

RHIC BPM SYSTEM

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APEX Workshop

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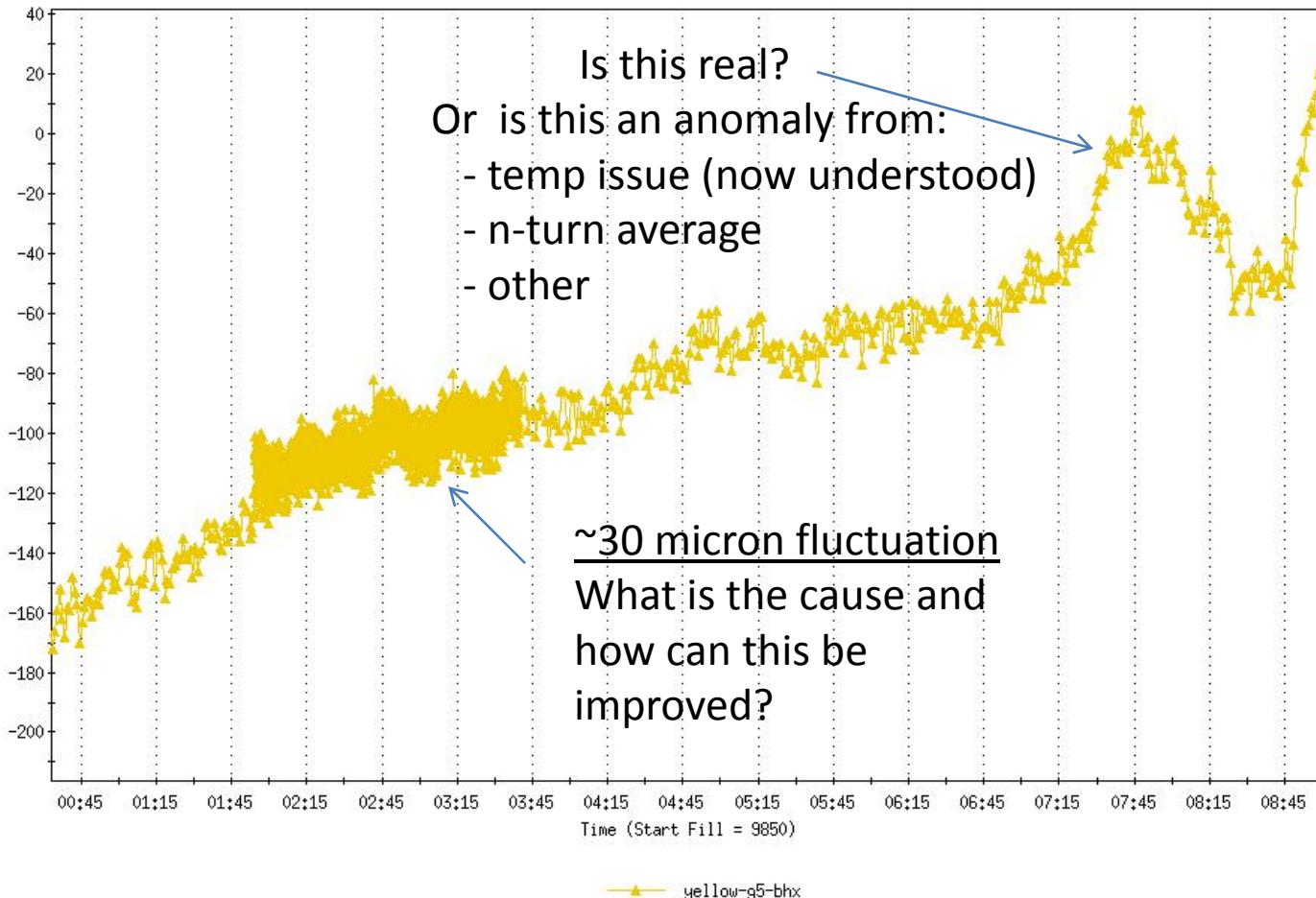
Overview of Work in Progress

