

Fast Accumulator to Recycler Transfers



- Goals
- Activities to Date
- Speed
- Transmission
- Beam Quality
- Next steps/Priorities
- Extras
- Summary

Goals – from Steve Holmes



- Establish the relevant operational sequences, setup protocols, and supporting controls/software to allow the transfer of 20-30 mA per shot from the Accumulator into a preexisting Recycler stack.
- Establish an operation in which transfers to the Recycler are initiated utilizing pbars stacked immediately after shots, utilizing the stacking lattice, and followed by an immediate return to stacking for collider shots.
- Work with the Run Coordinator to schedule pbar shots to the Recycler at the rate of roughly one per day.
- Organize whatever post-mortem or feedback mechanism is appropriate to improving the efficiency of the activity as it progresses.
- The goal is to achieve in a reliable manner an 85% stacking efficiency in the Recycler and shot times (defined as the interruption in Pbar Source stacking) of under an hour.
- Once this is achieved we will consider embarking on a multi-day dedicated exercise to build up a 200E10 stack in the Recycler.

Goals



- Regular Pbar Transfers to Recycler
- 85% Accumulator to Recycler transmission
- 30-minute turnaround time
- Build up Recycler stash
- Learn to operate Recycler with a continuous stash
- Dedicated 200 E10 stash
- Fast Collider transfers
- Recycler integration

