

Tevatron progress: January'04 to March'04

- Luminosity: (average initial peak L)
 - **Mid-January (7 stores #3175-3189) $L=44.3$**
 - **Mid-March (7 stores #3175-3185) $L=57.0$**
 - +12% N_p , +21% N_{pbar} , eff emm -4%
 - record L as of Jan.23 $51.8e30$ store #3108
 - record L as of Mar.12 $67.8e30$ store #3261
 - lifetimes of N_p & N_{pbar} ~same (~90hrs, ~27hrs).
Lumi lifetime slightly improved (8.6→9.5hrs)
- FY'04 goal integral 300 pb-1 (now 104 pb-1)

Highlights on Operations/Reliability:

- >30hrs stores, 140 store hrs/weeks → large stacks
- Now 104 pb-1 out of FY'04 goal integral 300 pb-1
- Two shots from RR – first ever
- Smaller emm from AA ← time to cool
- Backporch time fixed at 96 sec (MikeM)
- Stores lost due to : valves closed (2), unwanted collimator move, RF did not ramp
- Separator spark on ramp
- High abort gap losses (10→15→20kHz – no help)
- Pbar ramp efficiency reduced 98% → 91%
- Scallop – here and there

Tevatron Beam Physics Progress:

- 115% helix studies reveal lifetime improvements, tuneup was needed in real stores (Ron, Tanaji)
- Optics measured at LB, $\pm 20\%$ beta-wave (Valery)
- P1 line optics measmnt $\rightarrow 1.2\pi$ (D.Johnson)
- 5% dBeta at 150 helix (Phil Yoon, XL)
- $1/d^3$ losses observed in TEL EoS study (TS,FZ,XL,VS)
- Data and analysis of pbar bunch tunes (Paul L)
- “Truck effect” (Todd)
- Failed to clean DC beam with 300W noise (Tan, JS, VS)
- Strange: 180 Hz on ramp (Vahid), high Schottky $>800\text{GeV}$ due to pbar loss (VS), 50 mrad long oscillations at LB (VS, Bob Webber)
- No success so far with fixing crossing angle (Peter, Yuri)

Tevatron Diagnostics:

- 1.7GHz Schottky tunes (Paul Lebrun)
- BPM prototype $<9\mu\text{m}$ orbit, $15\mu\text{m}$ TBT (JS, BW, et al)
- $C_{v,h}$ from head-tail: 3-5 points on ramp (Vahid)
- Pbar light “found” (Sasha Valishev, Stephen P)

MISC:

- Letters of Recognition from AD Head to Ralph P, Andreas J, Paul L for 1.7GHz Schottky monitor
- High marks at the DoE review Feb'04
- Mtg/review multi-lab beam-beam simulation efforts
- Situation with beam studies slightly improved, but still...

Next Two Months – Physics/Diagnostics

- Run octupoles and reduce chromaticities → 5-15% in L
- Fix optics and reduce β^* → 5-10% in L
- Roll 4 quads in P1 line to save 1 pi → 3-6% in L
- Reduce pbar loss at start of ramp → 3-6% in L
- Commission inj dampers to reduce $d\epsilon$ at inj → 2-5% in L
- Finally commission!:
 - Abort gap monitor (Sasha, Stephen, Eugene Lorman)
 - Pbar SL mirror move in/out (Stephen, Sasha, Dean)
 - Commission tunetracker (CYTan)
 - Commission head-tail monitor (Vahid Ranjbar)
 - dEmittance application (Aimin Xiao)
 - Beam Motion @ Abort system (Vic+)
 - CDF β^* analysis on-line (N.Lockyer, Vaia)

Major March 15 Shutdown Projects

- Fix cryo leak at A44 D.Augustine
- Roll 4 quads in P1 line D.Johnson
- Survey and move quads around B0 J.Annala, J.Volk
- Reshim 12 dipoles D.Harding
- Fix E11 FW J.Zagel
- Replace rusty stands Q1/Q5 A-4 J.Volk
- Separator as founds around D0 J.Volk
- Unroll 47 magnets at E4,E3,... J.Volk
- Home made water system at B4 J.Guerra

Next Two Months: Expectations

- Last time it was *“we are around 56-64 by Mar 14”*
- we are at 67.8e30
- Over the next 2 months, I expect:
 - stable operation at high 50's low 60's (e30)
 - possible improvements
 - 5% due to smaller beta^{*}
 - 5-10% more p ← use of octupoles
 - 3-7% more pbars ← ramp efficiency, fix
 - 3-6% smaller eff.emittance after P1 line rolls
- As the result, I expect peak luminosity be around 68-78e30 by mid-May, 2004