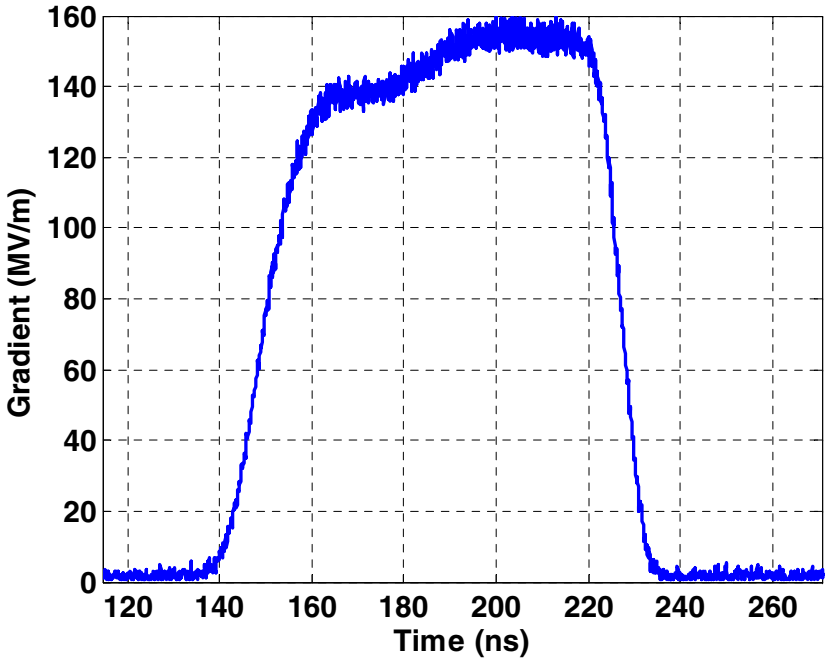
CTF3 Run 2005

- PETS mode
- Beam Stability
- Subharmonic bunching seen by a WCM

30 GHz Power Production in CTF 3/2005 run 2

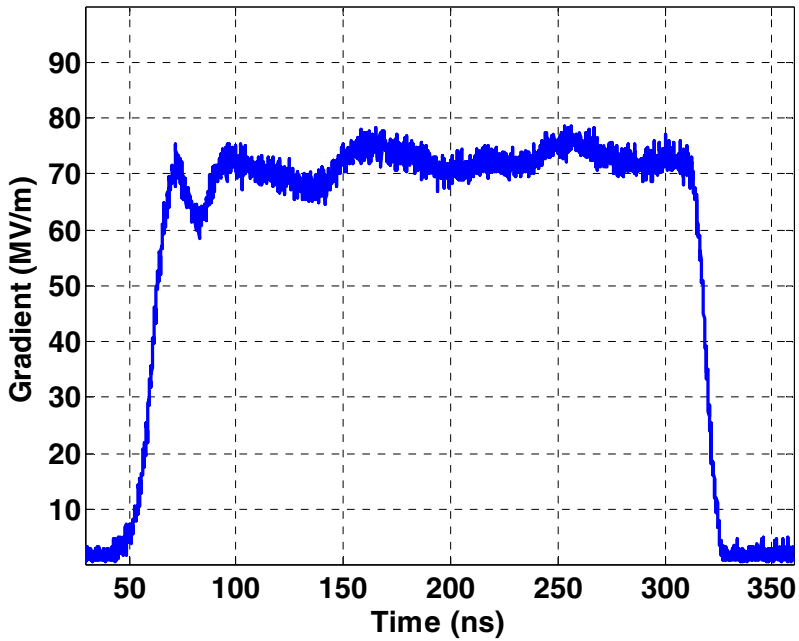
60 MW, 50 ns

~100 MW out of PETS

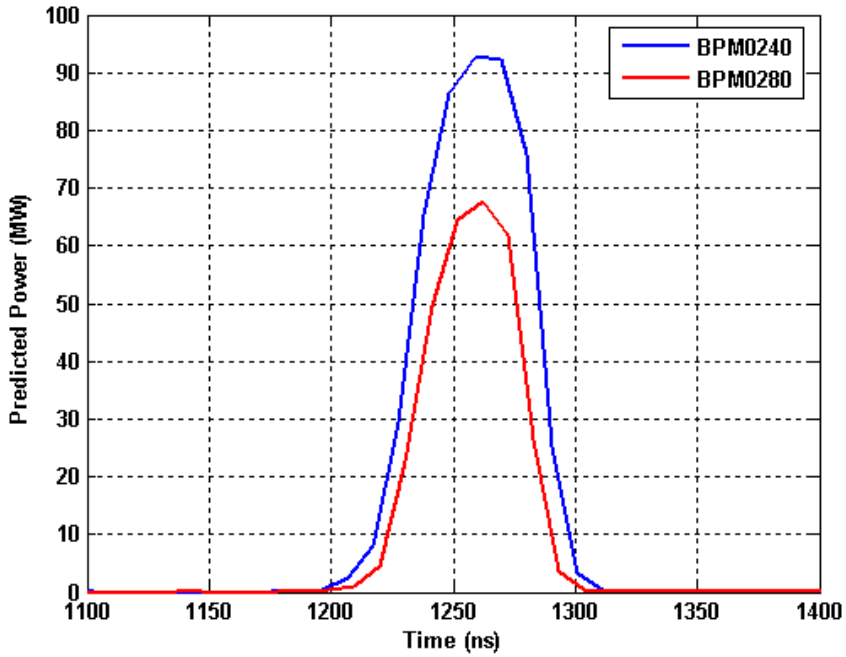


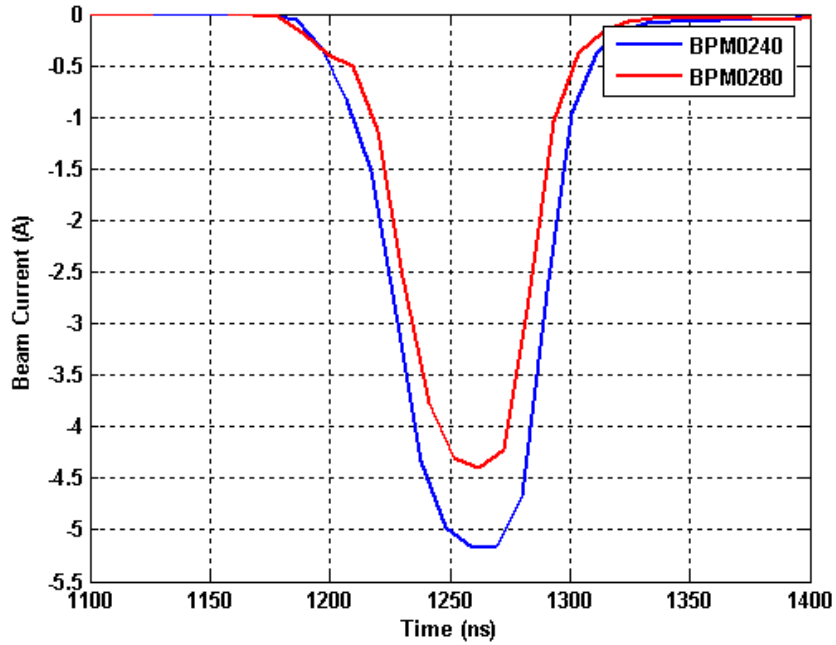
15 MW,300 ns

25 MW out of PETS



5.11.2005, 30 ns , 55-60 MW in CTFII,
85 % Transmission (Peak)

