

Tevatron collider progress: May to early July 2002

- I. Luminosity: → early May (stores #1280-1289)
Average initial peak $L=16.78$
→ early July (5 stores #1494-1518)
Average initial peak $L=18.6$

or 11% increase =

+mostly due to smaller pbar emittance
at injection → more pbars at low-beta

Met Run II milestone ($2e31$) : store #1499 with $2.13e31$

- II. Reliability: → Tev worked unreliably after shutdown
→ Tev tunes, apertures, coupling, losses are very different from before May 21
→ σ_s blow up is still there
→ F11 vacuum losses reduced by ~10
→ Store lost due to kicker pre-fire

III. Technical progress:

- A0 aperture opened by angle bump
- 150 GeV tunes/coupling drifts are studied
- Vacuum, RF leak losses separated
- F11 RWM ferrites replaced
- F0 BPMs, striplines aperture opened
- Longitudinal B-b-B damper commissioned*
- CO Lambertson replacement project started
- Diagnostics: Ron's digital mountain range now works, TBT available from all BPMs, Q-meter OK

IV. Issues:

- p, pbar lifetime @ 150 GeV as bad as before
- P-loss on ramp is up 5%→15%
- Pbar loss on ramp as bad as before (13%)
- Pbar loss early in squeeze is up 4%→12%
- "final touch" on SyncLite commissioning
- apertures are changed (tighter) after shutdn
- transverse instability 150→980, blown pbars
- too many puzzles (dancing p, β -Q& τ , collim-s)

Previous "Expectations" (May 2002):

p, pbar lifetime @ 150 GeV, loss@ramp improved in 2-3 mos
(octupoles, "new new" helix, adjust tunes&coupling)

NO

→ some 15-20% luminosity increase

more protons from MI

in 1 mo

FAILED

→ some 15-20% luminosity increase

injection tune-up

in 2 mos

(better closure, MI → Tev pbar eff, injection dampers)

F0 Apert

→ some 10-20% improvement in luminosity

— helps effic.

pbar intensity and emittance improved

in June

(pbar cooling)

yes

→ some 20-40% improvement in luminosity in August

Luminosity of $2.5e31$ before June shutdown

NO

$3.5e31$ in September

→ still possible

Vacuum improved by factor of 3

in two steps June, Oct

Aperture opened

in June(F0), Oct (C0)

SyncLite, Collimators, SBD, BLT

expect progress in 3mos

V. Expectations:

pbar loss on ramp, squeeze improved in 2 mos

(adjust tunes&coupling, smooth orbits)

→ some 10-15% luminosity increase

more protons to LB (till instability, 200e9?) in 2 month

→ some 10% luminosity increase

progress with Pbar source and MI in 2 mos

(smaller pbar emittances, MI coalescing, MI → Tev pbar eff)

→ some 5-15% improvement in luminosity

...as the result →

N_pbar increased to >600e9 at LB

N_p increased to 7200e9 at LB

Same or slightly smaller emittances as now

→ some 20-40% improvement in luminosity in August

Peak luminosity of 2.6-3.0e31 early Septemeber

Transverse dampers commissioned in 2 month

Preparations to October shutdown till Oct.

