Week in Review: 12/16/02 -12/22/02

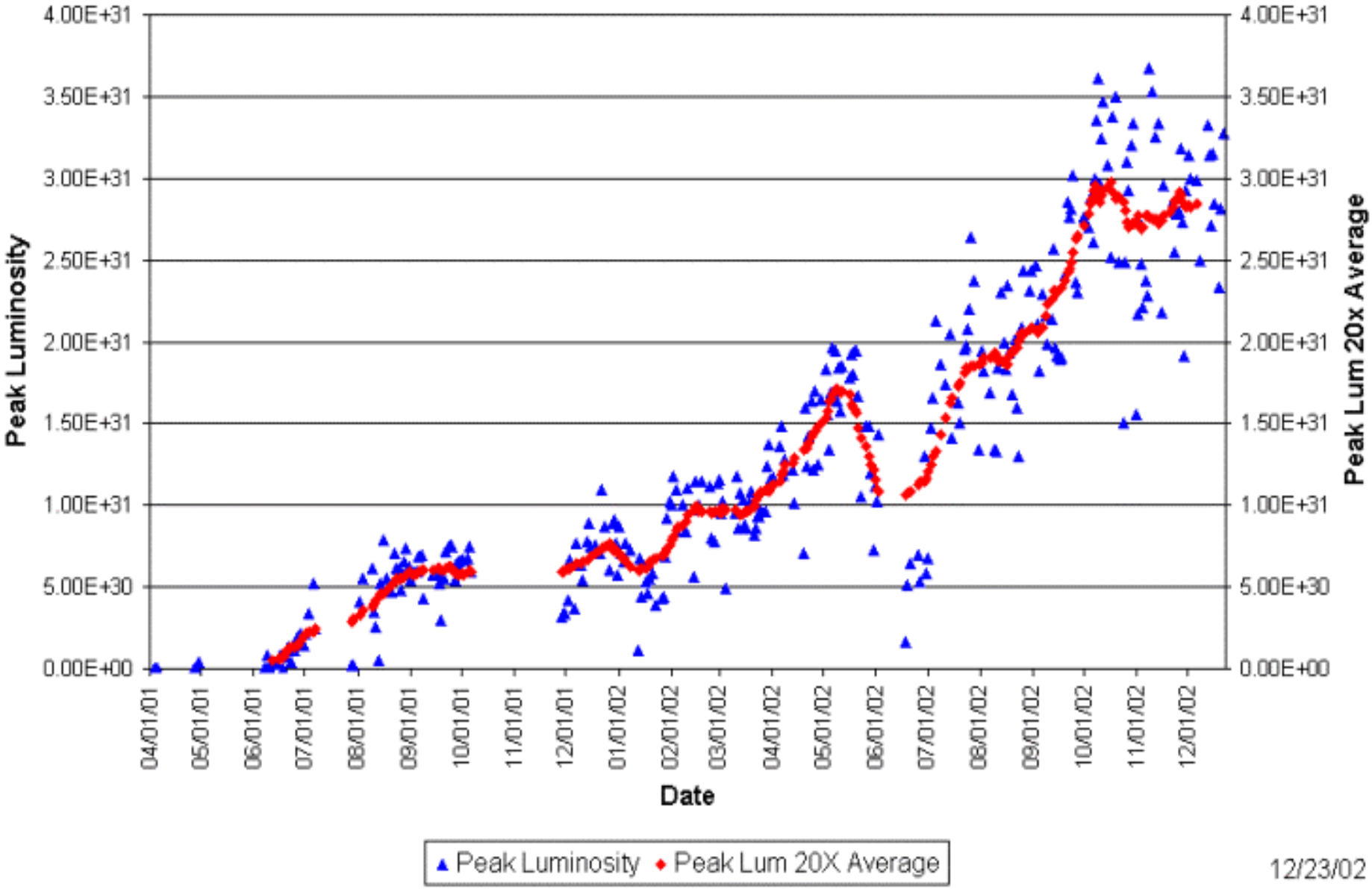
Ron Moore – FNAL

- Store Summary (Studies Week)
- Studies Review
- Schedule for Week

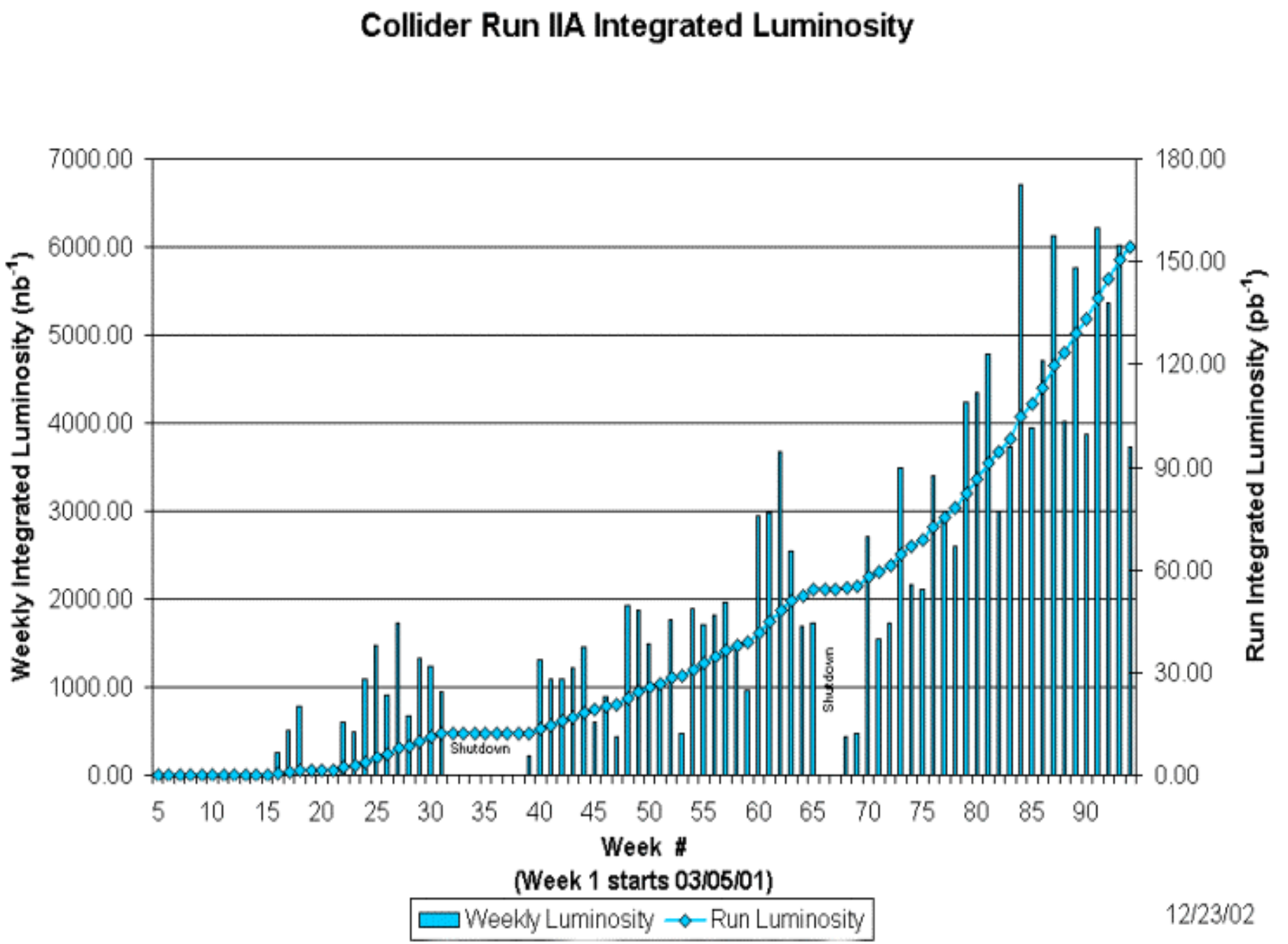
Store Summary

Store	Initial Lumi	CDF Deliv'd Lumi	Termination	Comments
2078	28.4	1229	Intentional	Proton bunch length blow-up at 980 GeV
2087	22.9	894	Intentional	New feeddowns implemented @ 150 GeV
2090	27.9	-	Abort	Safety system dropped power supplies for 7 sec Bad UPS?
2091	24.8	827	"Intentional"	Longitudinal dampers cause proton blow-up; TEL failure; proton removal study
2094	32.6	750	Abort kicker prefire	Horz and vert dampers ON @ 150 GeV; longitudinal damper OFF
2097	29.5	-	*ongoing*	Horz and vert dampers ON @ 150 GeV; longitudinal damper OFF

