
Rapid Accumulator to Recycler Transfers Update

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AD/Pbar source
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Frequent Antiproton Transfers

- Introduction
- Progress report
 - Facets
 - Speed
 - Efficiency
- Summary

Frequent Antiproton Transfers - Introduction

- Run II Upgrade project
- Motivation for speeding process
 - Increased stacking rates only possible by not building a core - empty the Accumulator when it 'fills up'
 - Maintain as high an average stacking rate as possible - minimal impact on stacking
- Expected set-up time - ultimate goal
 - move from shot set up to transfer when full
 - actually, *automated* transfers as they occur on event now
 - Unstack/transfer time now ~30 seconds, driven by time to adiabatically bunch, accelerate, and extract pbars from the Accumulator

Frequent Antiproton Transfers - Introduction

■ Requirements

➤ Time

- Empty stack every 30 minutes
- Transfers of order one minute

➤ Stack size

- 40×10^{10} or less

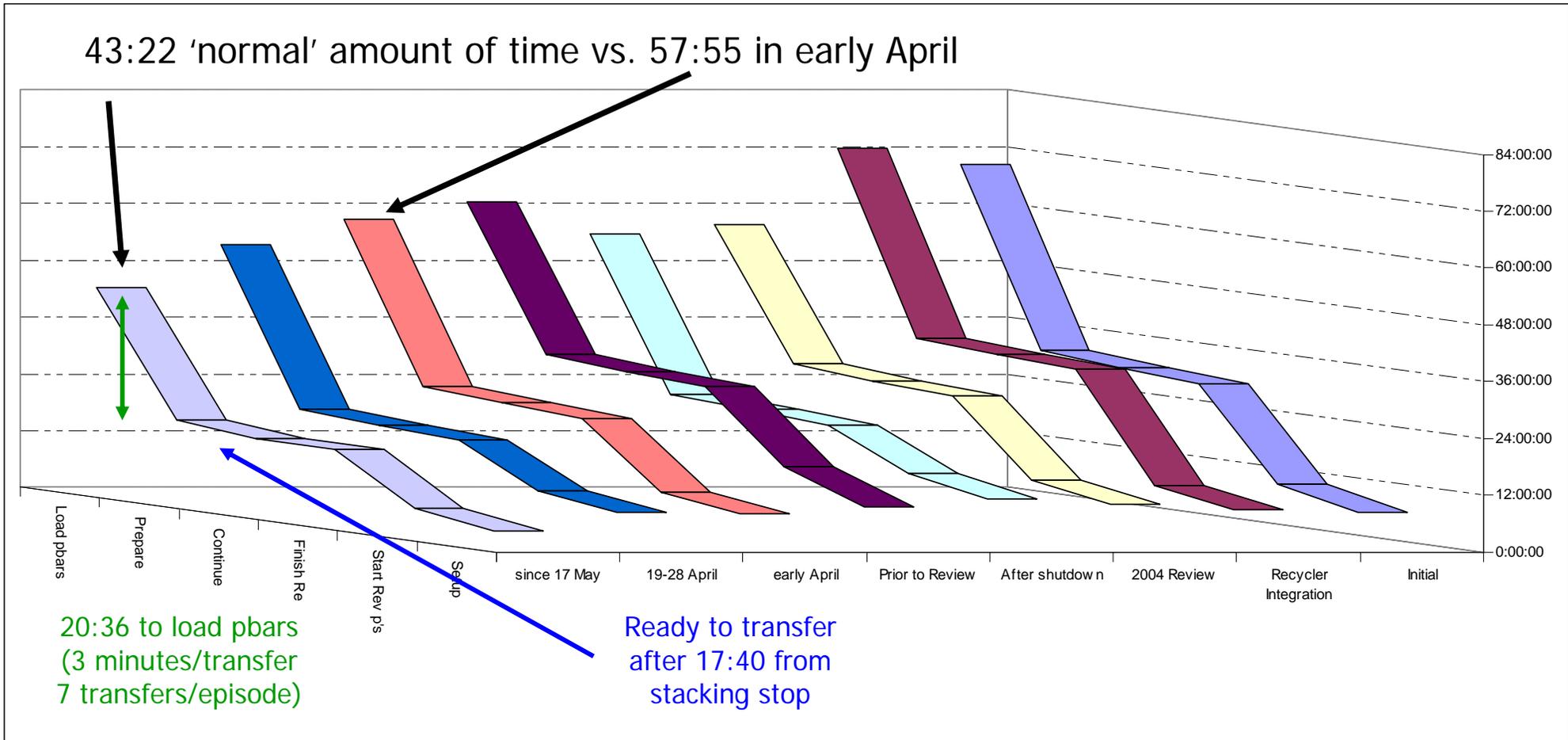
➤ Emittances

- Transverse: 10π mm-mrad (95% normalized)
- Longitudinal: 10 eV-s
- Up to 50% dilution allowable