Activities to Date

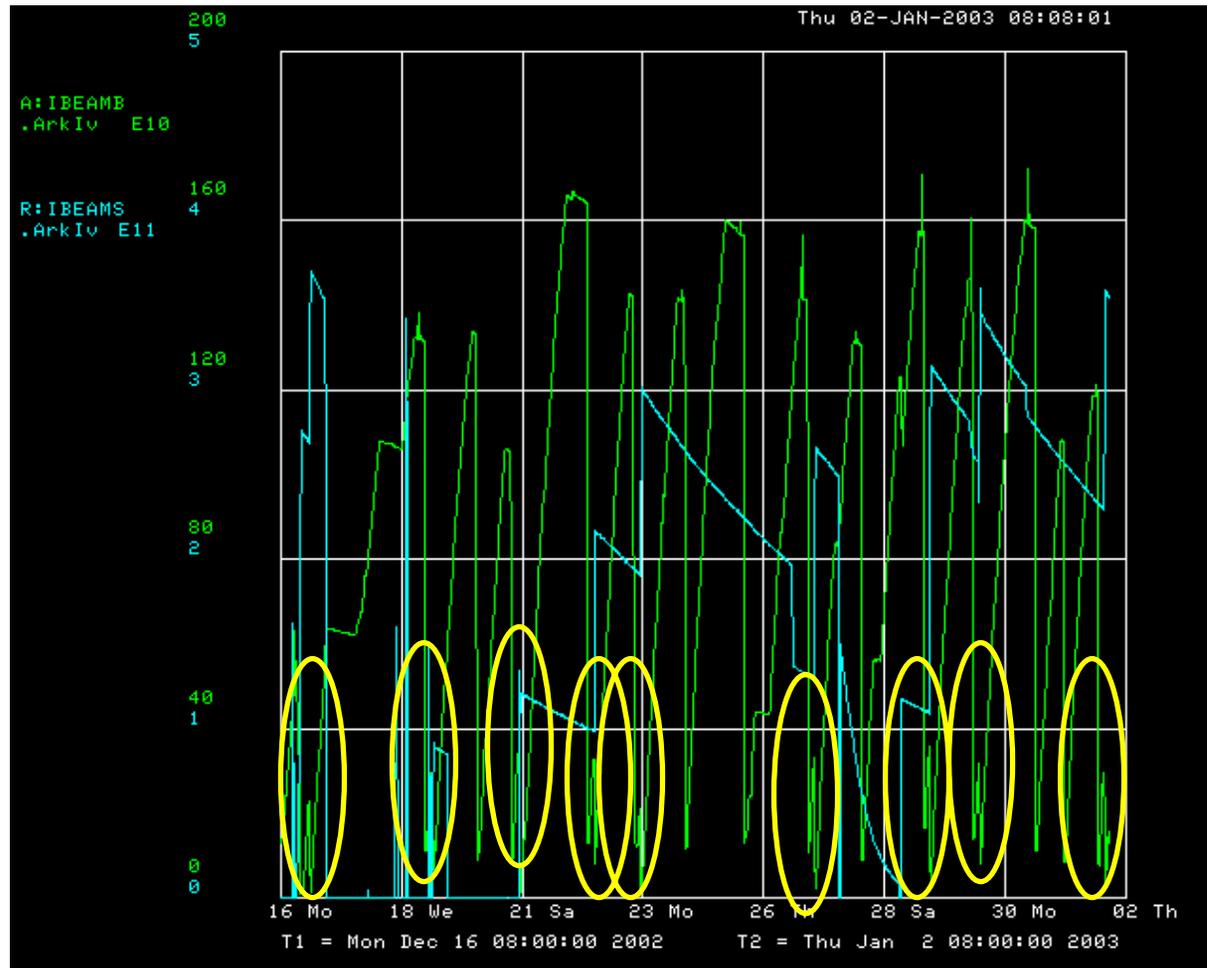


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- Begun 16 December
- 10 opportunities
- Single – several shots
- No failed transfers, but some oops's
