

f

Week in Review: 05/12/03 –05/19/03

Keith Gollwitzer – FNAL

- Store and Operations Summary
- TEL: Beam-Beam Compensation Studies
- Standard Plots

f

Stores Summary

Store	Initial Lum. (E30)	Deliv'd Lum. (nb ⁻¹)	Termination	Duration (hr)	Comments
2538	44.86	1547	Intentional	17.7	158mA Stack; End-of-Store studies
2540	43.1	1545	Intentional	18.6	152mA Stack
2542	-	-	Abort	-	152mA Stack Quench during scraping; T:HE17 trip
2546	40.3	950	Abort	9.7	143mA Stack Quench due to T:QA42 trip
2549	44.44	1578	Intentional	18.0	162mA Stack ; End-of-Store studies
2551	43.1	1605	Intentional	18.3	166mA Stack
2555	44.90	1590	Intentional	17.1	174mA Stack
2557	-	-	Abort	-	174mA Stack Quench during scraping;
2562	30.1		On Going		112mA Stack Store counts for next week

f

High & Low Lights of the Week

- TeV
 - Trips that caused quenches -- T:HE17 & T:QA42
 - Minor adjustment of orbits and tunes
 - Stuck collimator during scraping procedure
 - Record Protons to HEP: **~9000e9**
 - Stacking
 - Record protons to target (Booster & MI): **5.45e12**
 - Accumulated record number pbars in **1hr: 13.51mA**
 - Tests of Beam Loading Compensation on MI ramp
 - Along with MI Bunch Rotation, shortens bunch length on pbar production.
 - Need to tune pbar Debuncher Bunch Rotation
 - Other
 - Booster Notcher timing jitter
 - LRF3 Driver Tube
 - SDA problems due to java machine stale cache and reboots
-

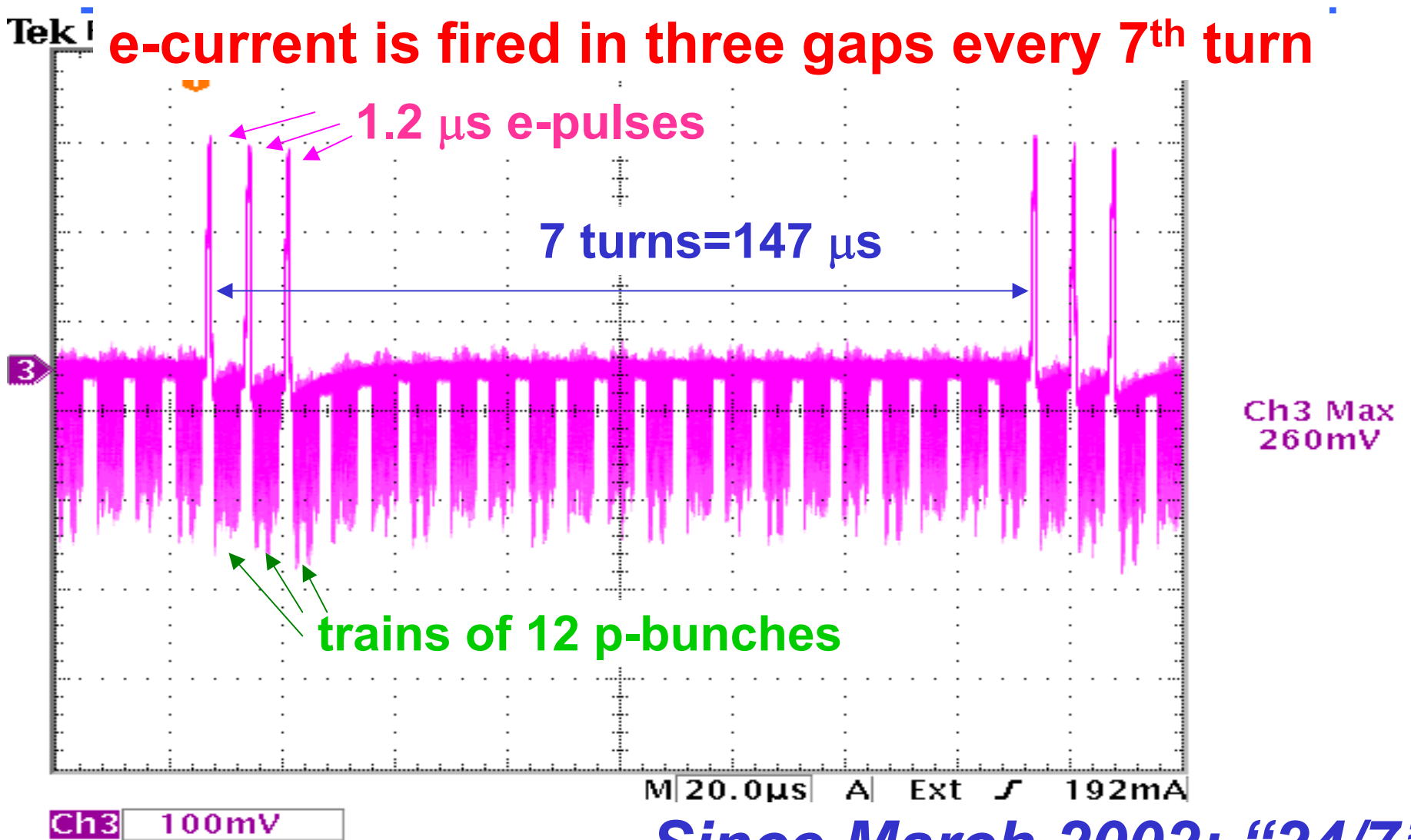
f

Recent studies of the TeV TEL

- Currently used for “cleaning” the Abort Gap
 - Seen recent “scalloping” of emittance of pbar trains
 - Tried compensation on single pbar bunch
-
- Note that Vladmir Shiltsev gave me a few minute tutorial and sent the following transparencies before leaving the country (he is gone to Beam-Beam03).... Imagine an excitable person with the Russian accent....