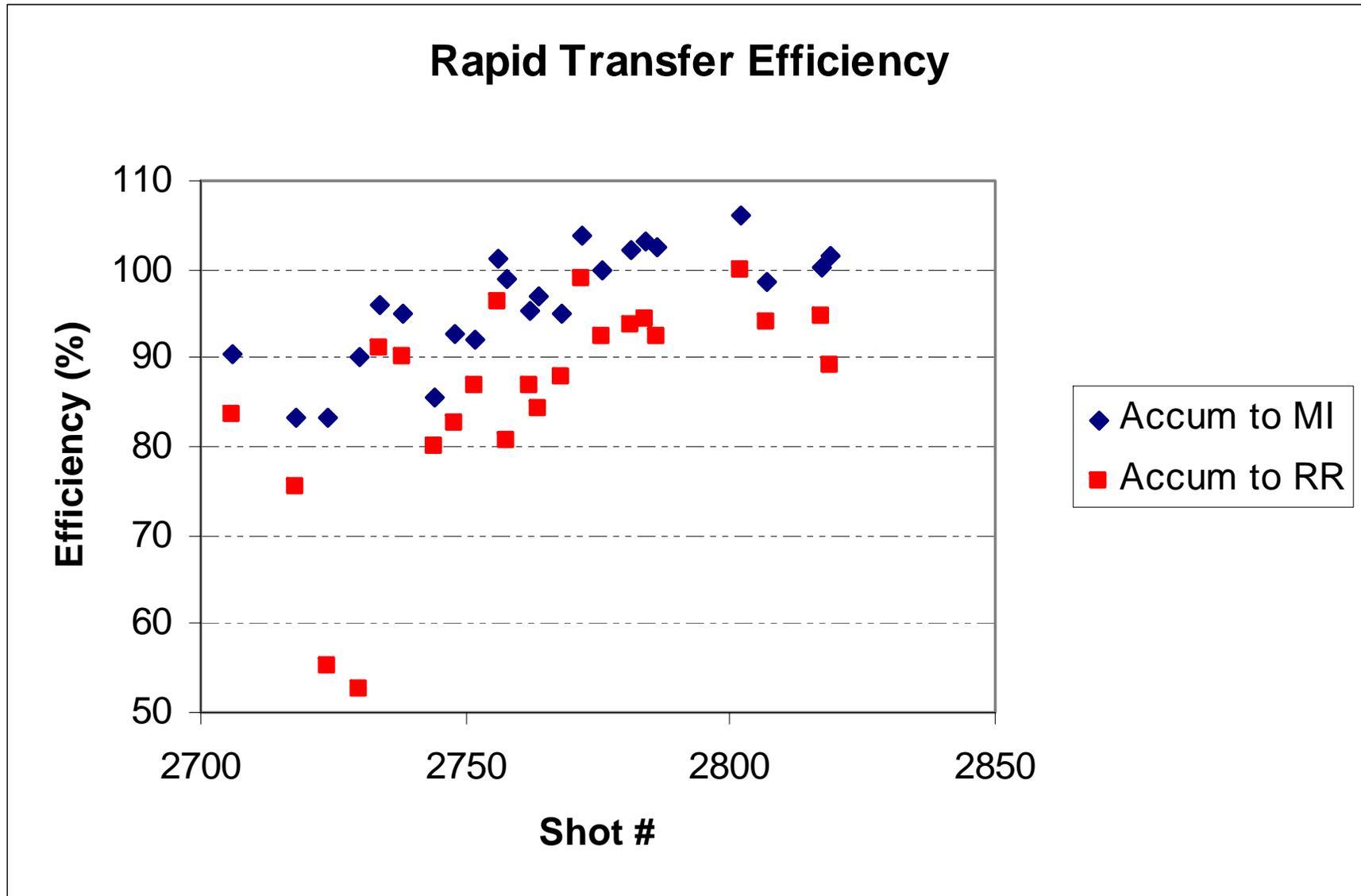
Frequent Antiproton Transfers - Introduction