- Accumulator remains on 'Stacking' lattice
- Routine – MCR crews do the driving
- Focus on speed and technique
- Beam quality to follow

Activities to Date

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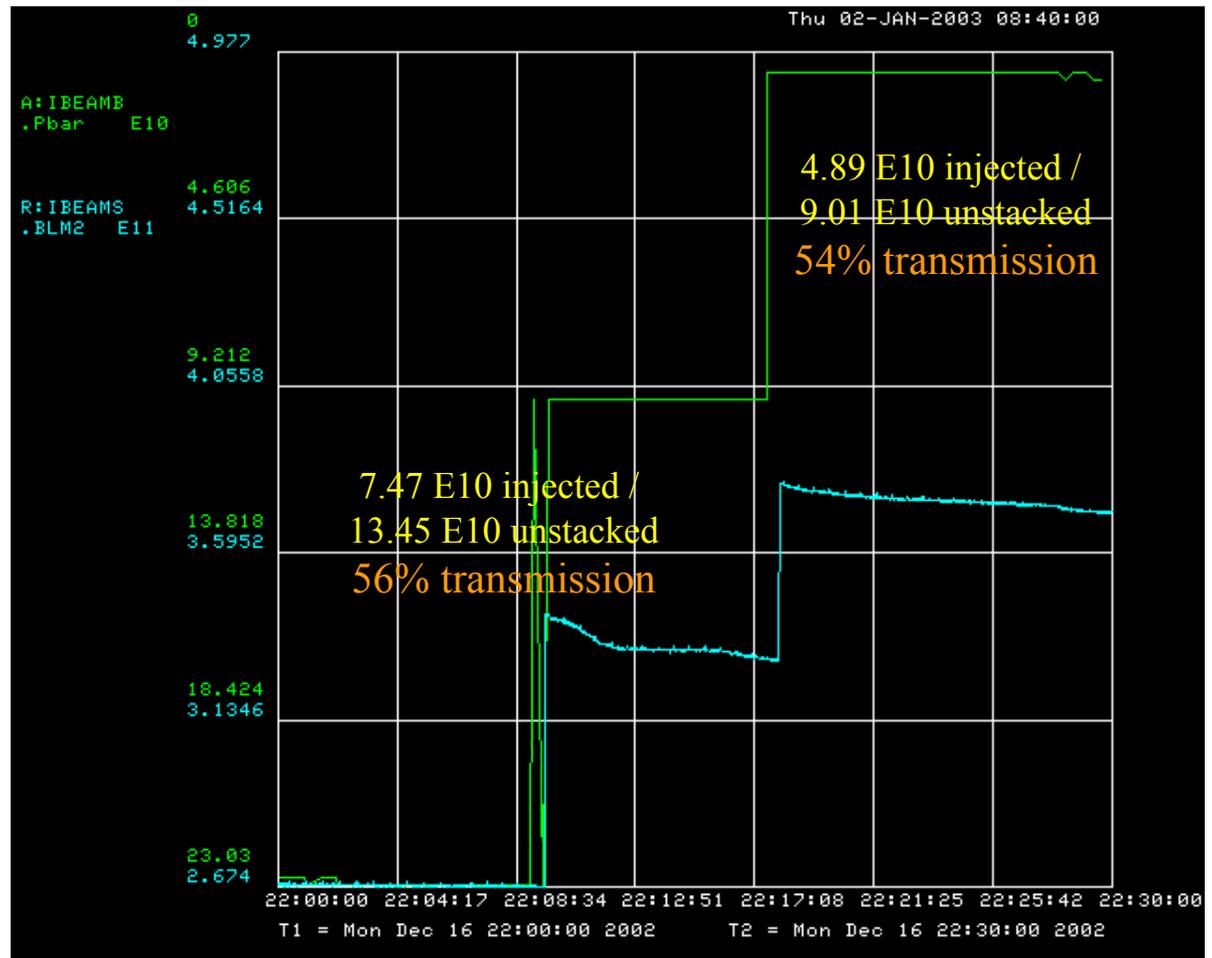