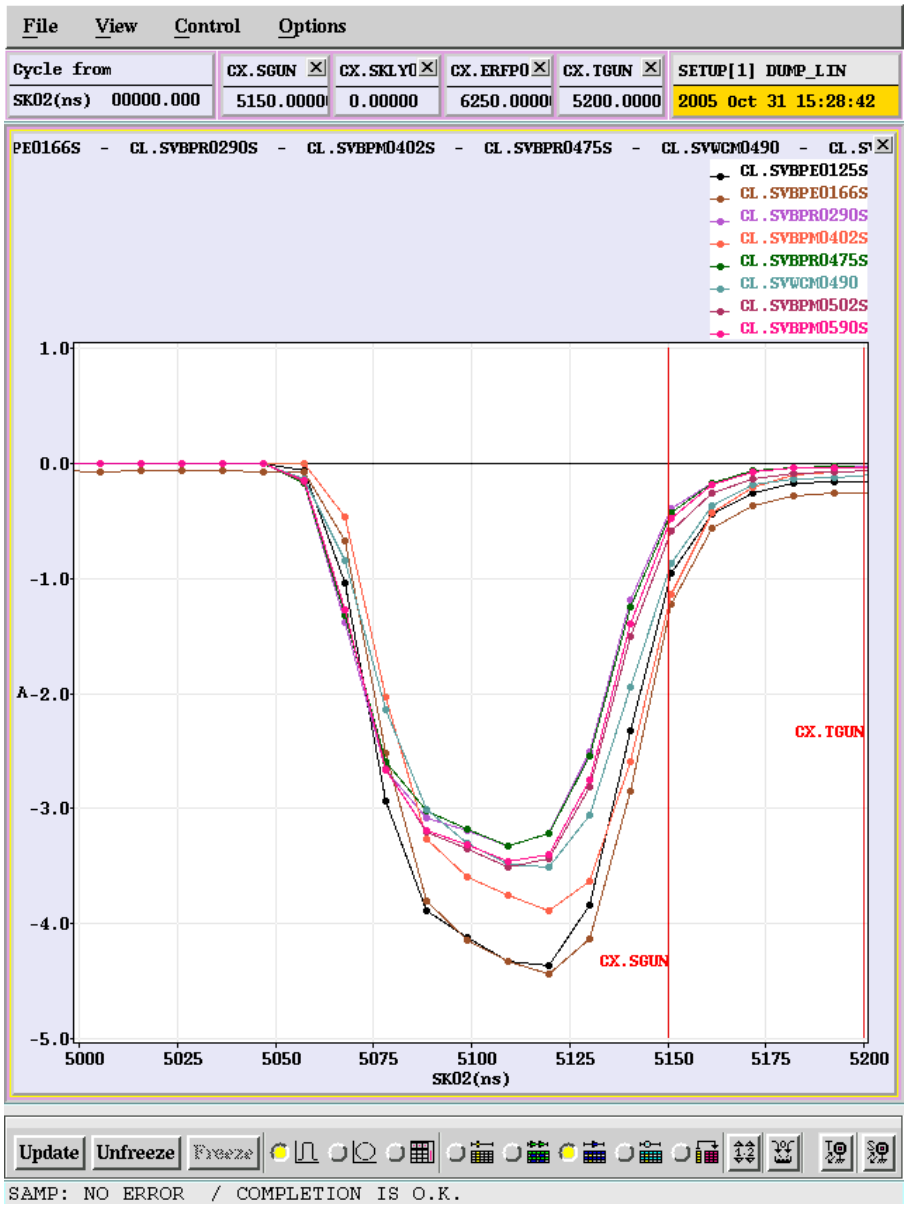




3.5A Beam along the LINAC

4.5 A out of the Gun

3.5 A before PETS



5A Beam set up first night

7 A out of the Gun

5 A before PETS

30 GHz Power Production in CTF 3

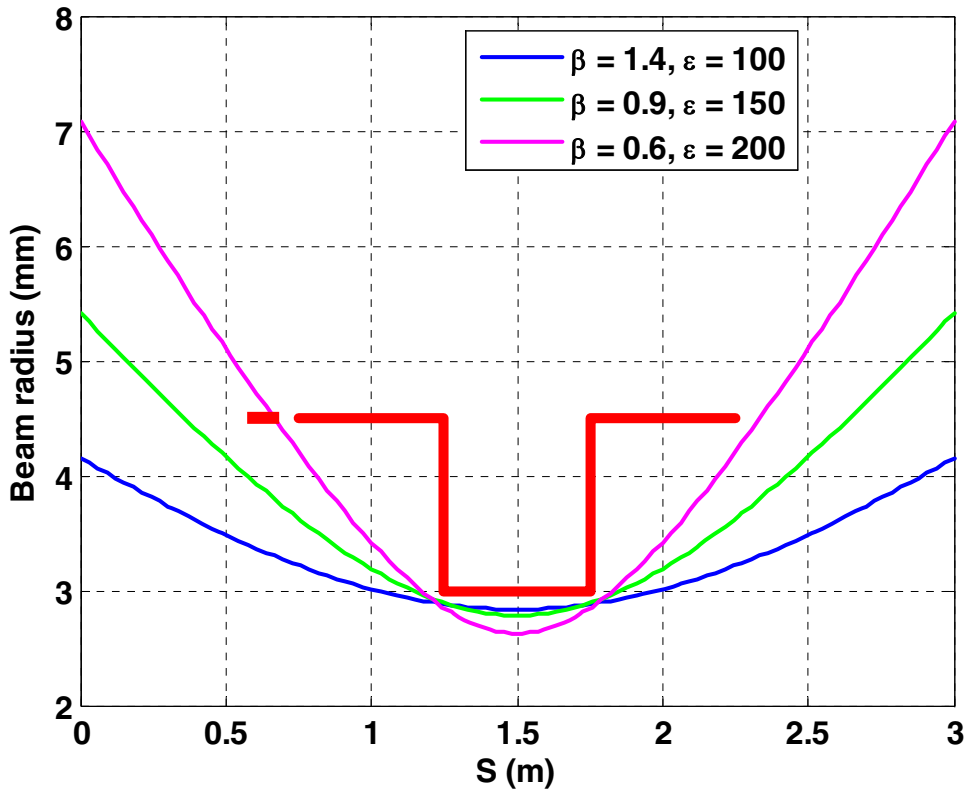
Expected	Achieved
(P_{out} (MW) = 4.762 I^2 (A) *F^2)	
3.5 A: 58 MW	30 MW ,90 %Trans
4.5 A: 96 MW	77 MW
5A: 119 MW	100 MW, 80 % Trans
95-100% Transmission	