Collider Run IIA Peak Luminosity



12/23/02


Collider Run IIA Integrated Luminosity
Weekly Integrated Luminosity (nb-1)
Run Integrated Luminosity (pb-1)
7000.00
6000.00
5000.00
4000.00
3000.00
2000.00
1000.00
0.00
180.00
150.00
120.00
90.00
60.00
30.00
0.00
Shutdown
Shutdown
5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90
Week #
(Week 1 starts 03/05/01)
Weekly Luminosity
Run Luminosity
12/23/02

Recycler Pbar Shots

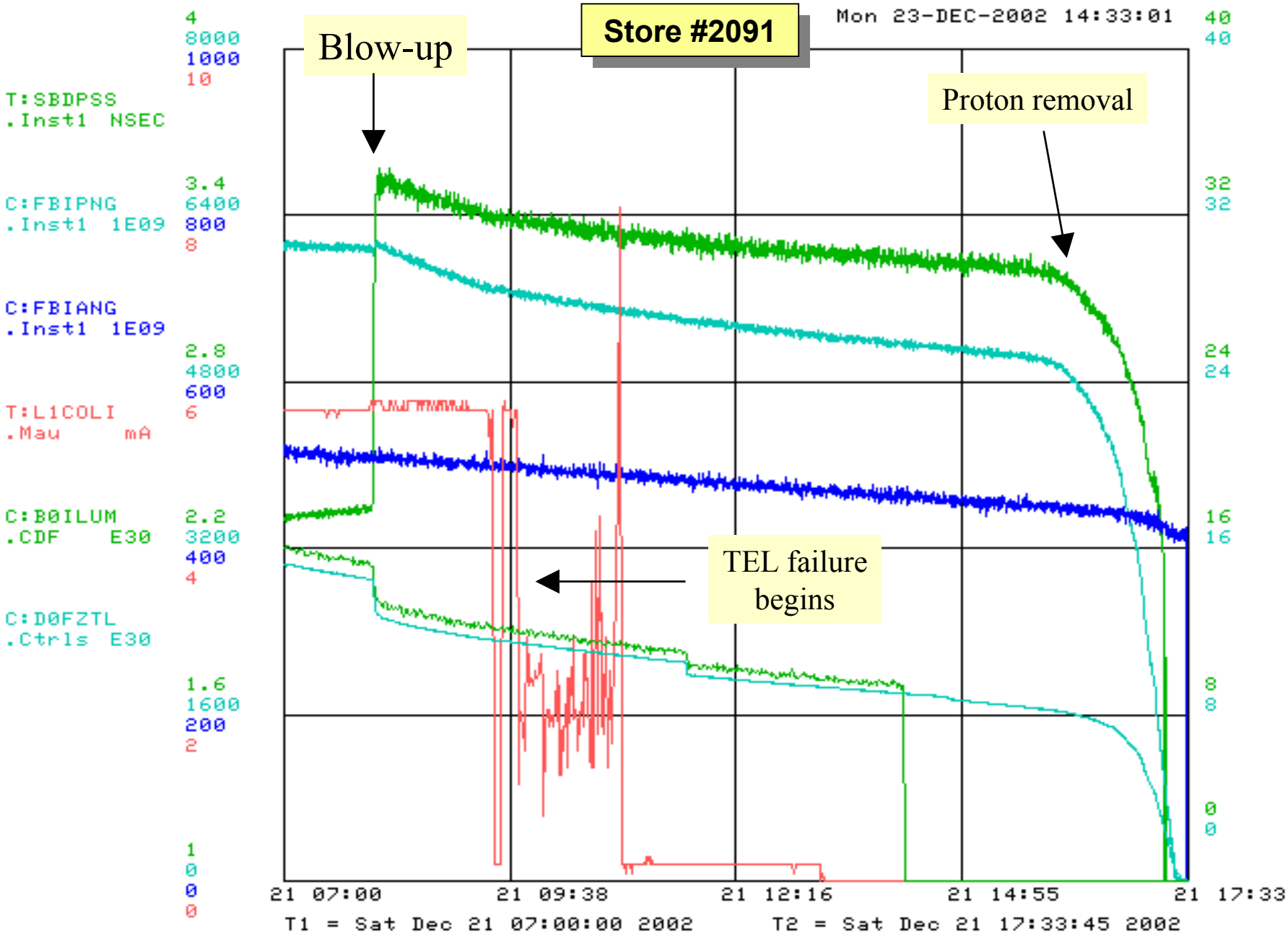
- Stack to ≈30 E10 following HEP shot, then shoot to RR
- 5 opportunities since 12/16
  - 1 cancelled due to losing TeV store #2090 early
  - Lots of small pilot shots on first try
  - Usually 1 or 2 shots in subsequent attempts
- Initial goal is to streamline shot procedure
  - Only 2 individual transfers "failed" – no beam unstacked in Acc.
  - Time of no stacking ~ 60-65 minutes
  - 2 shots delayed by Booster, MI problems during setup
- Average transfer efficiency ≈60%
  - Leaving 10% beam in MI – need to improve coalescing
- Shots successful overall – still learning and adjusting to minimize impact on Tevatron operations