- 60-minutes stacking to stacking achieved ‘effortlessly’
 - Significant Sequencer work, more to come
 - Minimal P1 to AP3 tuning
 - Recycler preparation beforehand
 - MI position setting has been critical path
 - Downtime: vacuum, RF trips
 - Further gains
 - AP1/3 set up
 - Timeline optimization
 - Other shortcuts

Transmission



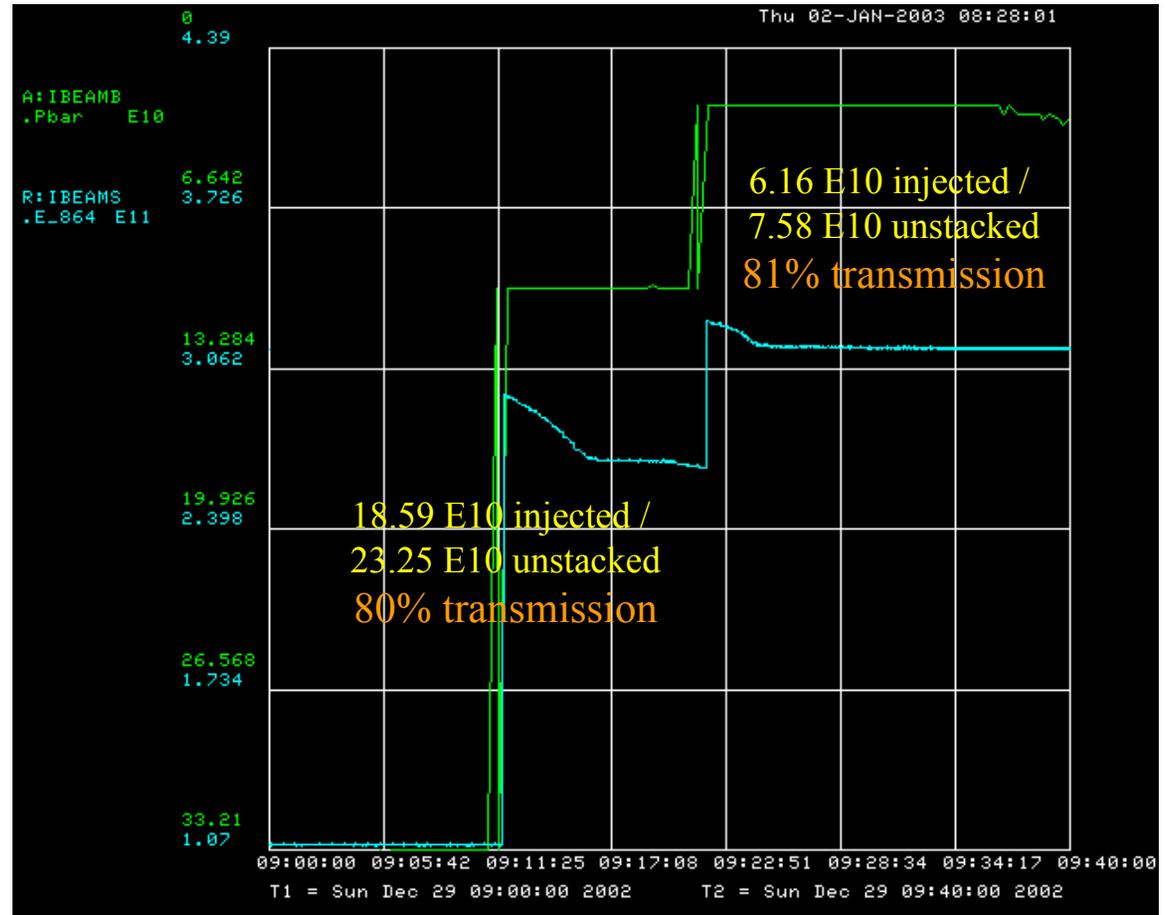
starting conditions



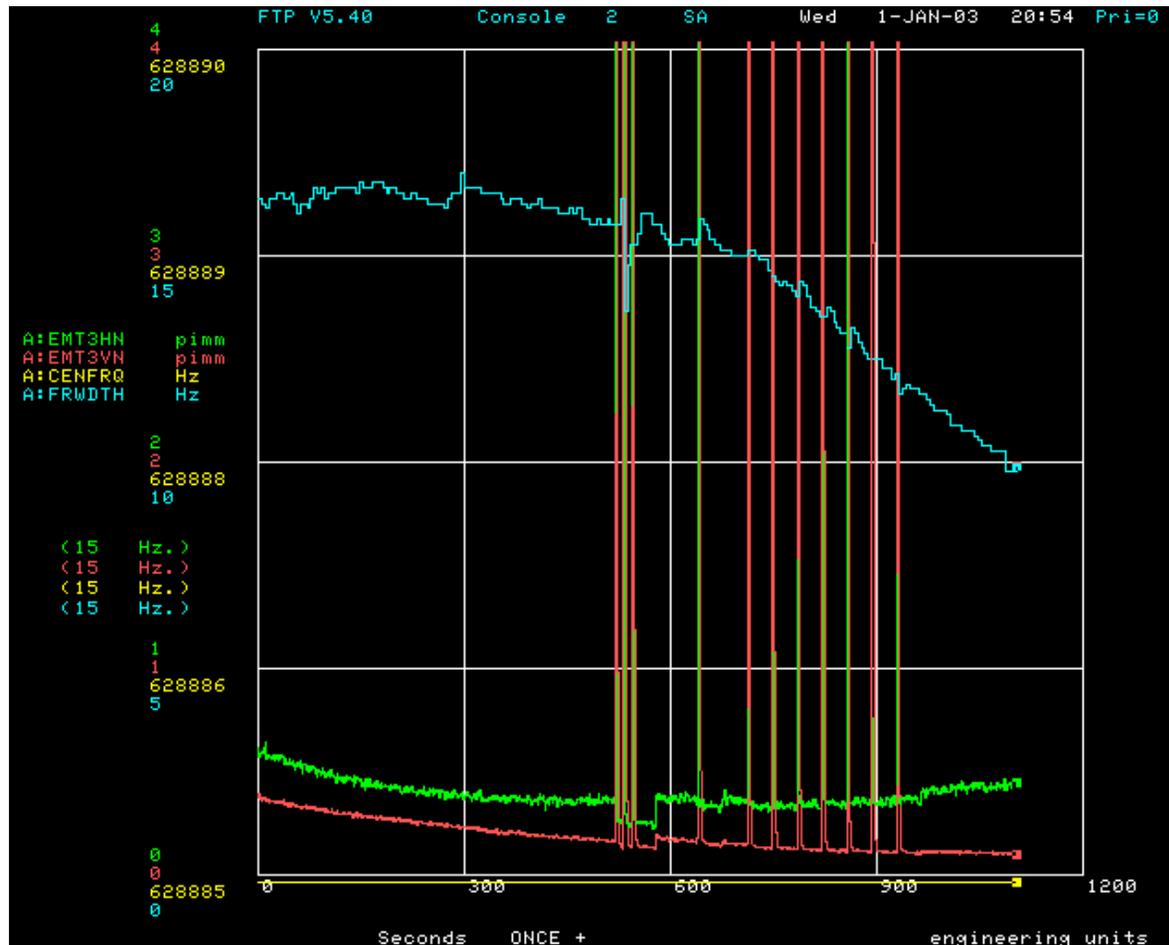
Transmission



‘state of the art’