- Fixed Trigger Timing Automation
- Timestamp Problems
- Improved Average Orbit Calculation
- Repair of Bad Feedthroughs and Bad Cables
- New Status Bits and Data Integrity Checks
- Measuring and optimizing DSP execution time
 - Position calculation, interrupt handlers, etc.
- Timing Calibration with Beam
 - To (hopefully) resolve issue where position variations with building temperature
- Continue searching for issues and resolutions

Focus for this Presentation

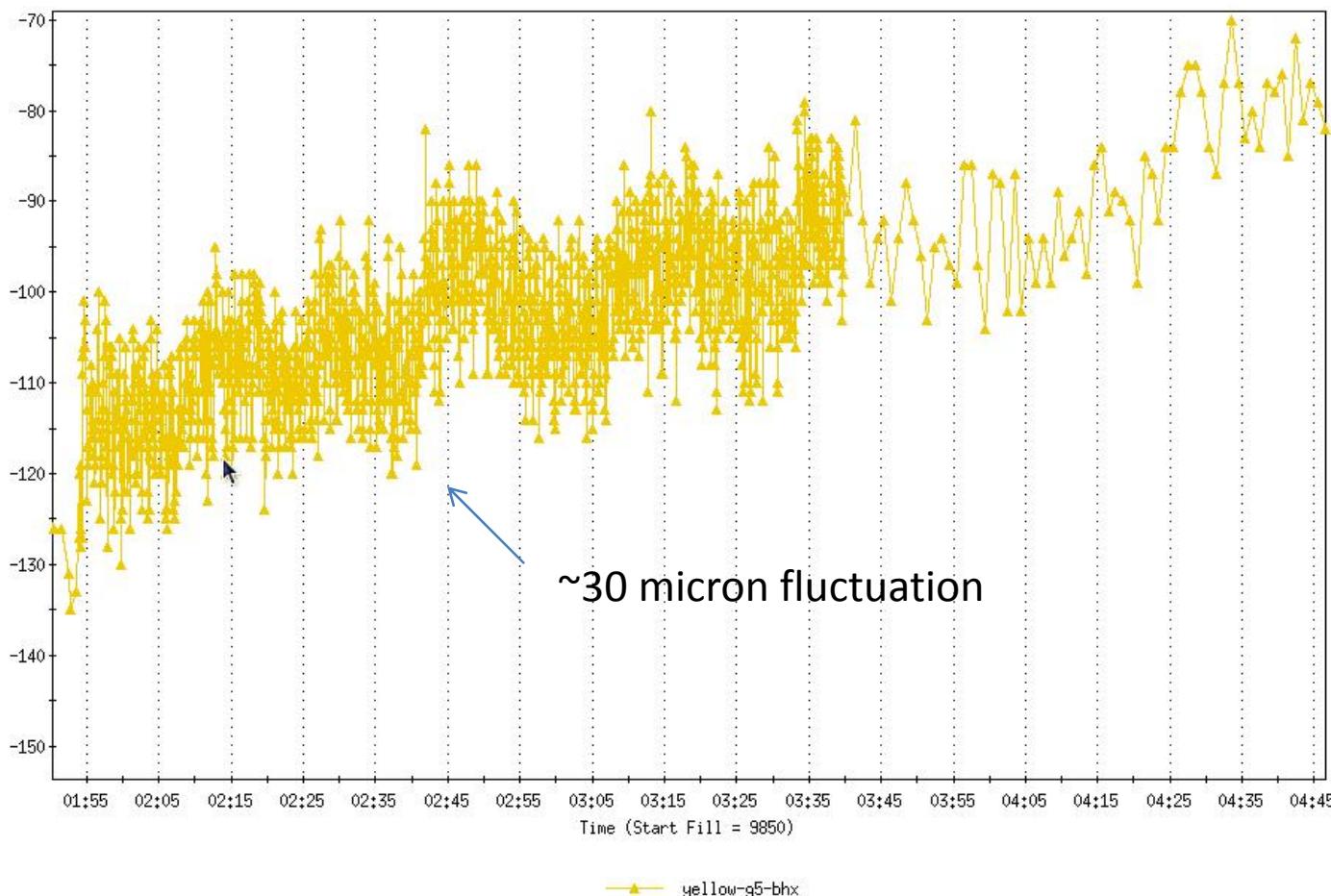
- Improved Average Orbit Calculation

yellow-g5-bhx, fill 9850 (Feb 12, 2008)