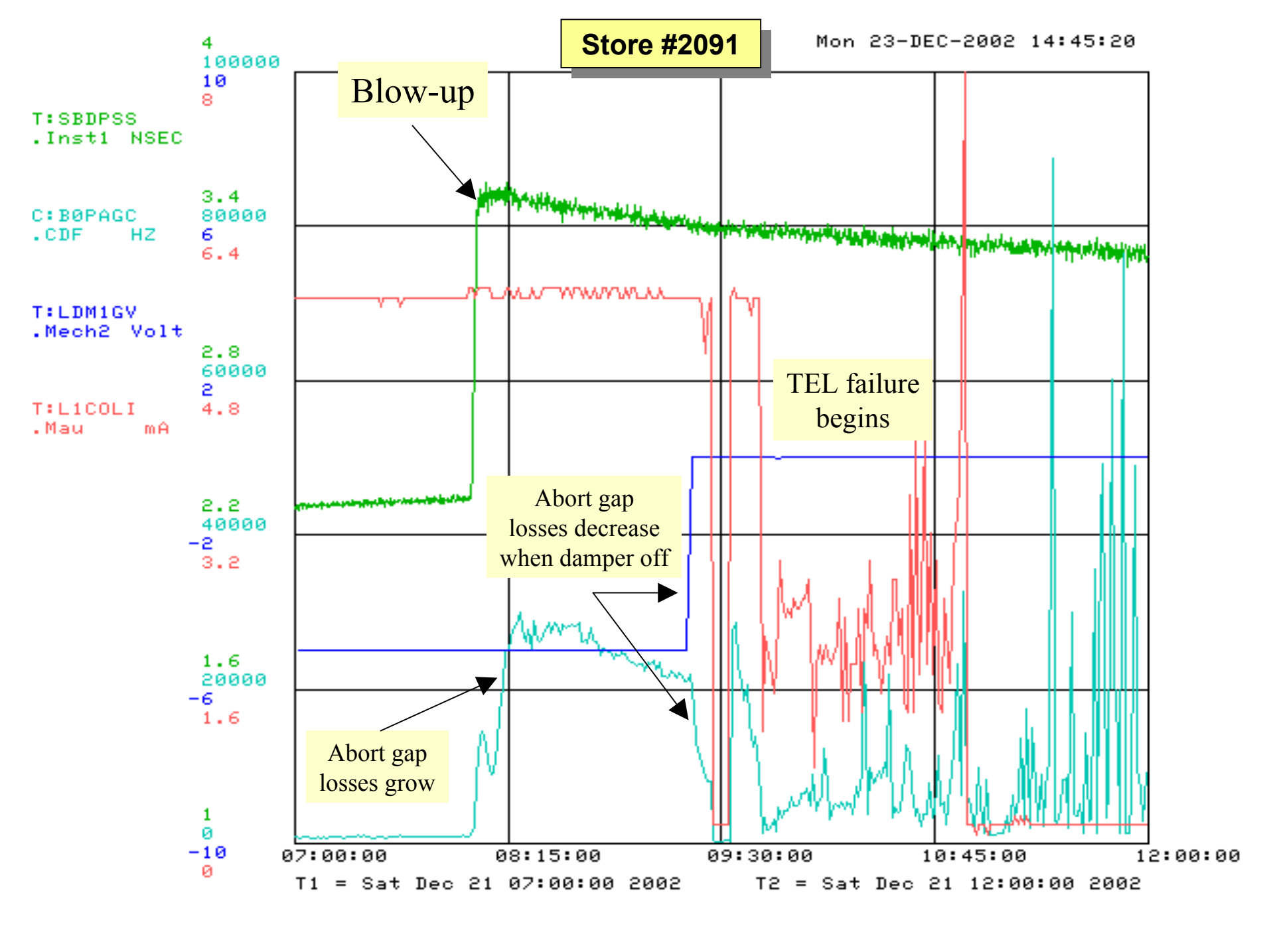
Tevatron Studies

- Adjusted feeddowns @ 150 GeV to improve decoupling
  - Minimum horizontal, vertical tune split < 0.002 on both helices
  - Chromaticity on proton helix 2 units larger than before
  - Can now run both horizontal, vertical transverse dampers to allow lower chromaticities to improve lifetimes
    - Pbars lost @ 150: Store 2078 – 15% ⇒ Store 2097 – 8 %
- Pbar removal to compare flying wire / synch light monitor
  - Try to understand differing emittances from the two systems
  - TEL removed 30 pbar bunches, then vert collimator scraped rest
  - Initial flying wire emittance high (43π vs 20-24 π expected)
  - Sync light had significant offset 12-18π when essentially no beam
- Measure transverse impedance of C0 lambertson
  - Lambertsons now thought to be large source of impedance (up to 5 MΩ/m) and strong head/tail instability

Hardware Problems Friday-Sunday

- Lost store #2090 due to safety system – bad UPS
- Longitudinal damper blew-up proton bunch length (store #2091)
  - Losses in abort gap grow – CDF turned off Si
- TEL failed as abort gap losses began to decrease (store #2091)
  - First replaced melted capacitor array
  - Then found water leak
  - Required tunnel access and 8 hours to repair
- Booster extraction kicker MP02 regulator failed
  - Related to elevated temperature in Booster gallery?
  - Required a few hours to finally understand, replace chassis
- Booster injection Lambertson supply failed (only ~1 hour down)
- Proton abort kicker prefire ended store #2094
  - Got lucky with timing – almost in abort gap
  - No additional damage to CDF Si
  - Conditioned all 10 thyratron tubes for 6 hours


Store #2091
Mon 23-DEC-2002 14:33:01
Blow-up
Proton removal
TEL failure begins
T:SBDPSS .Inst1 NSEC
C:FBIPNG .Inst1 1E09
C:FBIANG .Inst1 1E09