Beam Quality - Accumulator

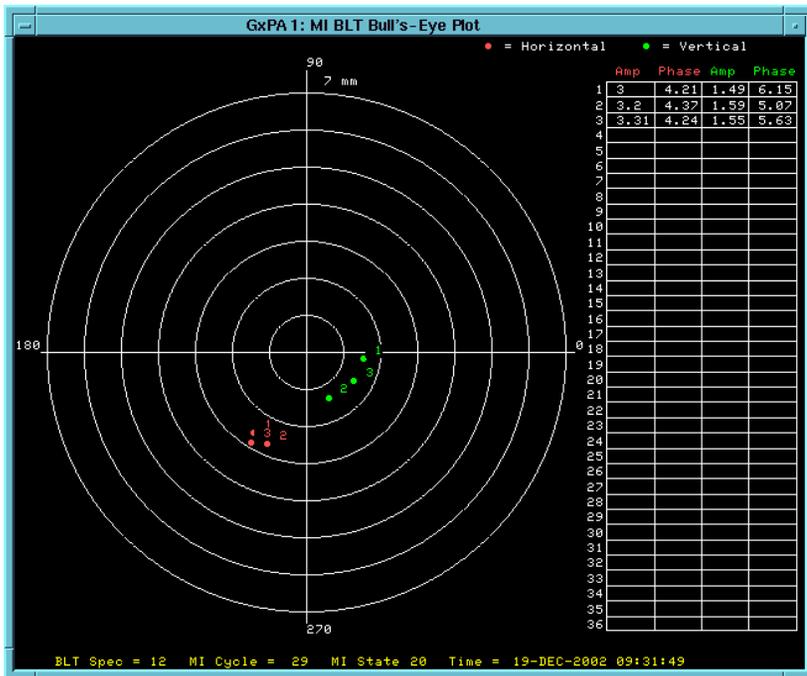


Beam Quality – Transverse

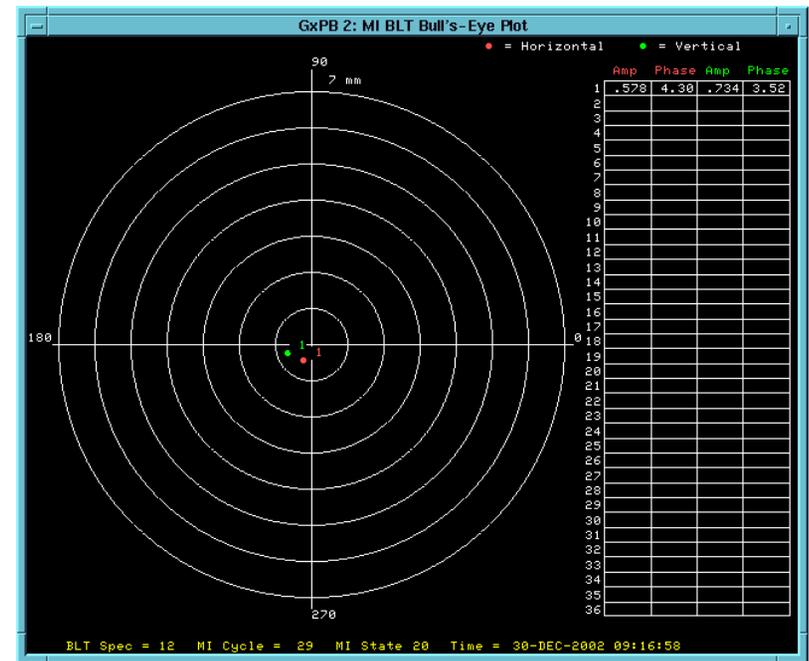


- Scratching the surface
 - BLT
 - Multiwires
 - Alberto taking a lead role in further improvements