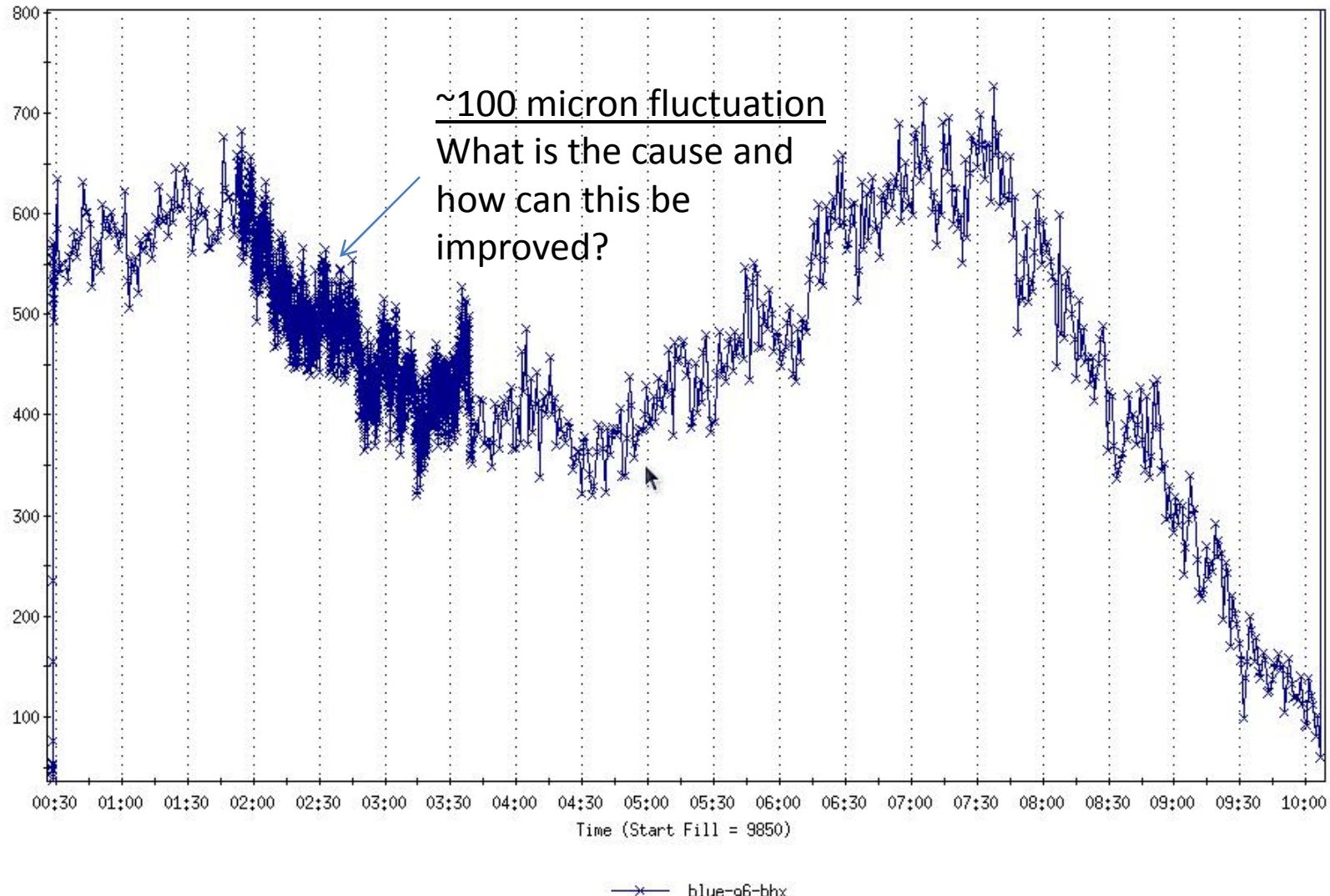


yellow-g5-bhx, fill 9850 (Feb 12, 2008)