- Intermediate Goals (since early April)
 - 15-minute transfers
 - High & Consistent Efficiency
 - No reverse proton tune up
- Tradeoffs
 - Speed
 - Efficiency
 - Emittances
 - Stack size

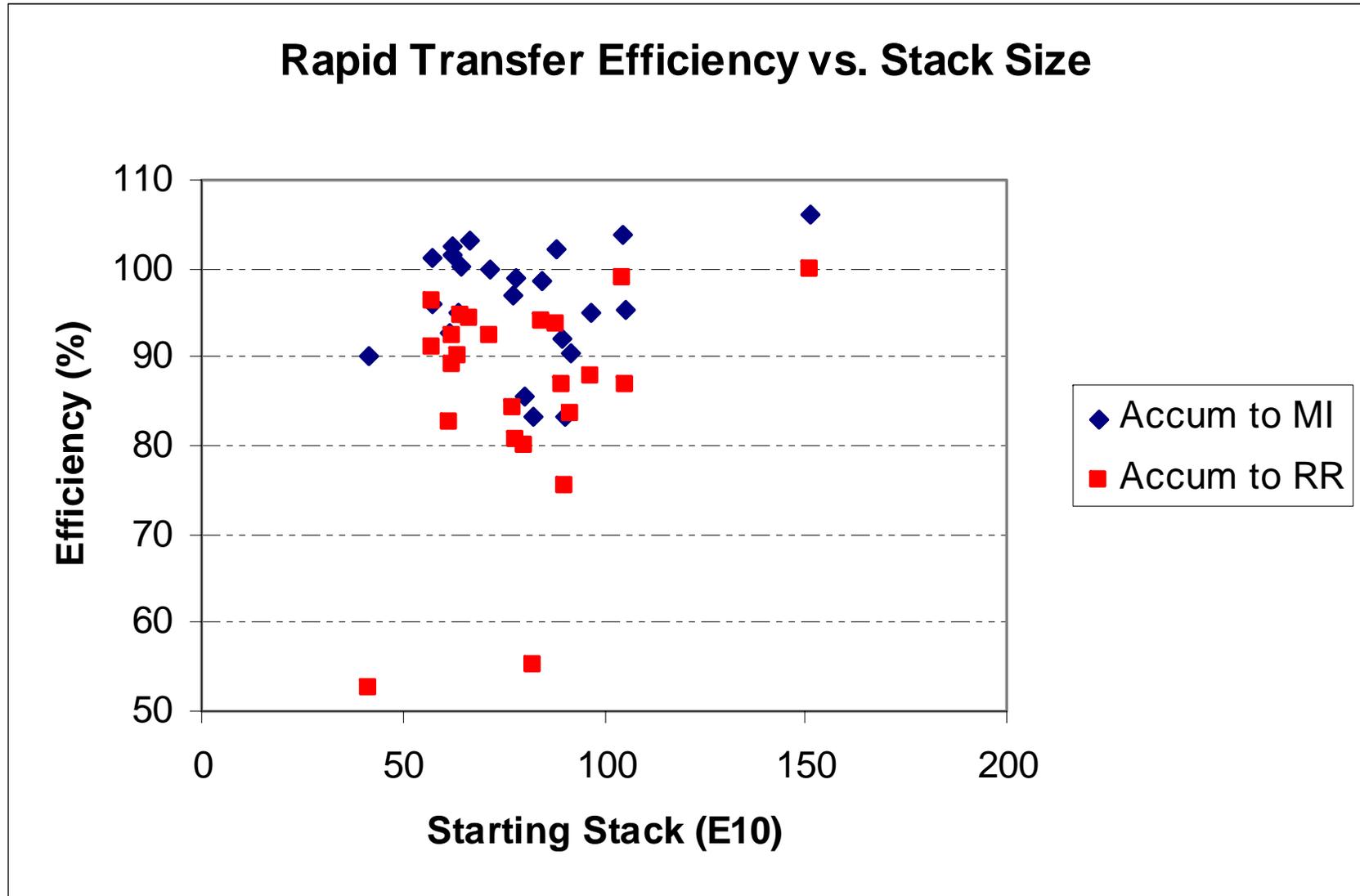
Frequent Antiproton Transfers - Current State



