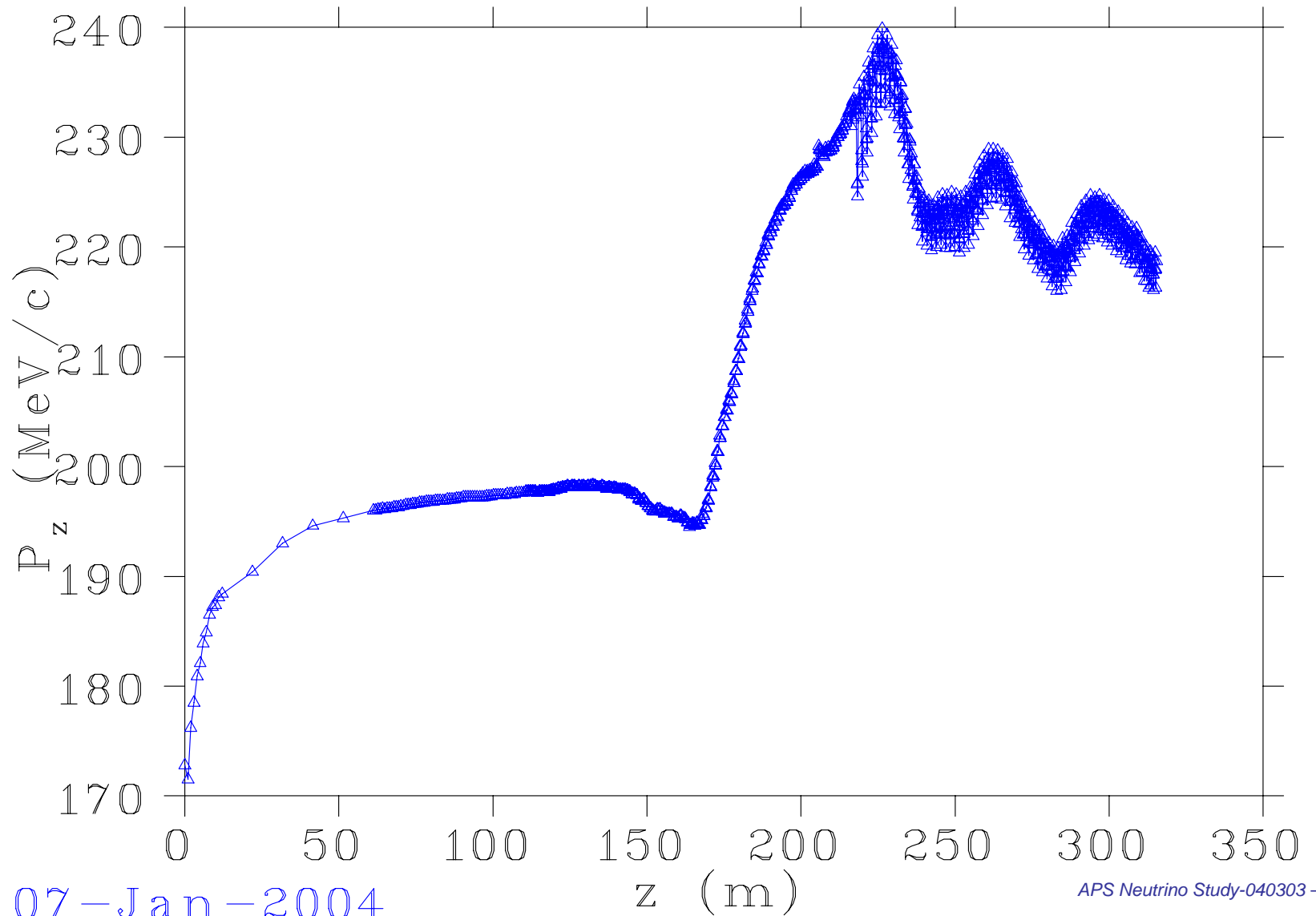