f

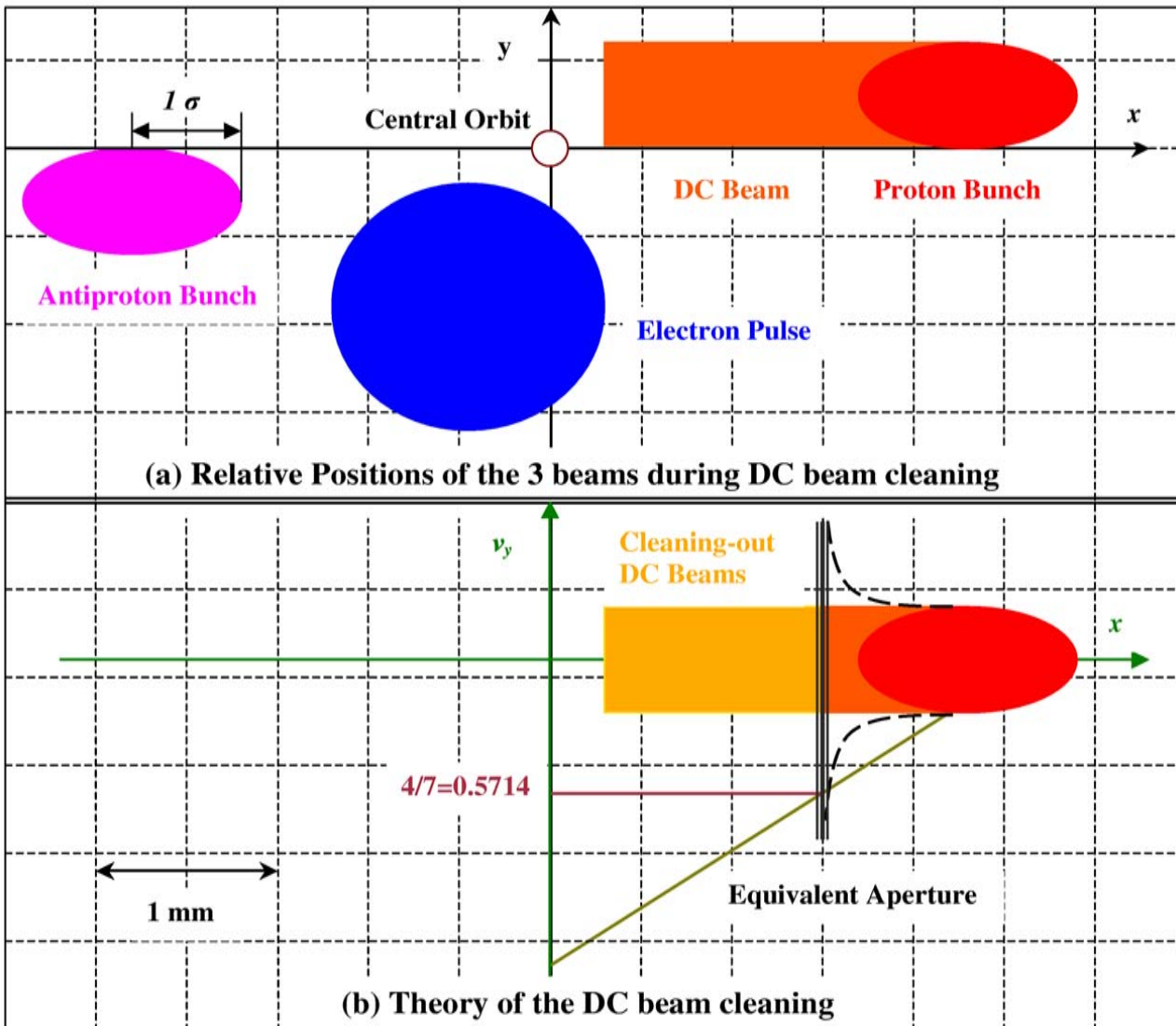
“DC Beam Killer”



Since March 2002: “24/7”

f

e-Beam Position for “cleaning”