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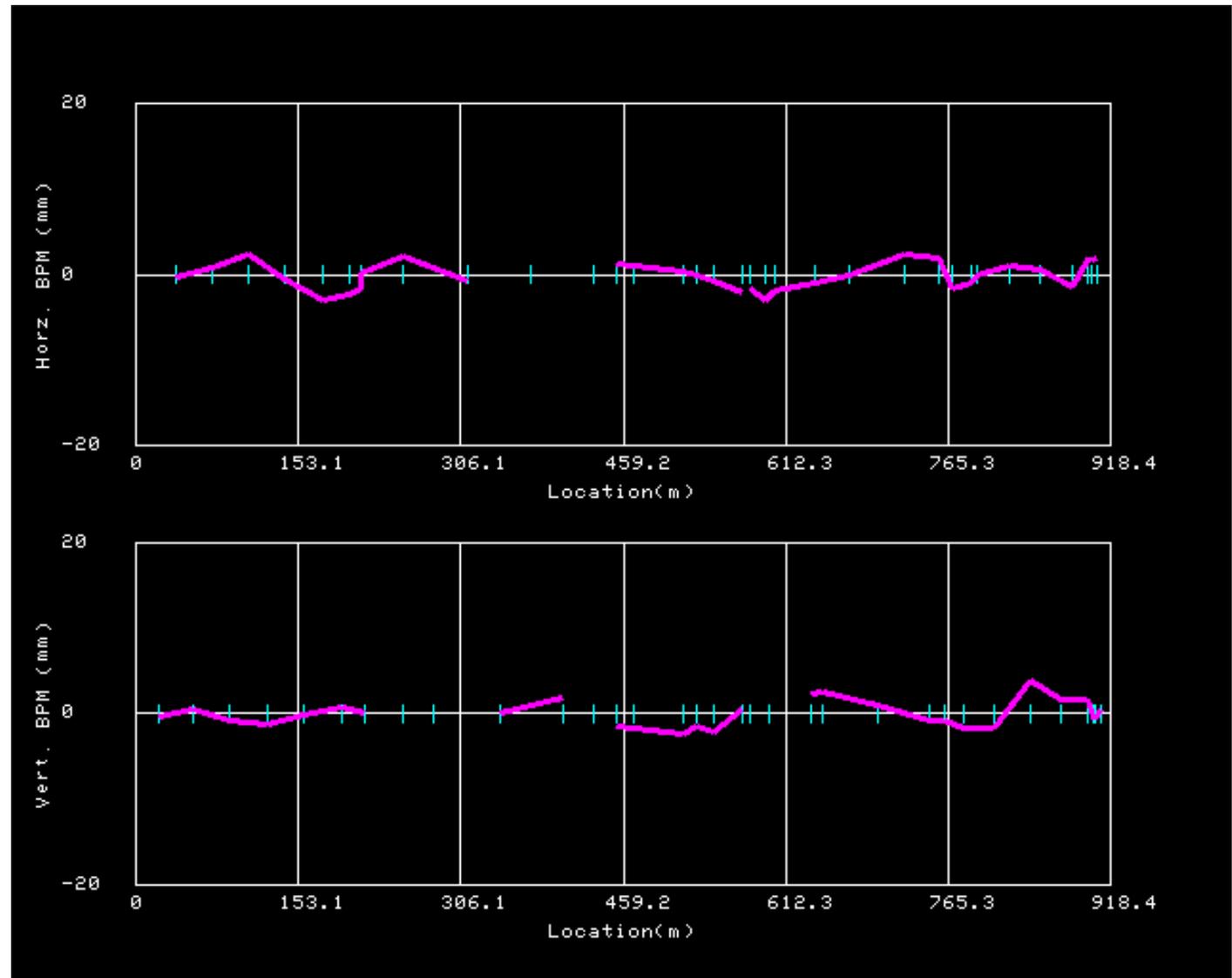
- Changes to date
 - MI orbit smoothing/tuneup (SY120 off) before stacking is stopped
 - MI to Accumulator tuneup only when efficiency drops
 - Sample and save Beamline orbit on every set up
 - ~ 1 tuneup/week
 - Sequencer optimization
 - See above
 - Remove unnecessary or redundant steps
 - Fewer checks
 - Stack sooner
 - More work to do
 - NuMI running during set up

Frequent Antiproton Transfers - Current State

- Ongoing work
 - Current Focus on efficiency rather than speed
 - Collect MI extraction position data for reverse protons
 - Looks okay
 - P1 - AP3 orbit data
 - SEM grids
 - Difference between reverse protons and pbars?