Power Production is consistent with F=0.9 for the current going into the PETS

Transmission achieved is very reasonable

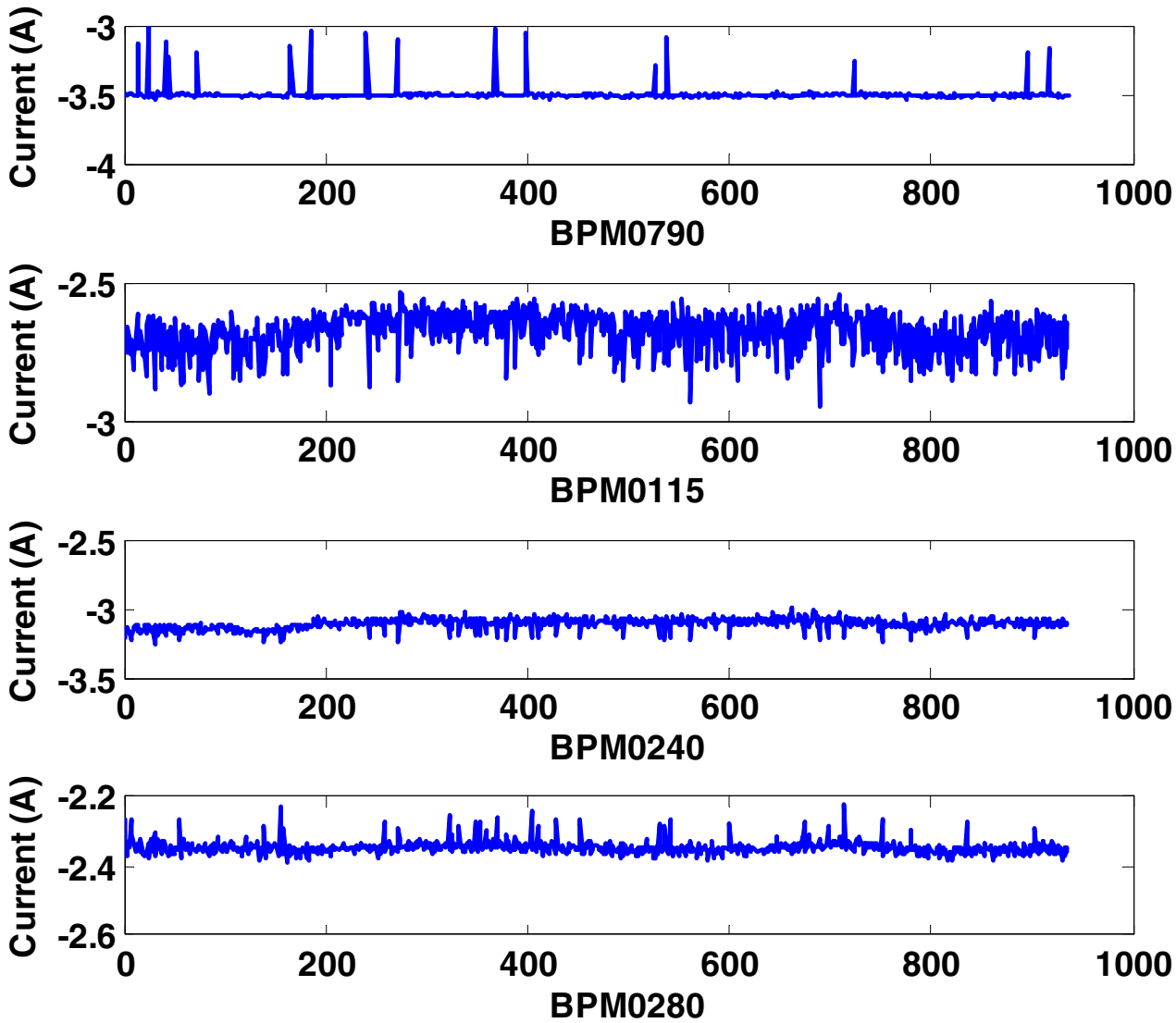
PETS Transmission

E=80 MeV, 3 σ Envelopes

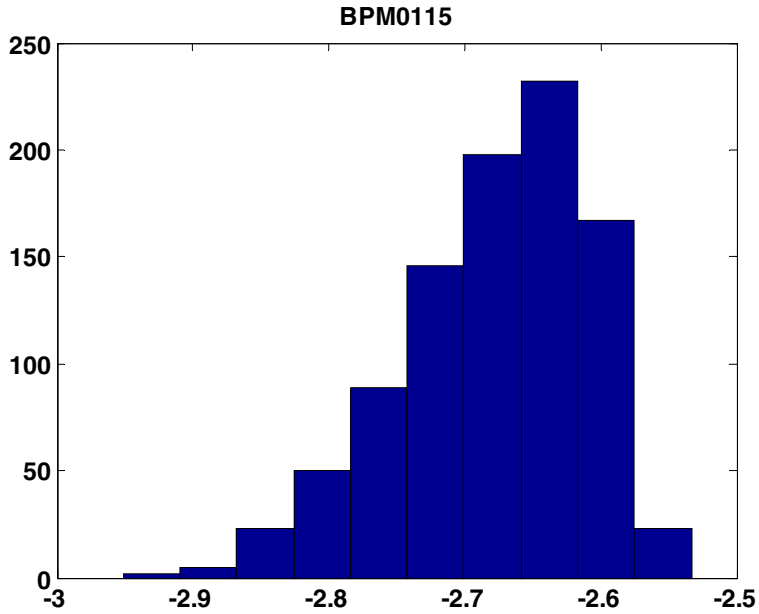


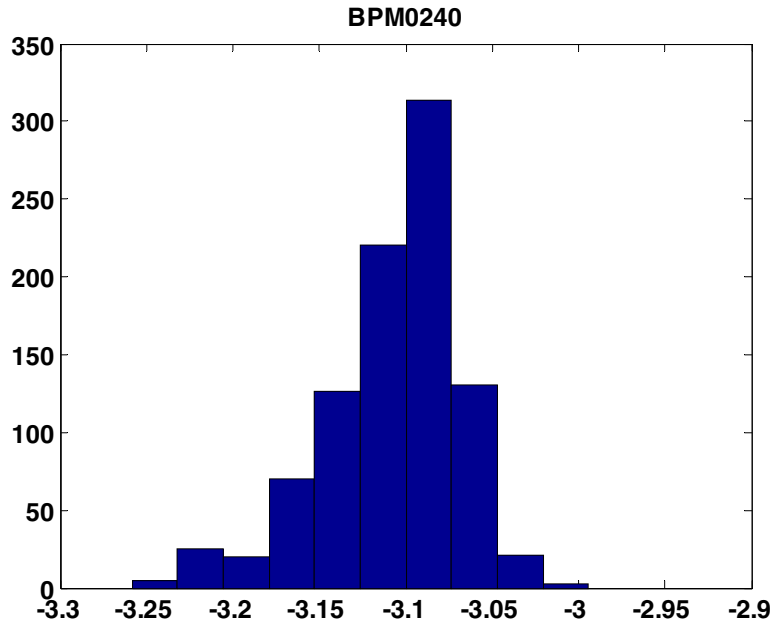
Clearly very critical, has to be perfect for no losses !

Beam stability with the 3.5 A beam for PETS



Beam stability with the 3.5 A beam for PETS



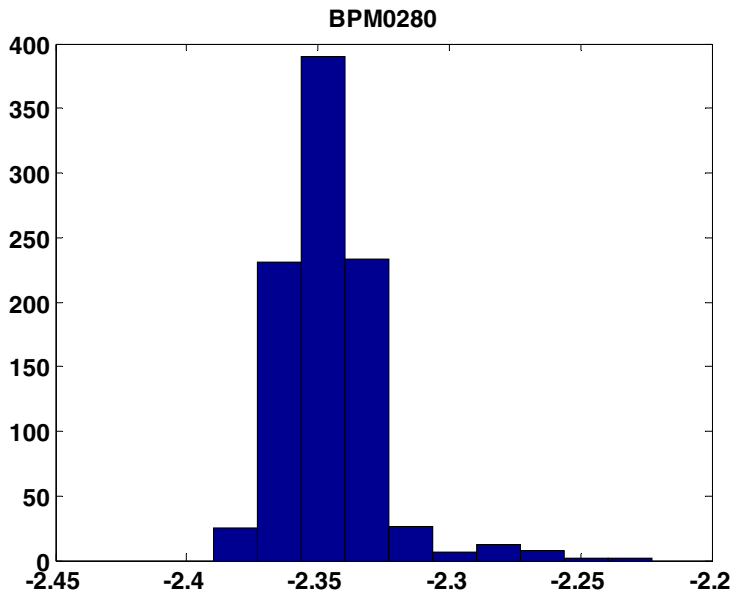


Standard deviation:

BPM0115: 2.6 %

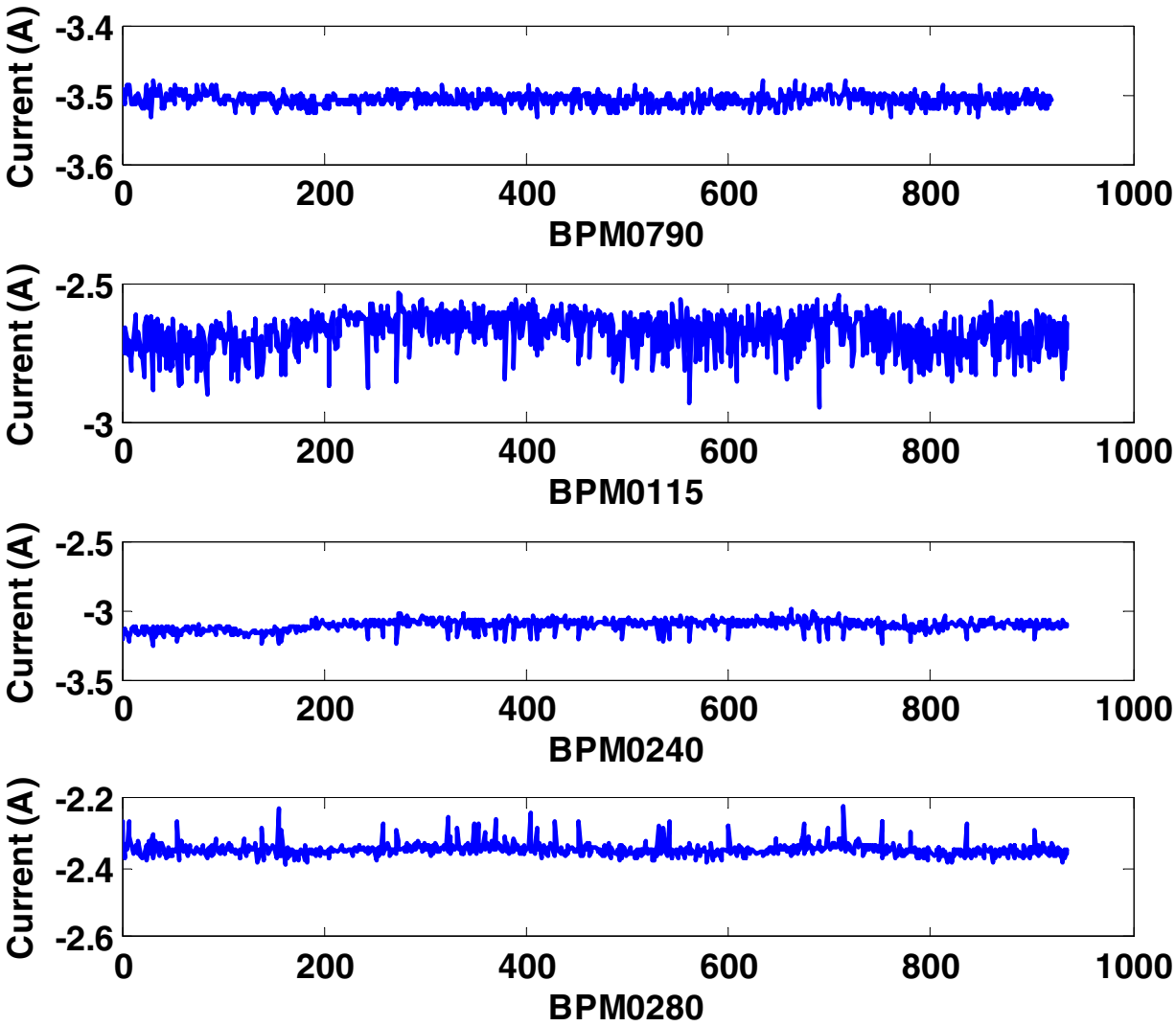
BPM0240: 1.3 %

BPM0280: 0.9 %

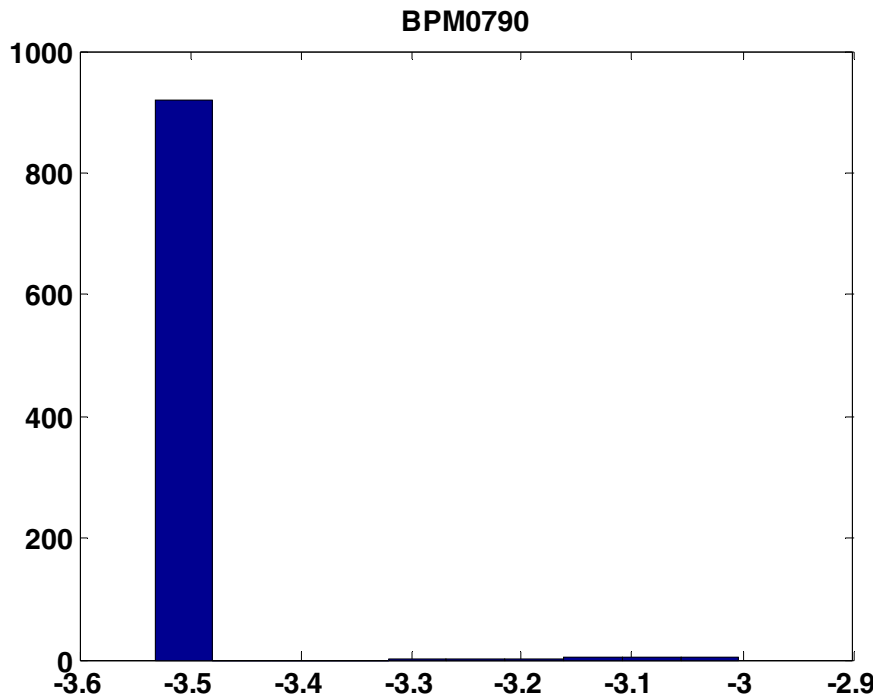


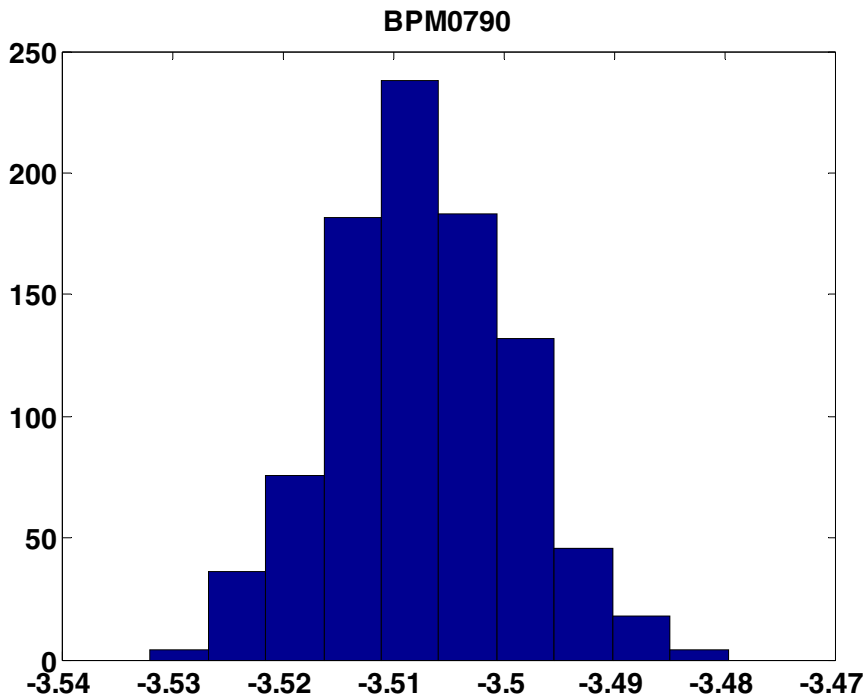
Beam stability with the 3.5 A beam for PETS

Rf jitter taken out



Beam stability with the 3.5 A beam for PETS





Standard deviation:

BPM0790: 1.5 % with rf jitter

BPM0790: 0.3% w/o rf jitter

Switching of operation modes

Turns out to be unproblematic after some experience

Switching times of 15-30 Minutes achieved

But, a few critical elements:

(Gun, Collimators, RF-phases, Correctors)