T:L1COLI .Mau mA
C:B0ILUM .CDF E30
C:D0FZTL .Ctrls E30
4
8000
1000
10
3.4
6400
800
8
2.8
4800
600
6
2.2
3200
400
4
1.6
1600
200
2
1
0
0
0
40
40
32
32
24
24
16
16
8
8
0
0
21 07:00
21 09:38
21 12:16
21 14:55
21 17:33
T1 = Sat Dec 21 07:00:00 2002
T2 = Sat Dec 21 17:33:45 2002


Store #2091
Mon 23-DEC-2002 14:45:20
Blow-up
TEL failure begins
Abort gap losses decrease when damper off
Abort gap losses grow
T:SBDPSS .Inst1 NSEC
C:B0PAGC .CDF HZ
T:LDM1GV .Mech2 Volt
T:L1COLI .Mau mA
4
100000
10
8
3.4
80000
6
6.4
2.8
60000
2
4.8
2.2
40000
-2
3.2
1.6
20000
-6
1.6
1
0
-10
0
07:00:00
08:15:00
09:30:00
10:45:00
12:00:00
T1 = Sat Dec 21 07:00:00 2002
T2 = Sat Dec 21 12:00:00 2002

Other happenings this past week

- Shutdown Tuesday > 1 shift
  - Tevatron surveys for C0 lambertson, magnet rolls
  - Main Injector (4.5 hours) and Tevatron safety system tests
  - Cryo maintenance
  - Electrical/power supply maintenance
  - Various tunnel tours in preparation for January shutdown
- Completed safety system tests after store #2090 lost
  - 3 hour Tev test + collision halls
  - No need for variance to extend grace period
  - No need to shutdown to complete tests
- Impromptu proton removal study at end of store #2091
  - Needed to scrape beam anyway to eliminate DC beam without TEL
  - First time for proton removal without quench
  - Took more than 2.5 hours, but gained valuable info on removal process and flying wire, sync light comparison

Summary

- Various hardware failures: only delivered 3.7 pb^{-1}
- Completed safety system tests whose grace period expiring
- "Fast" Recycler pbar shots progressing well
- Tevatron transverse dampers on @ 150 GeV
  - Continue to improve lifetimes, leading to better luminosity
- This week is stack and store.

- These talks available on the web via:

  http://www-runii.fnal.gov/RunCoord/RunCoord.htm