Frequent Antiproton Transfers - Current State

- Identical beam line settings restored
- Set-ups 1 week apart
- Consistent cusps?

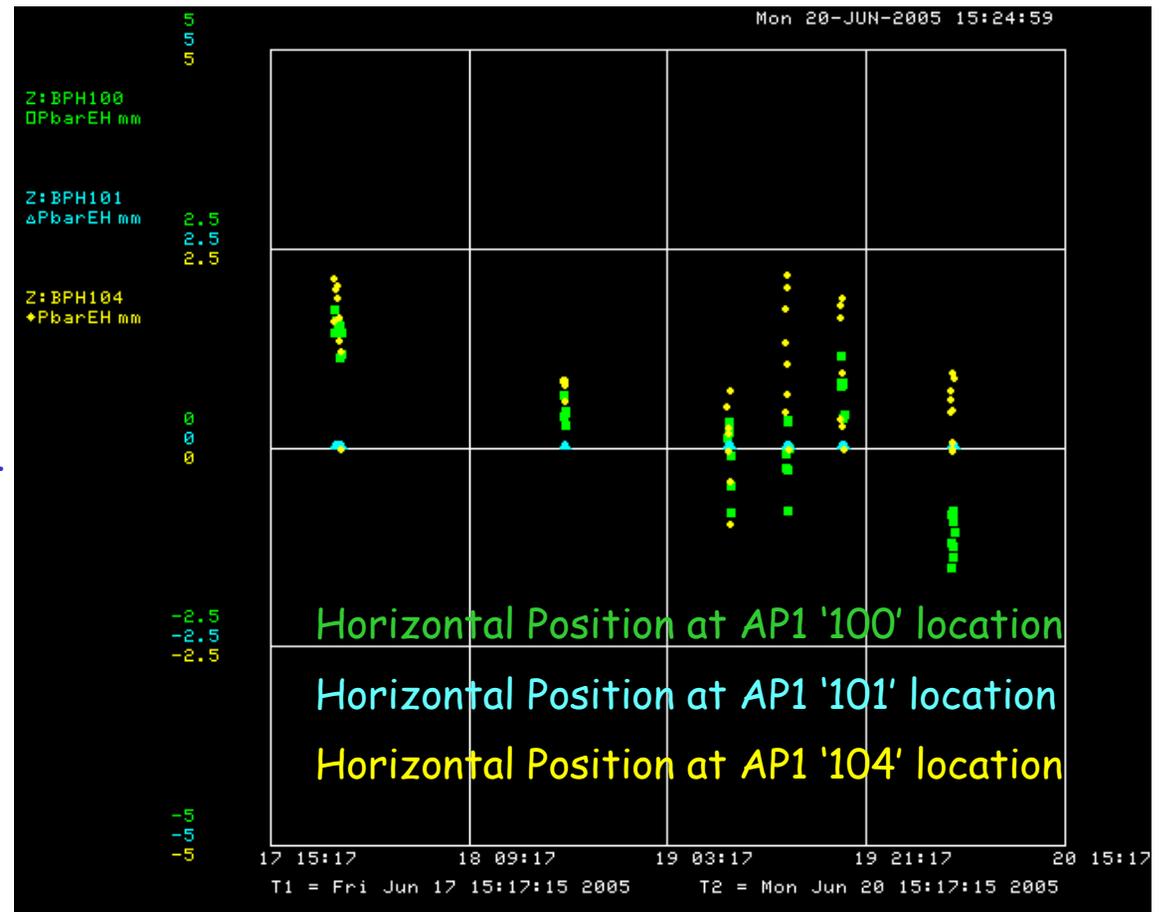


Frequent Antiproton Transfers - Current State

- Ongoing work
 - Next steps/tools
 - Beam line BPM upgrade
 - MI injection damper
 - Ramp AP1 power supplies

Frequent Antiproton Transfers - Diagnostics

- Beam line BPM upgrade status
 - Assembly and procurement largely complete
 - Front end software complete
 - Application software in progress
 - First system installed at F23 for AP1
 - Timing and system shakedown in progress
 - Test data with beam being gathered at 53 MHz and 2.5 MHz
 - 3 BPM's/plane instrumented
 - Complete later this summer



Frequent Antiproton Transfers - Summary

- Greater focus on faster and more efficient Accumulator to Recycler transfers
- Transfers are faster, but not yet 15 minutes
 - Stack size/# of transfers
 - No Reverse Proton tuning
- Working to understand source(s) of drift in efficiency
- More tools under development