Problems

Repetition Rate: Got a leak at 50 Hz, 10 Hz most of the time

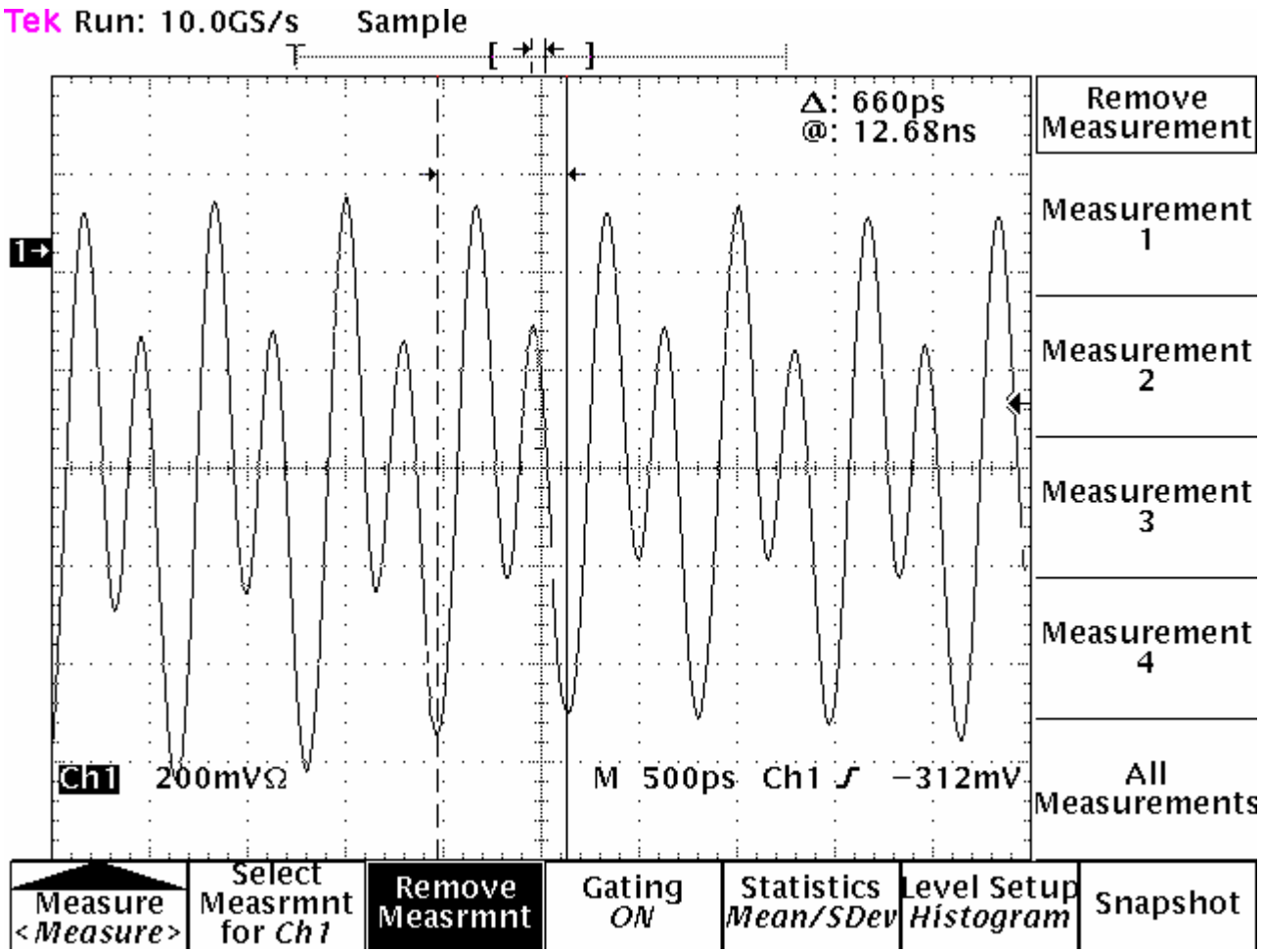
Radiation: Activation of the beam line around PETS

Collimators: Mechanical and control problems

Stay at 10 Hz for time being, work on Transmission,
Move collimators as little as possible