Beam Quality – Transverse

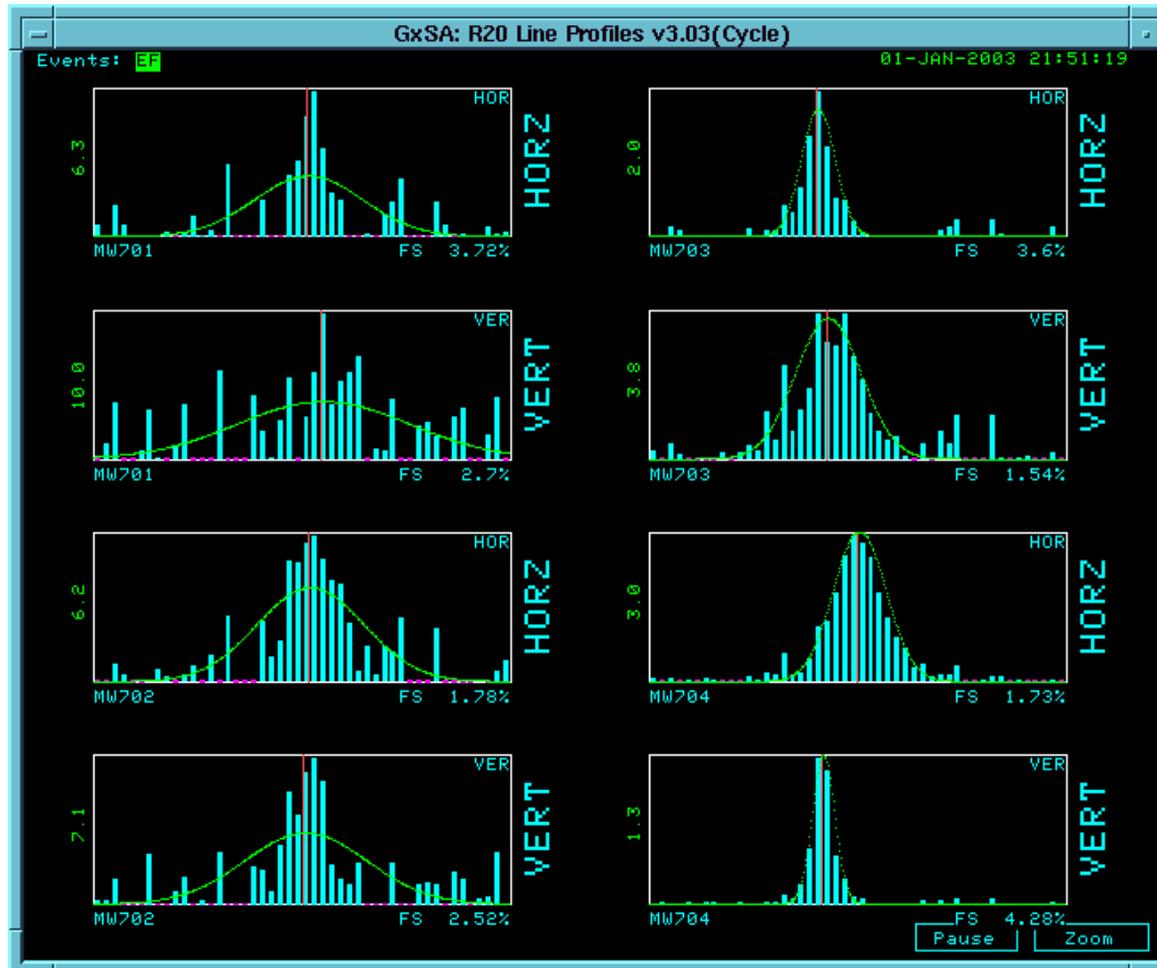


as found
46% Acc - RR



with estimated BLT trim
settings
80% Acc - RR

Beam Quality – Transverse



Beam Quality – Longitudinal

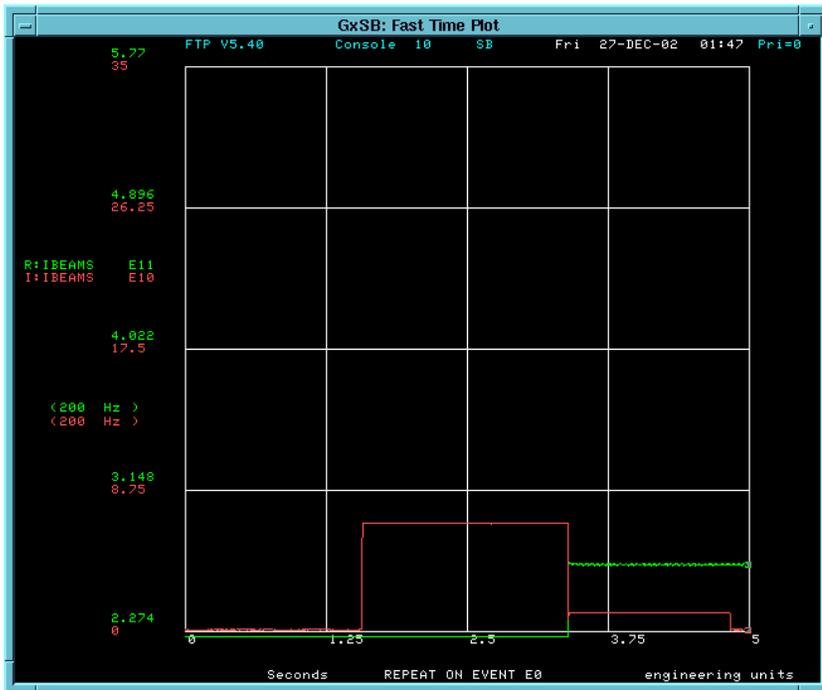


- Scratching the surface
 - New Unstacking paradigm
 - Specify eV-s instead of mA
 - Optimum longitudinal emittance to unstack
 - Recycler acceptance ~ 10 eV-s
 - Accumulator to MI matching RF voltage
 - Cooling gain in recycler
 - Feed-forward compensation
 - Ioanis taking a lead role