zoom-in of previous

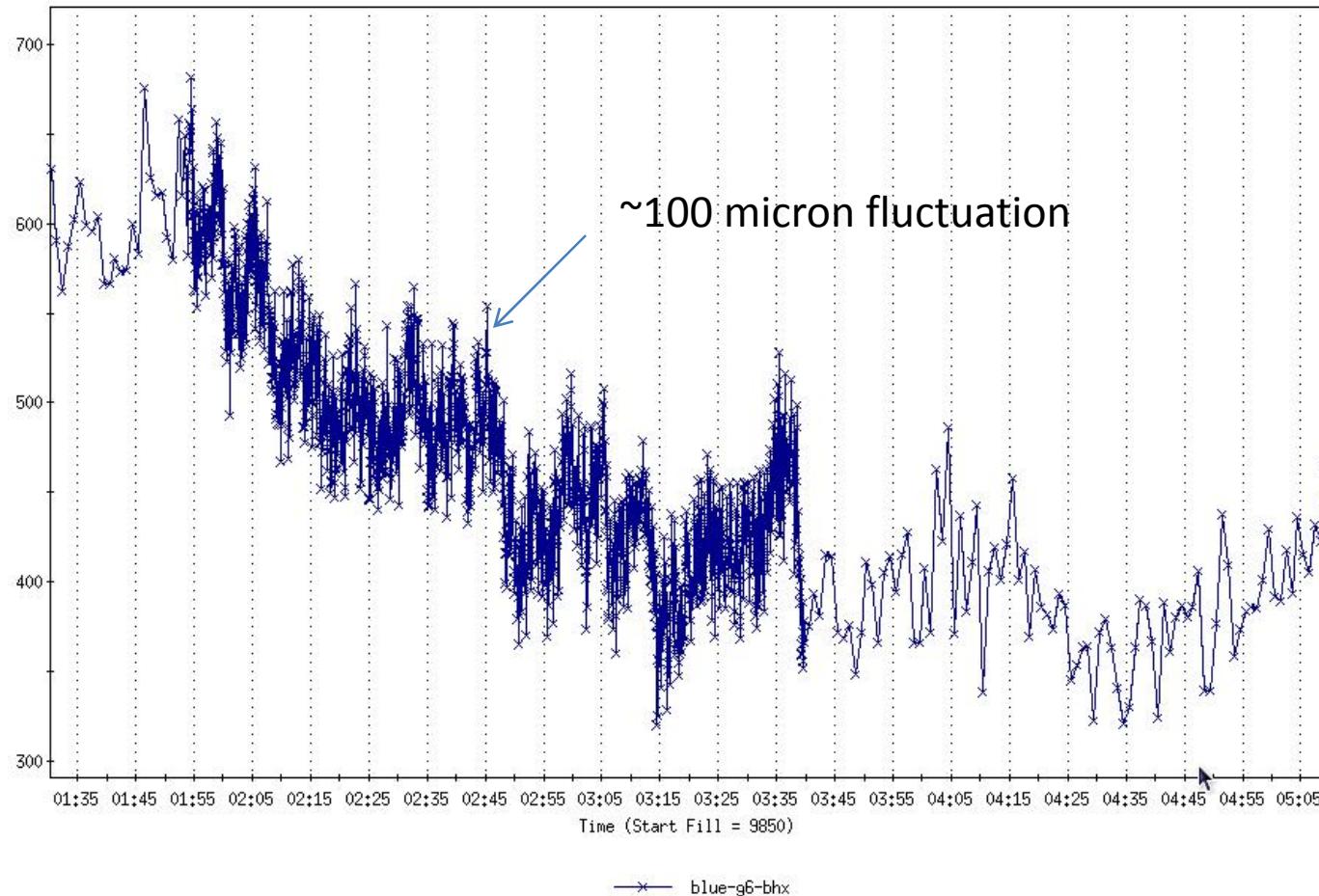


blue-g6-bhx, fill 9850 (Feb 12, 2008)