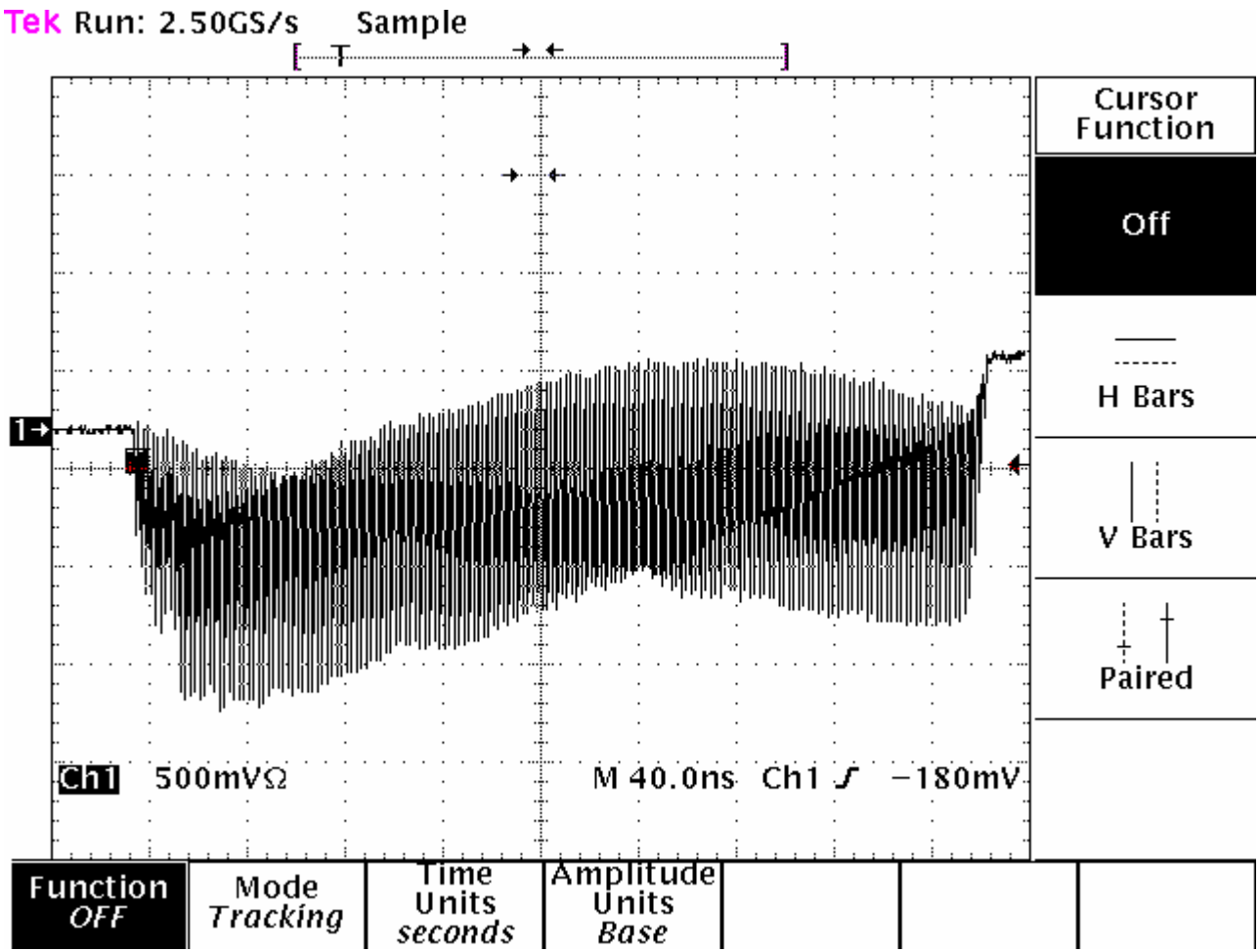
Sub-harmonic bunching in CTF3

1.5 GHz time structure with fast scope
Main bunch and satellite



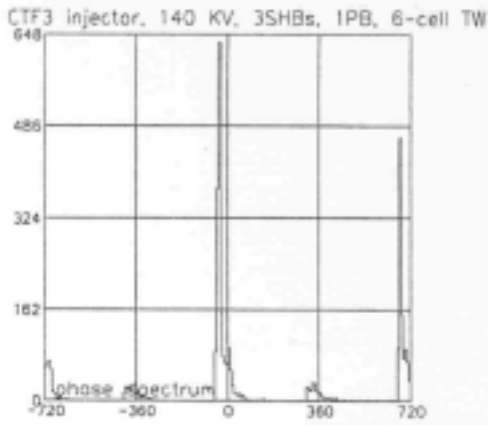
Sub-harmonic bunching in CTF3

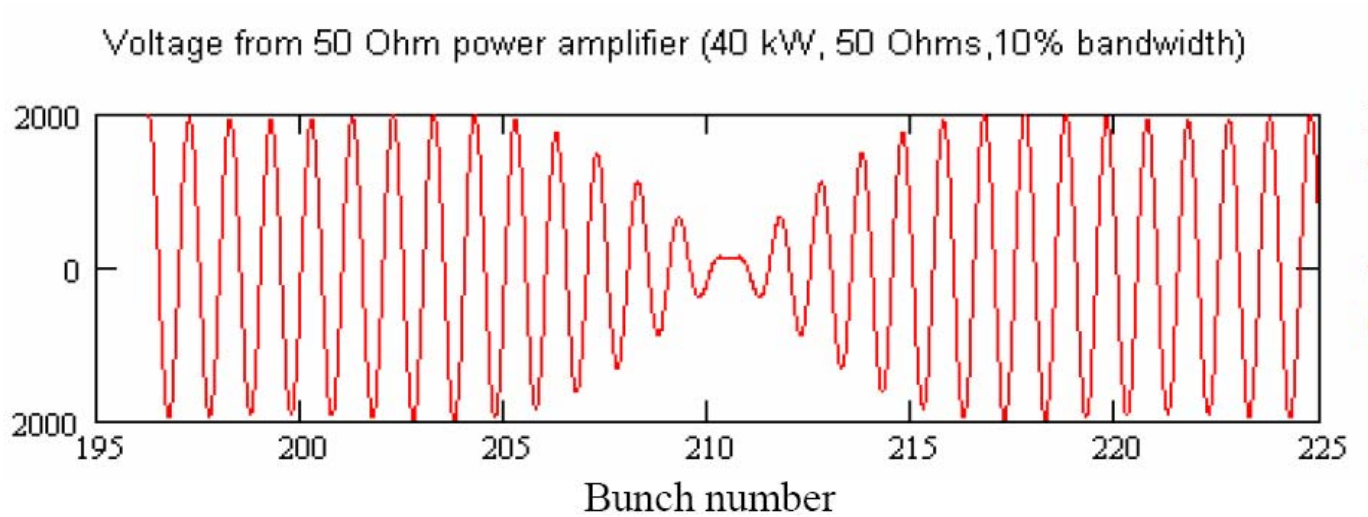
