Bunch Merging at 24 GeV

- Goal: 16 Tp per bunch
- The scheme
- Set-up problems
- Result
- Future work to increase bunch intensity

The Scheme

- h=6 bunches (SEB) limited to 12 Tp
- Booster can deliver >15 Tp/bunch
- Combine(merge) two Booster bunches
- AGS
  - Accelerate on h = 12
  - Total beam loading is low
  - Merge at 24 GeV/c into h = 6
  - Extract to target!

Set-Up Problems

- Booster-to AGS (BTA) cogging
  - Forgot to use h=6 as AGS target at transfer
  - Hacking the software created some "confusion"
  - A hardware patch was left in when the software was fixed…etc.

- Harmonic jump in AGS Beam Control loops
  - Loops work on bunch-to-bucket phase
  - At the "critical time" the loops have to switch from h=12 to h=6
  - The trigger for this switch failed (fired on noise)
  - Had to STOP the loops at the "critical time"
  - Stopping loops with a transient is tricky

Result

- The rf gymnastic was set up and stable (caveat above)

- Merged bunch at 10Tp was extracted
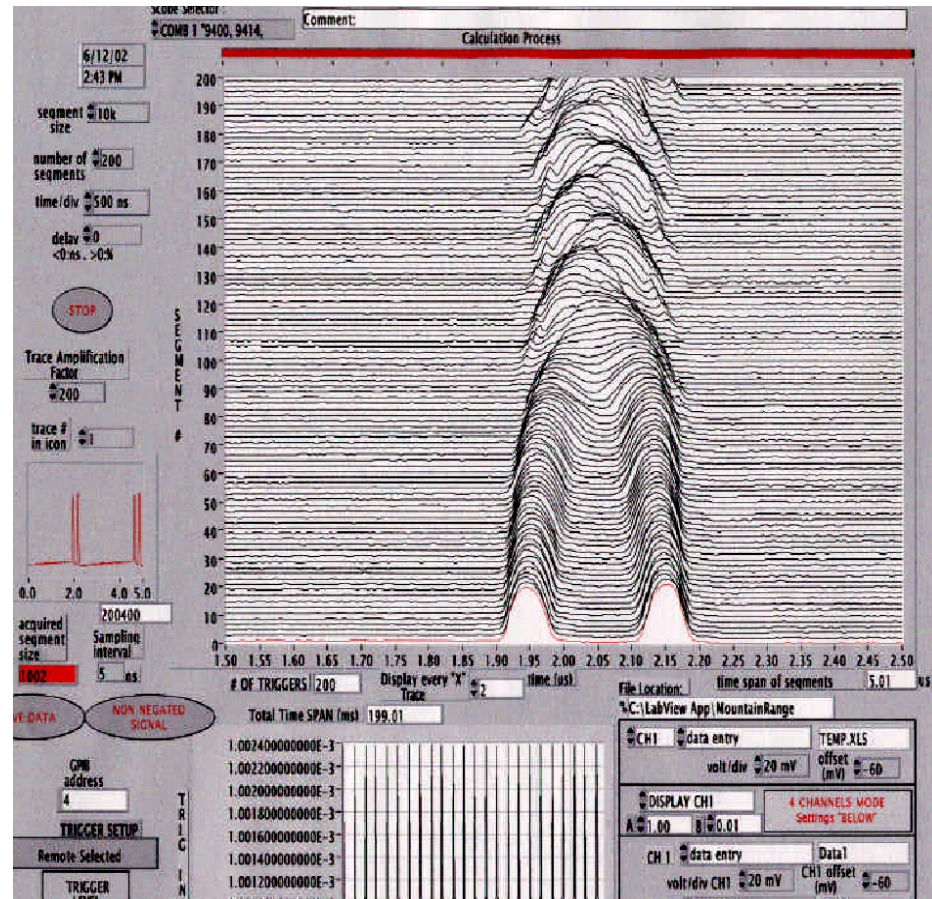
Future Work

- Fix the problems
  - BTA cogging
  - Beam control loops at merge
- Optimize Booster
  - Longitudinal painting at injection
  - Switch on h=2 rf (beam loading)
- AGS
  - Momentum match between machines (capture frequency)
  - Optimize VHF "dilution" cavity
  - Improve acceleration cycle
    - Time on injection porch (flat bottom)
    - Acceleration rate, Westinghouse to Siemens PS, x2 B-dot