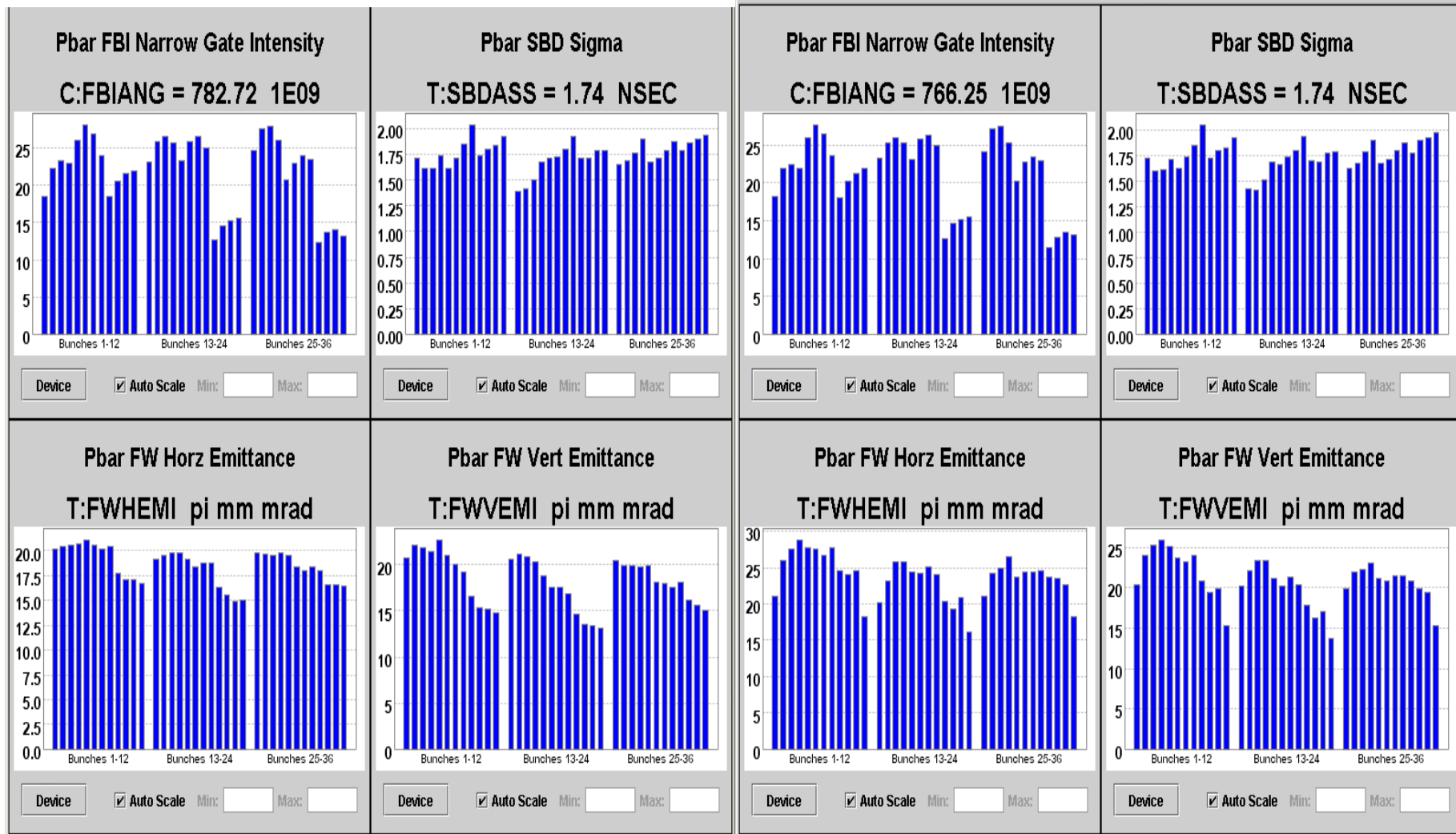


- e-beam is being moved by a set of 6 SC dipole correctors
- each corrector can move ebeam over $2^{3/4}$ " aperture (about 0.12Tm strength)
- moving e-beam does not affect Tev orbits!