Full beam pulse with fast scope



Sub-harmonic bunching and phase coding in CTF3

Simulations by Lars Thorndahl and Feng Zou



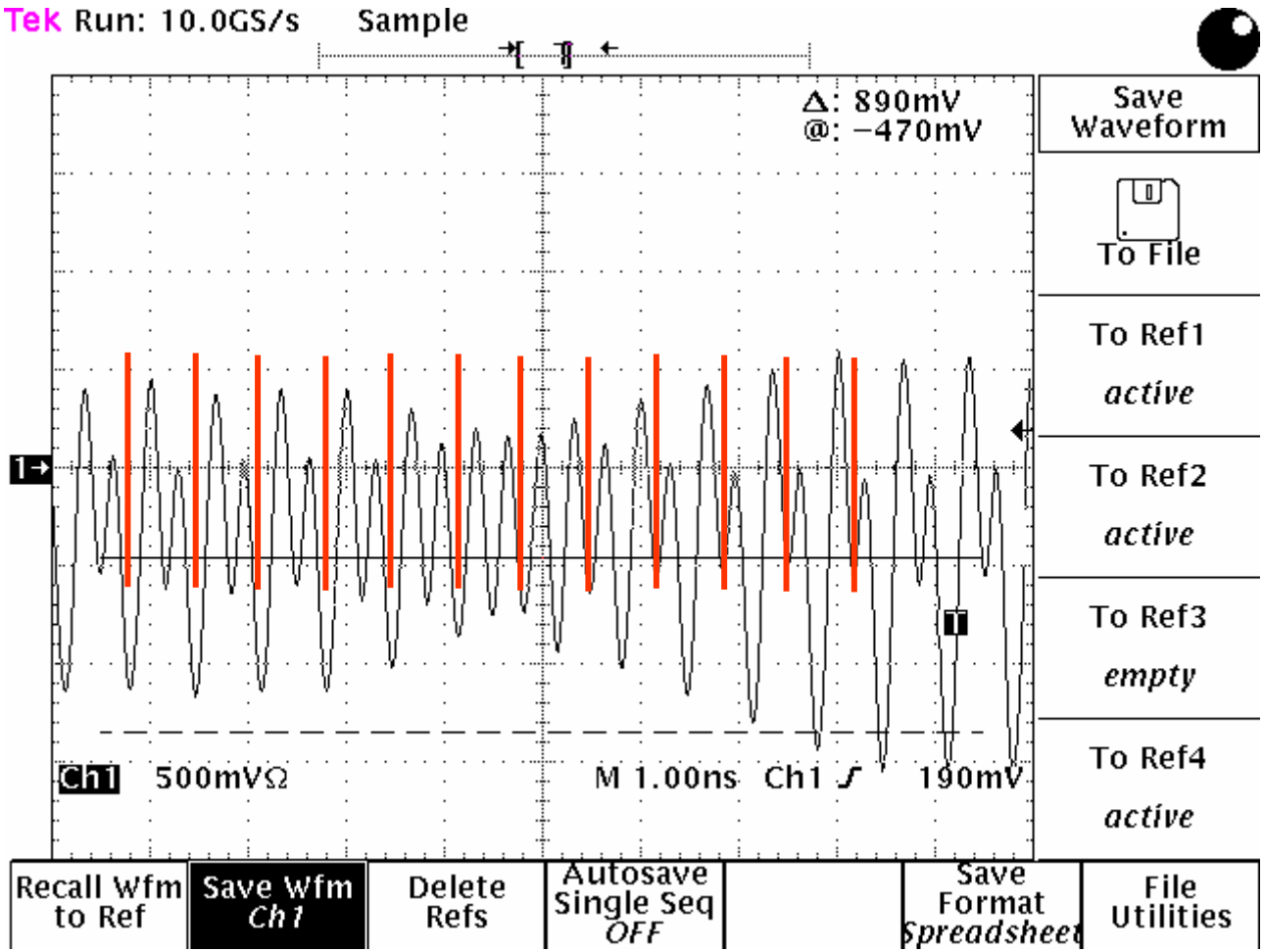


Polarity change takes about 10 oscillations after the power amplifier, or 10 bunches!