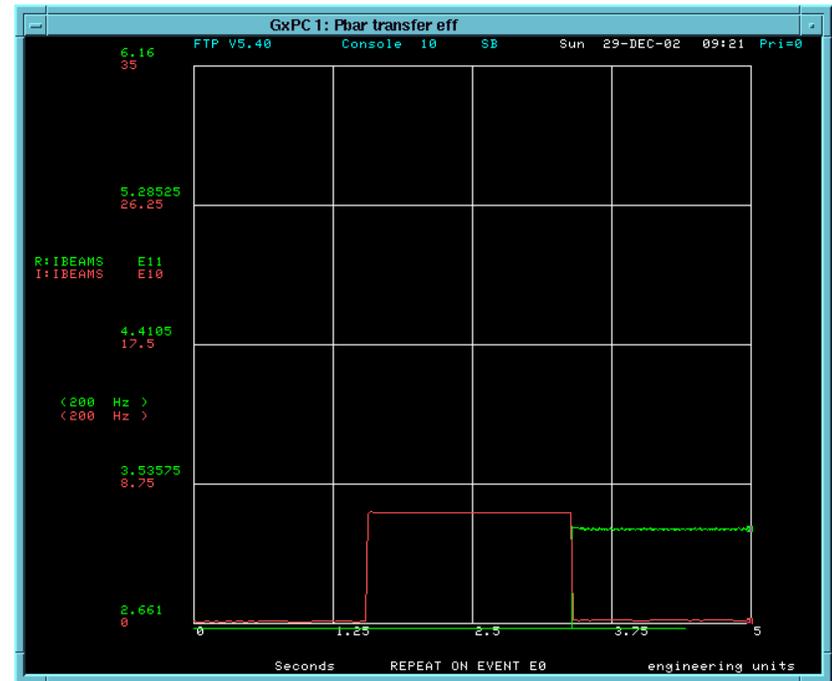
Beam Quality – Longitudinal



RF Voltage effects on Main Injector to Recycler transmission



RF voltage initially at 3.5 kV

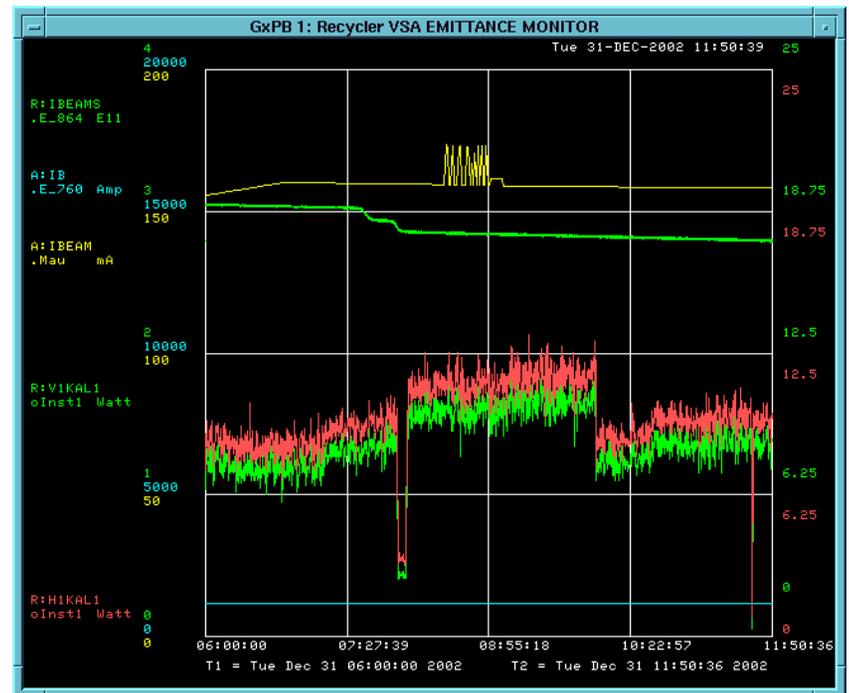
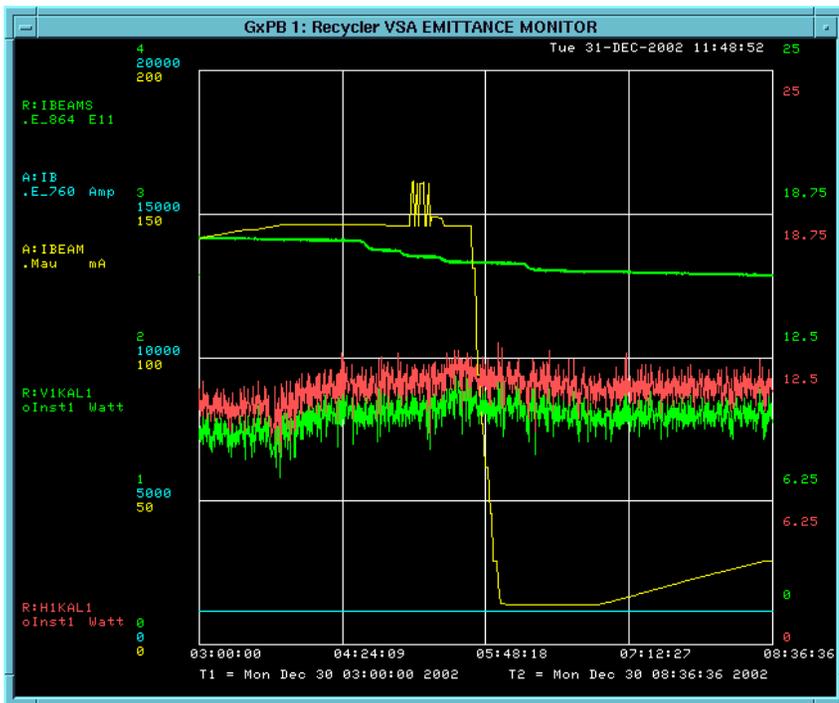


RF voltage increased to 4.5 kV

Beam Quality – Longitudinal



TLG effects on Recycler lifetime



.5 –1 GHz momentum gain increased

Next Steps



- Continue to refine technique
 - Short-term
 - New TLG's
 - Re-order sequencer steps
 - Define/address beam quality issues
 - Stash/study 100 E10 before 13 January
 - Long-term
 - Beam line set-up
 - More TLG changes
 - 2.5 MHz BLT (no more 53 MHz transfers)
 - Beam quality



- SDA
 - Data is beginning to appear
- Acknowledgements
 - MI/Pbar dept. cooperation

Summary



- Technique is maturing on all fronts
- ~1 hour stacking to stacking time
- >80% Accumulator to Recycler transmission achieved
- Beam quality issues starting to be pursued in detail