f

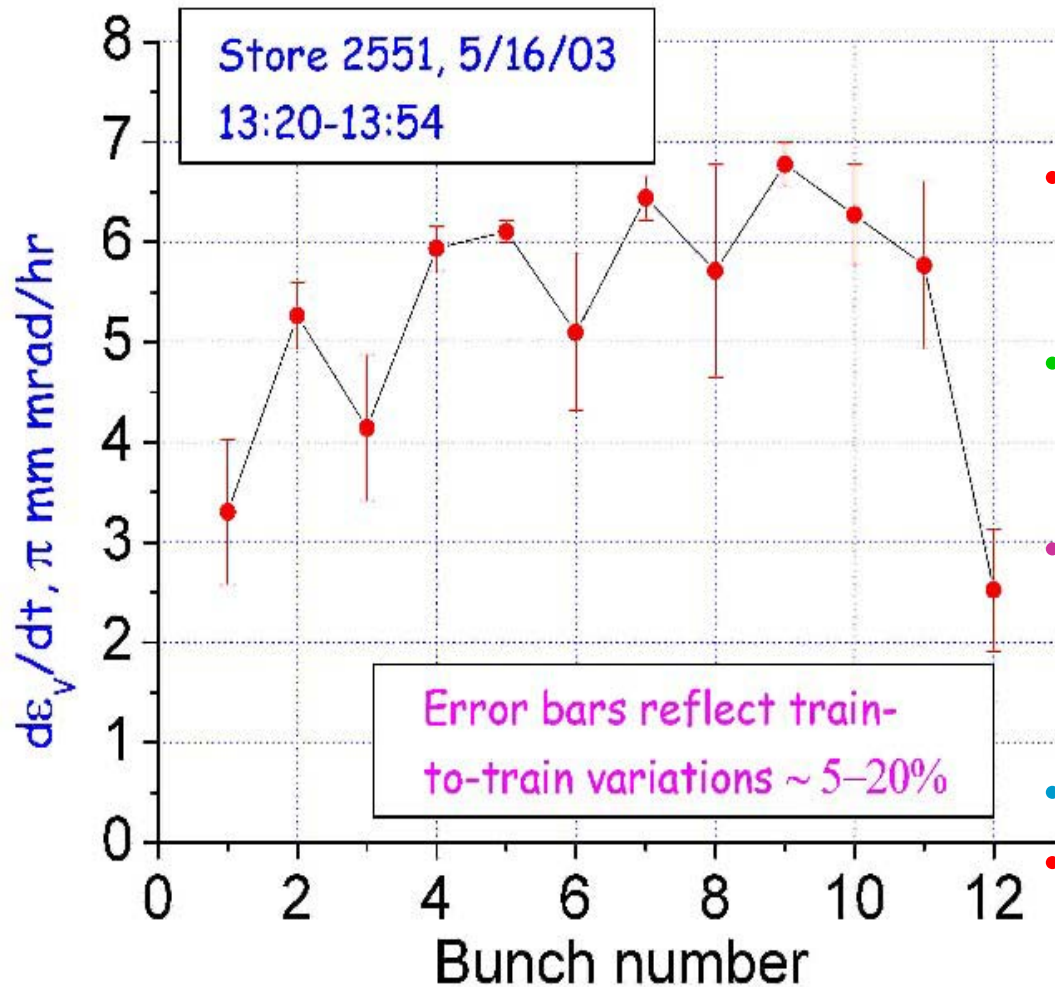
Scallops: Emittance Blowup

Pbar bunches after "initiate collisions" - same bunches 20 min later + 5π



f

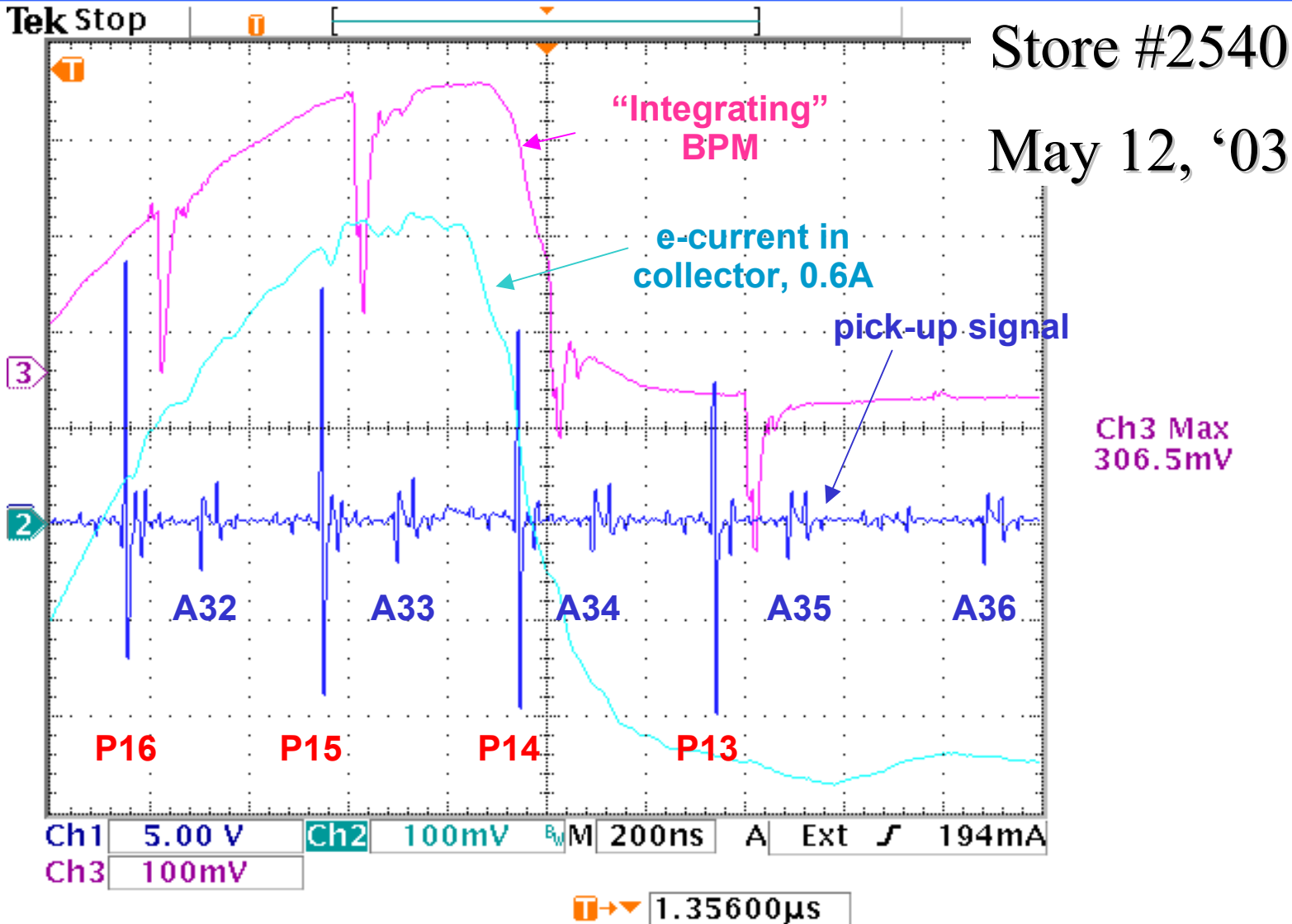
Pbar Vert Emittance Growth Rate



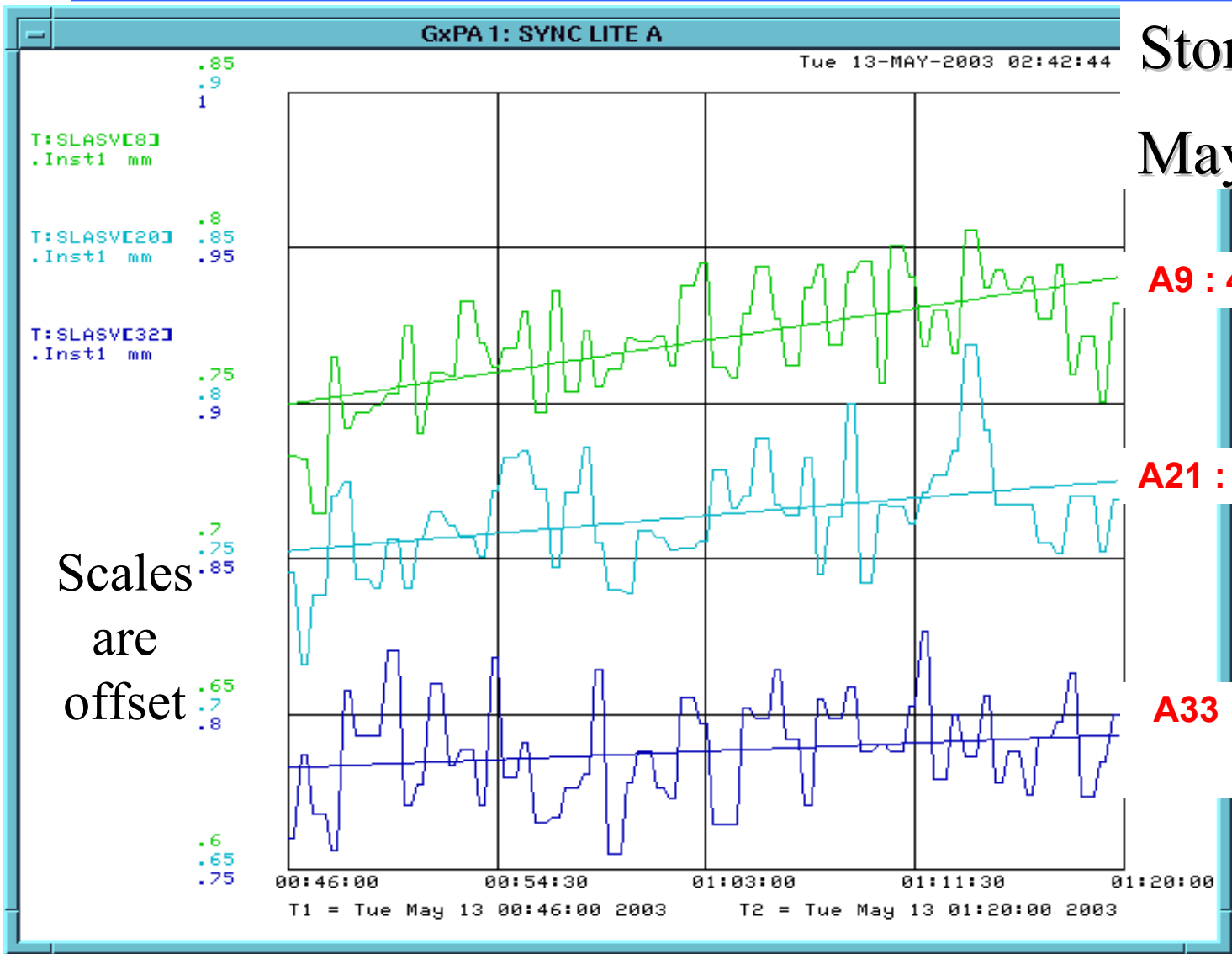
- Scallop is beam-beam phenomena; started occurring after N_{protons} exceeded $180e9/\text{bunch}$
- Scallop does not take place in every store even with $N_p > 180e9/\text{bunch}$
- Scallop occurs in both planes, but often more prominent in vertical
- Scallop seems to be dependent on tunes, e.g. vertical tune change -0.002 reduced scallop
- Small proton scallop
- Scallop is the same in all three trains of bunches (variations $< 20\%$)