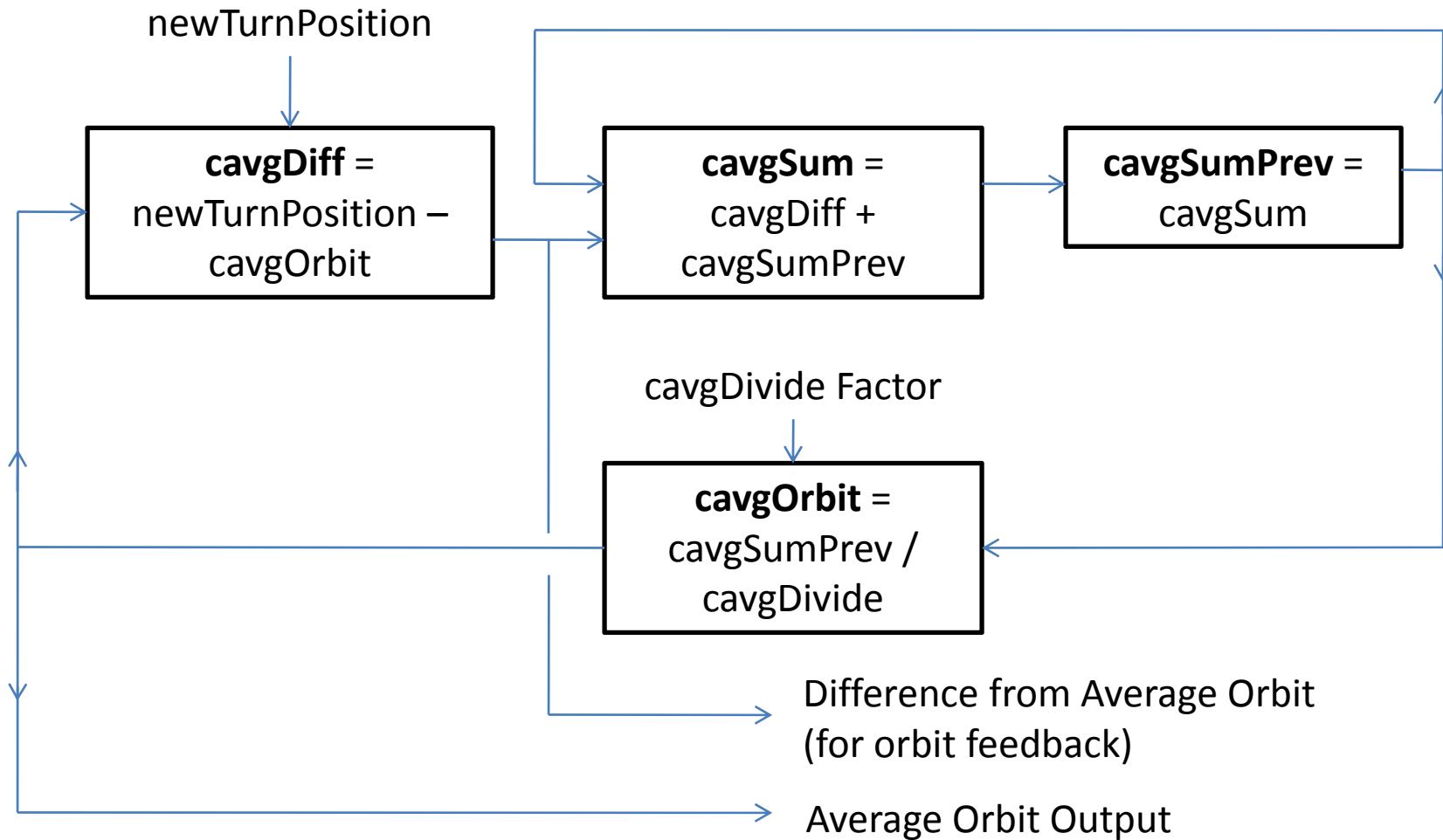
blue-g6-bhx, fill 9850 (Feb 12, 2008)