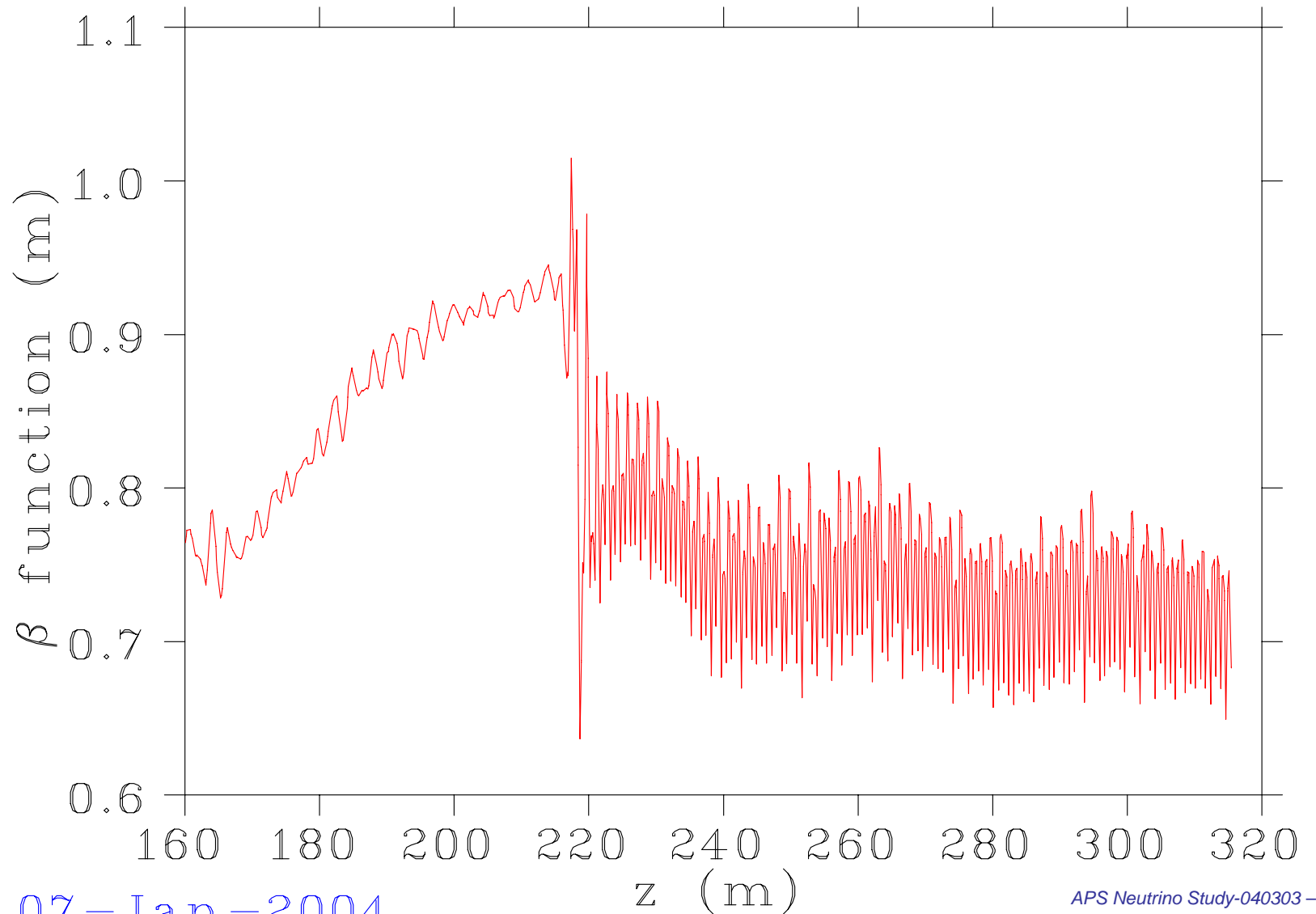
Number of μs over proton