f

BBC with TEL: e-Pulse on A33



f Pbar V-Sizes First 34 min of collisions



Store #2540

May 12, '03

A9 : 4.1 π mm mrad/hr

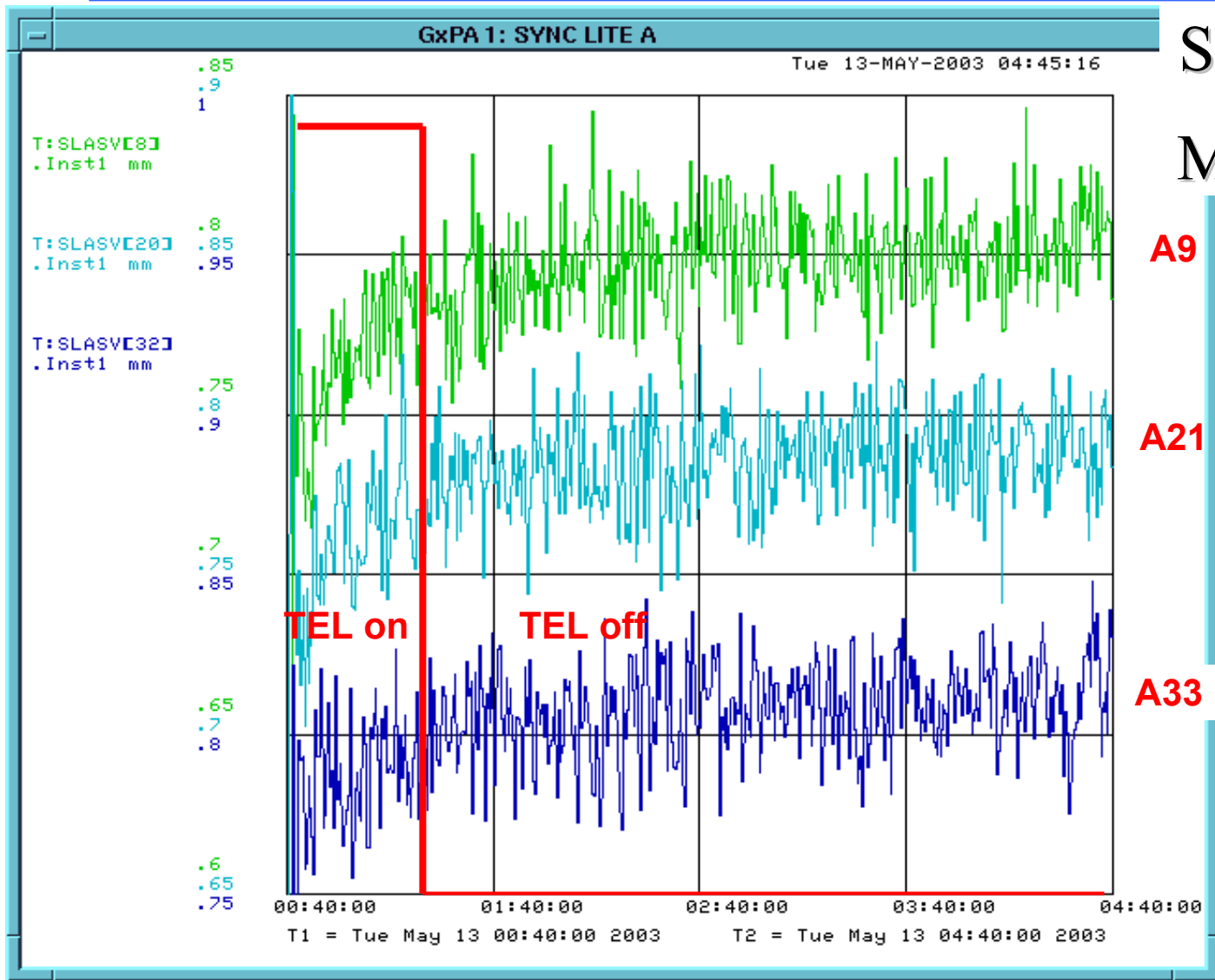
A21 : 2.2 π mm mrad/hr

A33 : 1 π mm mrad/hr

-TEL on it

f

Pbar V-Sizes first 4 hours collisions



Store #2540

May 12, '03

A9

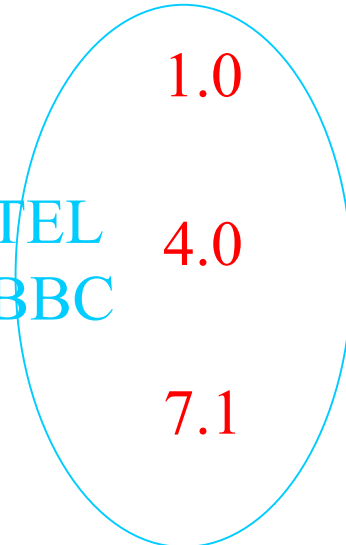
A21

A33 -TEL on/off

f Pbar V-emittance growth rates

store	#A9	#A21	#A33
# 2536 (40 min)	9.9	9.2	9.3
#2538 (35 min)	1.9	1.7	2.8
#2540 (34 min)	4.1	2.2	1.0
#2546 (30 min)	3.9	1.9	4.0
#2549 (26 min)	4.5	3.6	7.1
#2541 (34 min)	6.7	6.6	7.0