zoom-in of previous

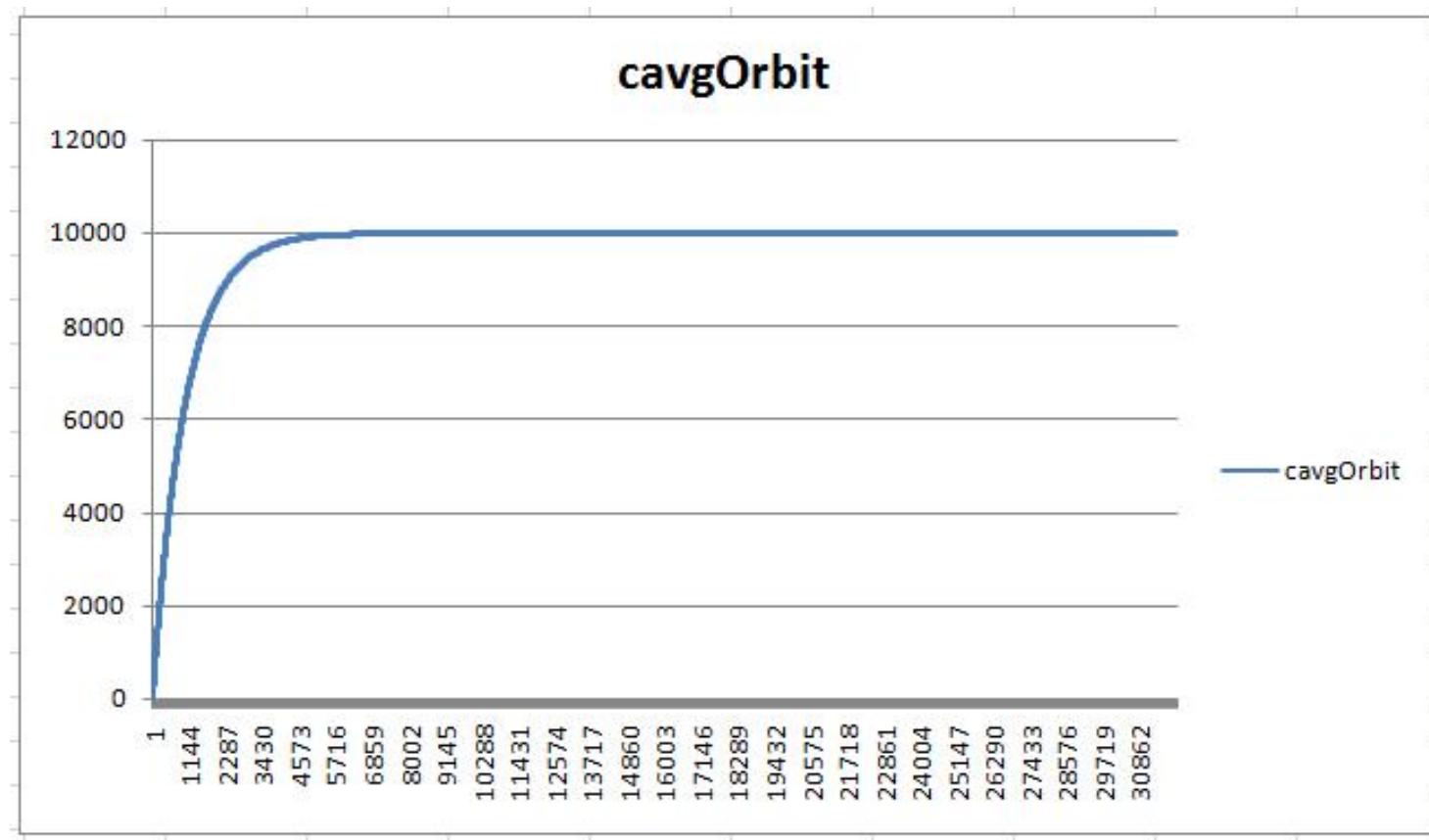


Continuous Average Orbit Algorithm