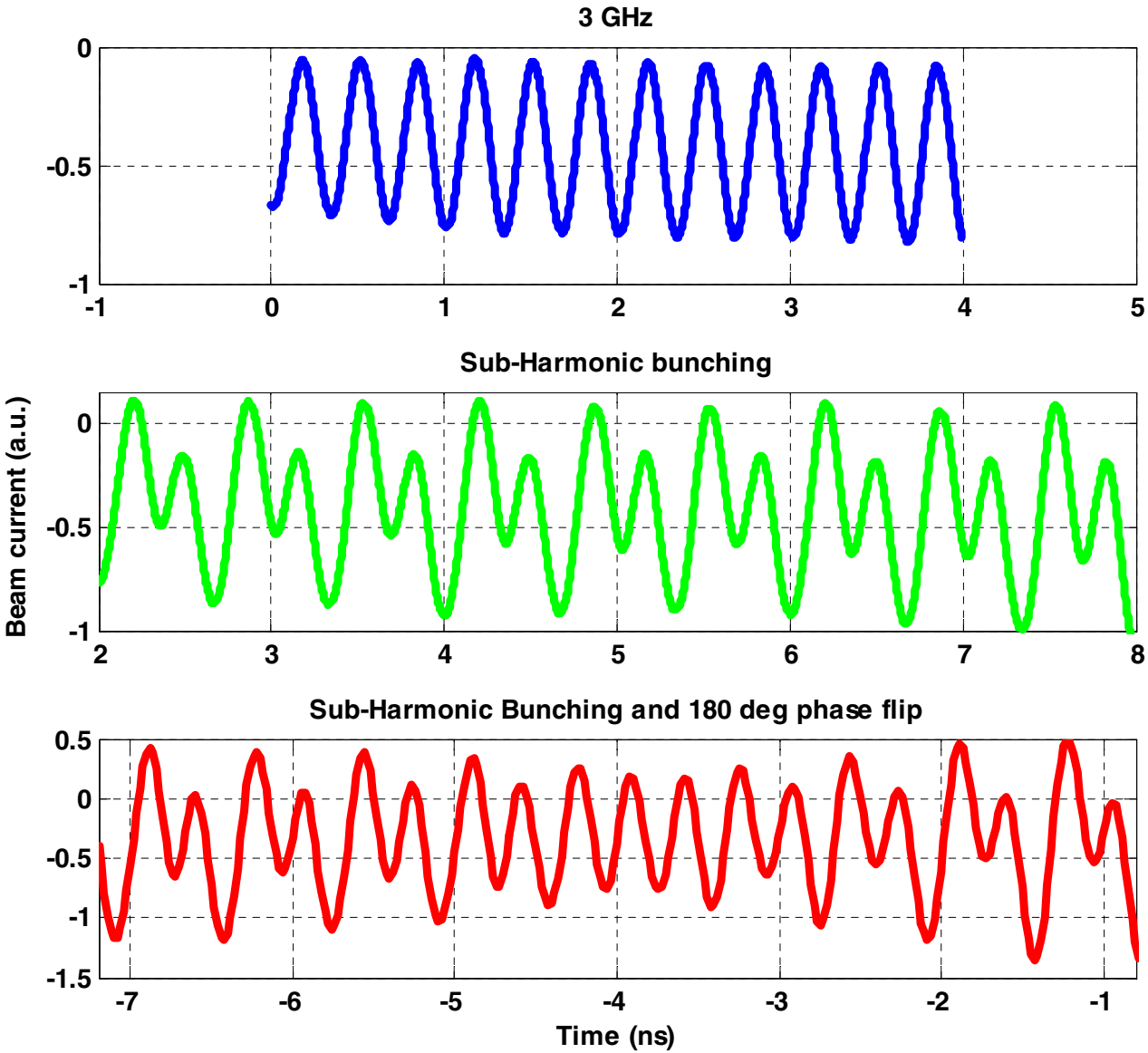
time

Sub-harmonic bunching and phase coding in CTF3

1.5 GHz time structure and 180 deg phase flip



Sub-harmonic bunching in CTF3



CTF3 Run 2005

Conclusion

- Not bad at all !