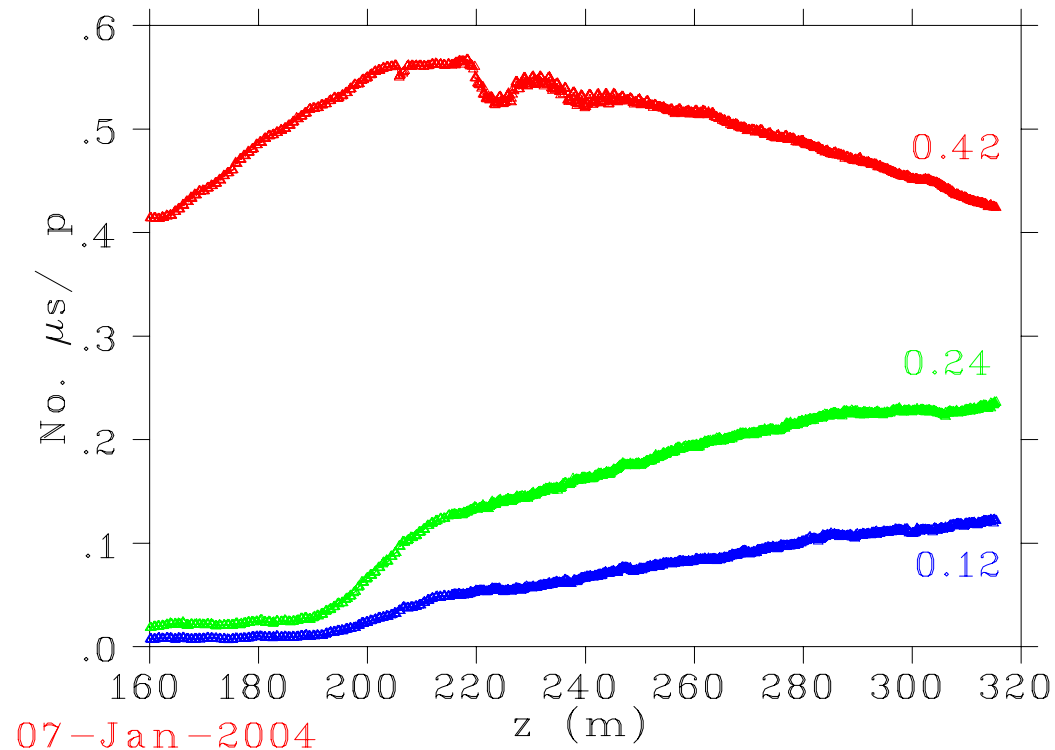