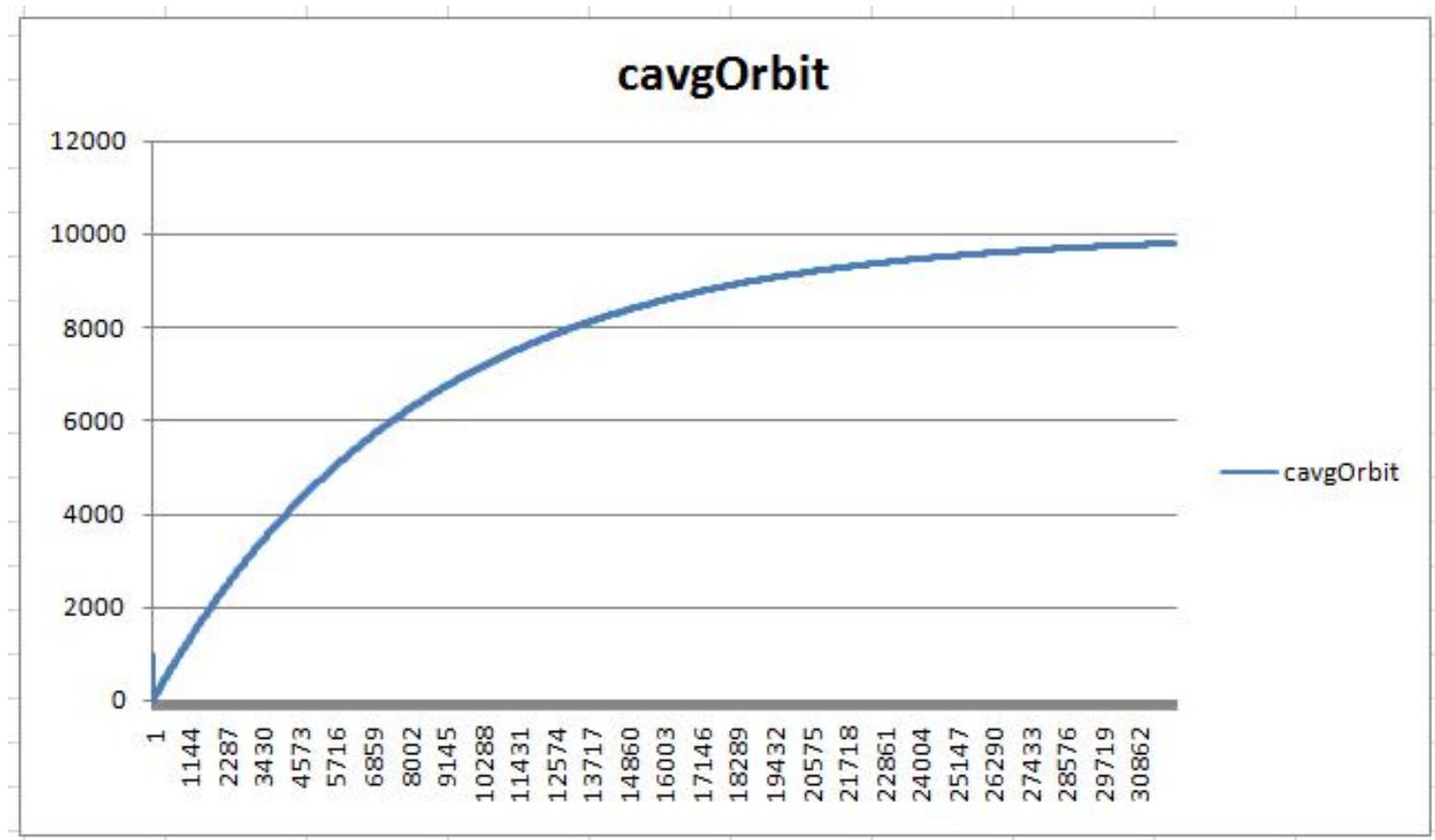
(identical to algorithm in AGS Damper)