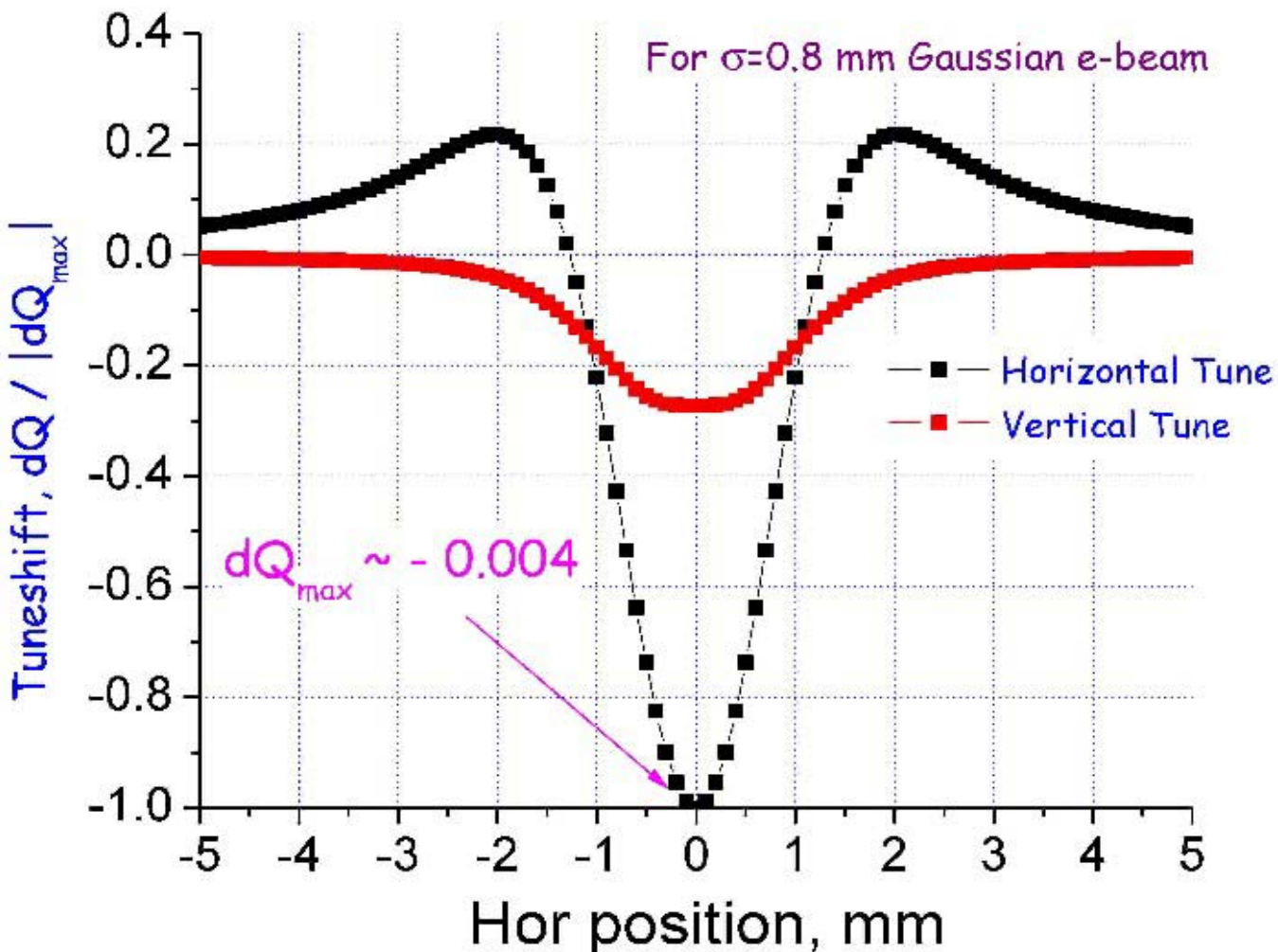
TEL
BBC



f

(Calc'd) Tuneshift vs e-position

Dependence of Pbar tuneshift due to TEL on e-beam postioning



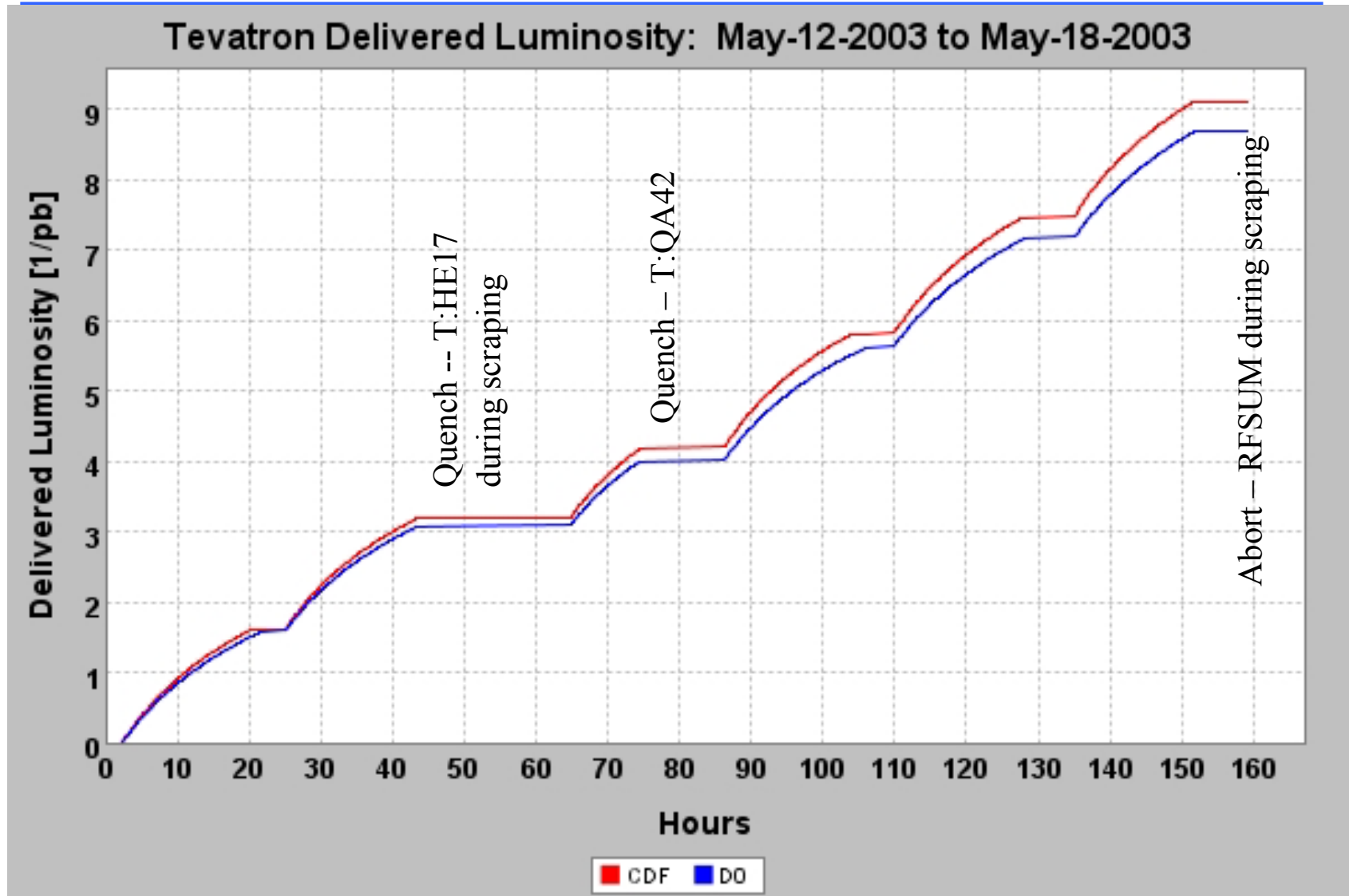
f

Beam-Beam Compensation:

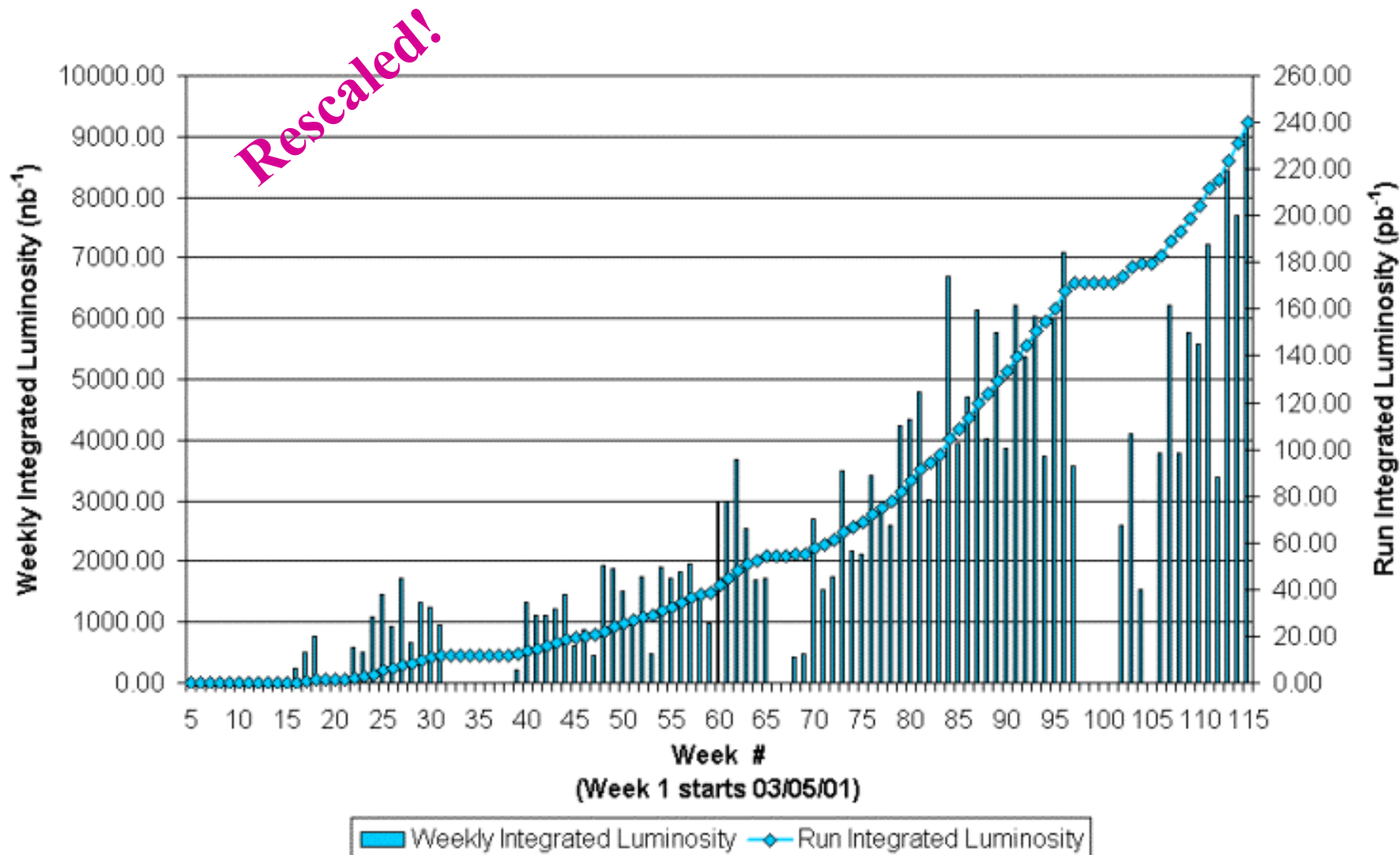
- the first indication of the BBC in store #2540
- later attempts in #2546 and #2549 show that the TEL effect can be neutral or even slightly negative
- the attempts will continue
- conditions to claim demonstration of the BBComp:
 - scallops or other “bad” effects without BBComp
 - reduced or eliminated “bad” beam-beam effects with the TEL on
 - on systematic basis
- Areas of major improvement needed:
 - e-pbar-p position measurements (TEL BPMs)
 - single pbar bunch tune diagnostics (1.7GHz Schottky)