N_0 total μ/p

N_1 within $\epsilon_T = 30$ mm-rad and $\epsilon_L = 150$ mm

N_2 within $\epsilon_T = 15$ mm-rad and $\epsilon_L = 150$ mm
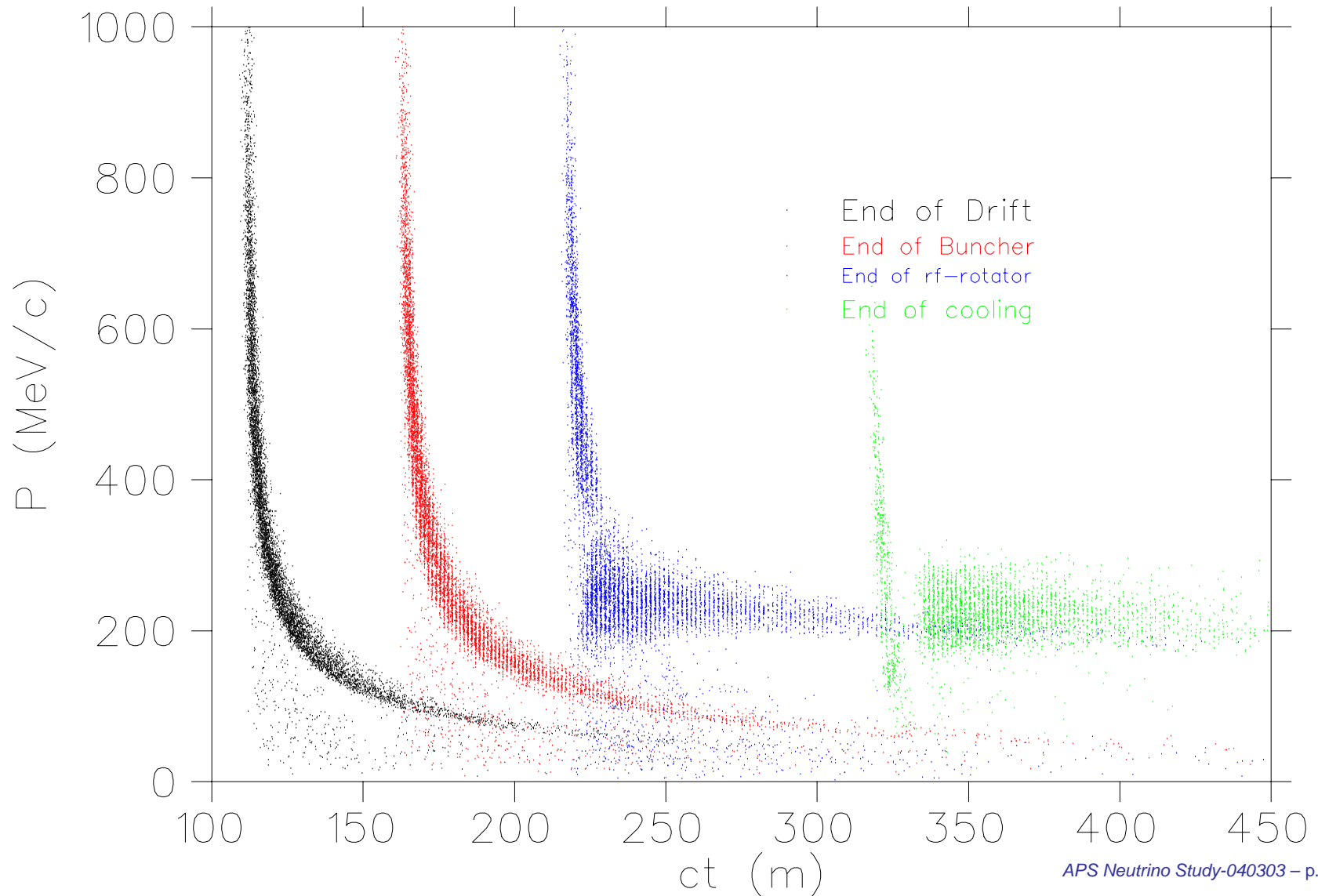
z-vs-p: drift; bun.; rot. ;cool.

End of Drift
End of Buncher
End of rf-rotator
End of cooling

P (MeV/c)

ct (m)

Table of performance

Table 1: Study-2; Palmer; B_z periodic in drift and buncher: [1] R=0.32 [2] R=0.43; Maxwellian and Be windows in the cooling section

	λ	ϵ_T		ϵ_L		ϵ_6		N_0		N_1		N_2	
ST-2.		7.7	2.7	95.0	25.6	6.0	0.2	0.37	0.22			0.08	0.16
Palmer.	0.	9.5	6.5	72.4	62.5	6.6	2.7	0.51	0.42	0.20	0.24	0.08	0.12
D.&B.[1]	0.5/0.75	9.6	6.7	69.3	65.7	6.5	3.0	0.47	0.39	0.17	0.21	0.08	0.11
D.&B.[2]	0.5/0.75	9.7	6.6	76.3	63.0	7.3	2.7	0.45	0.37	0.17	0.20	0.08	0.11
Maxw.	0.5/0.75	9.8	6.6	68.1	60.2	6.7	2.7	0.44	0.36	0.17	0.20	0.07	0.10
+win.	0.5/0.75	9.8	6.7	83.7	73.1	8.6	3.3	0.41	0.31	0.14	0.15	0.06	0.08

N_0 total μ/p

N_1 within $\epsilon_T = 30$ mm-rad and $\epsilon_L = 150$ mm

N_2 within $\epsilon_T = 15$ mm-rad and $\epsilon_L = 150$ mm

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