f

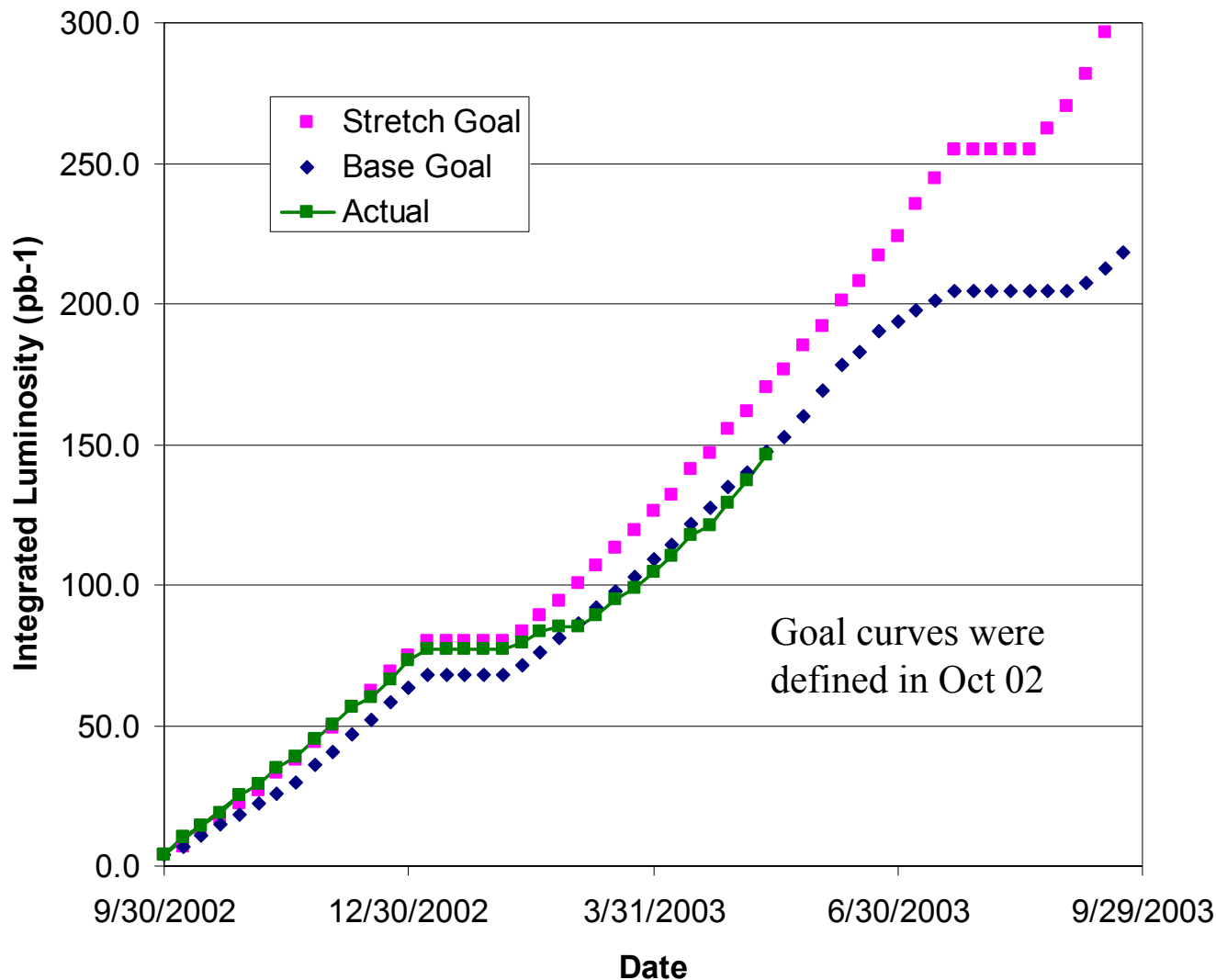
Best Week!!



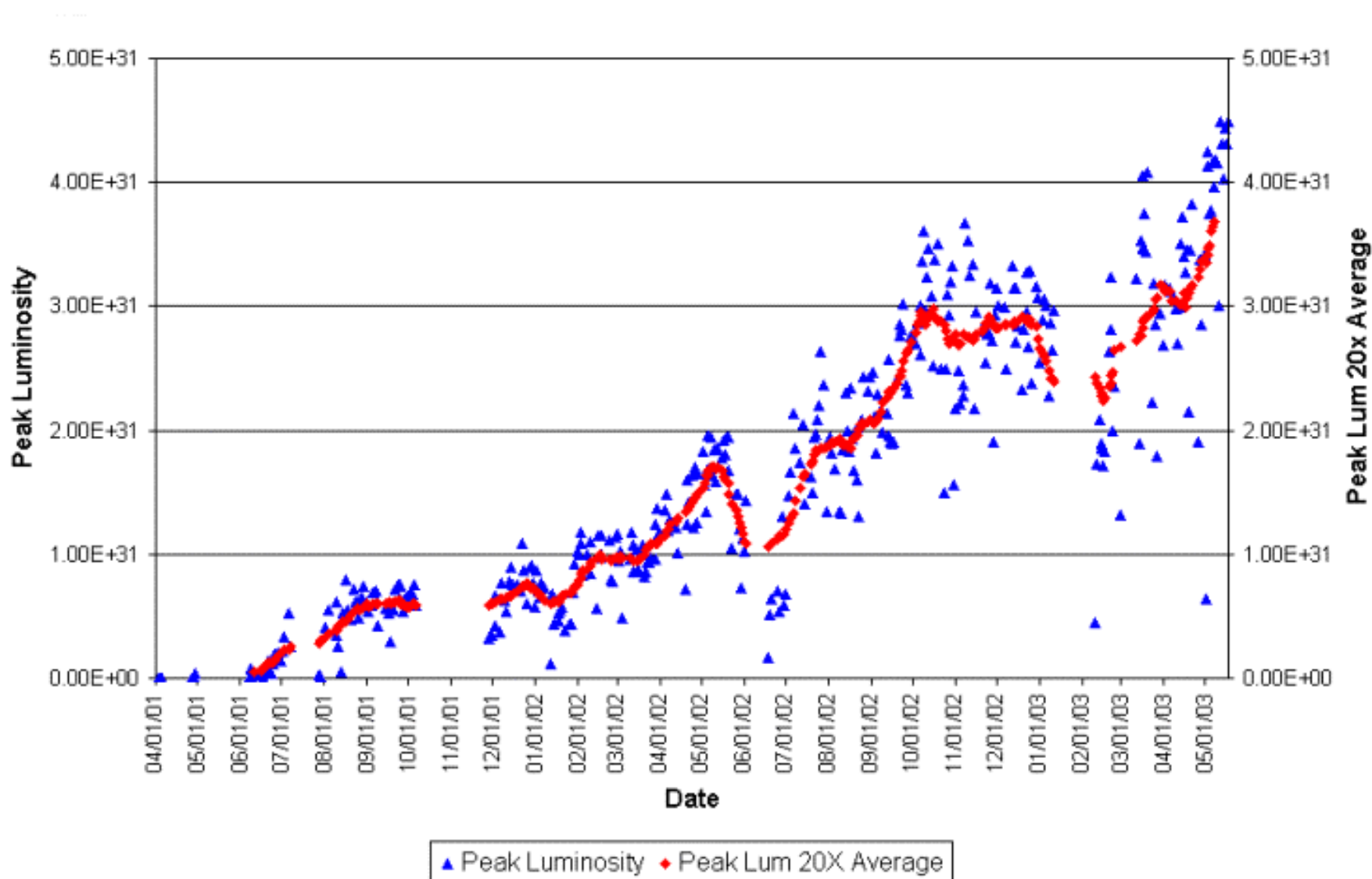
Collider Run IIA Integrated Luminosity



Integrated Luminosity & Goals



Collider Run IIA Peak Luminosity



- The week
 - 99 store hours
 - Best week of Integrated Luminosity $> 9 \text{ pb}^{-1}$
 - Record Initial Luminosity: $44.90\text{e}30 \text{ cm}^{-2} \text{ s}^{-1}$
 - All 6 stores $> 40\text{e}30 \text{ cm}^{-2} \text{ s}^{-1}$!!!!
 - Stacking record of **13.51mA/hr**
- Goal for this week
 - Studies week (includes some accesses)
 - Want to get back to stable running