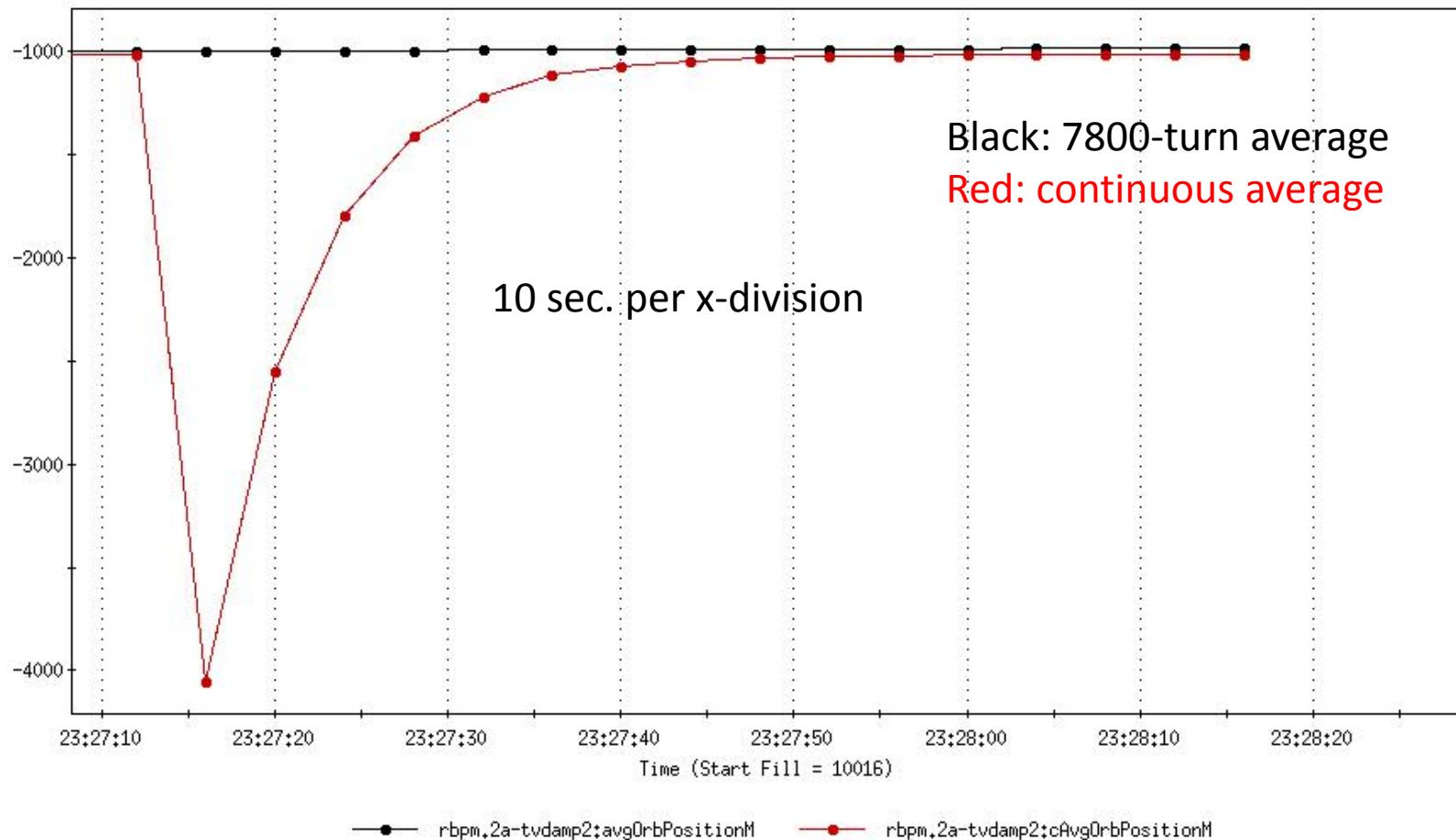
Simulation of response with divide factor = 1024



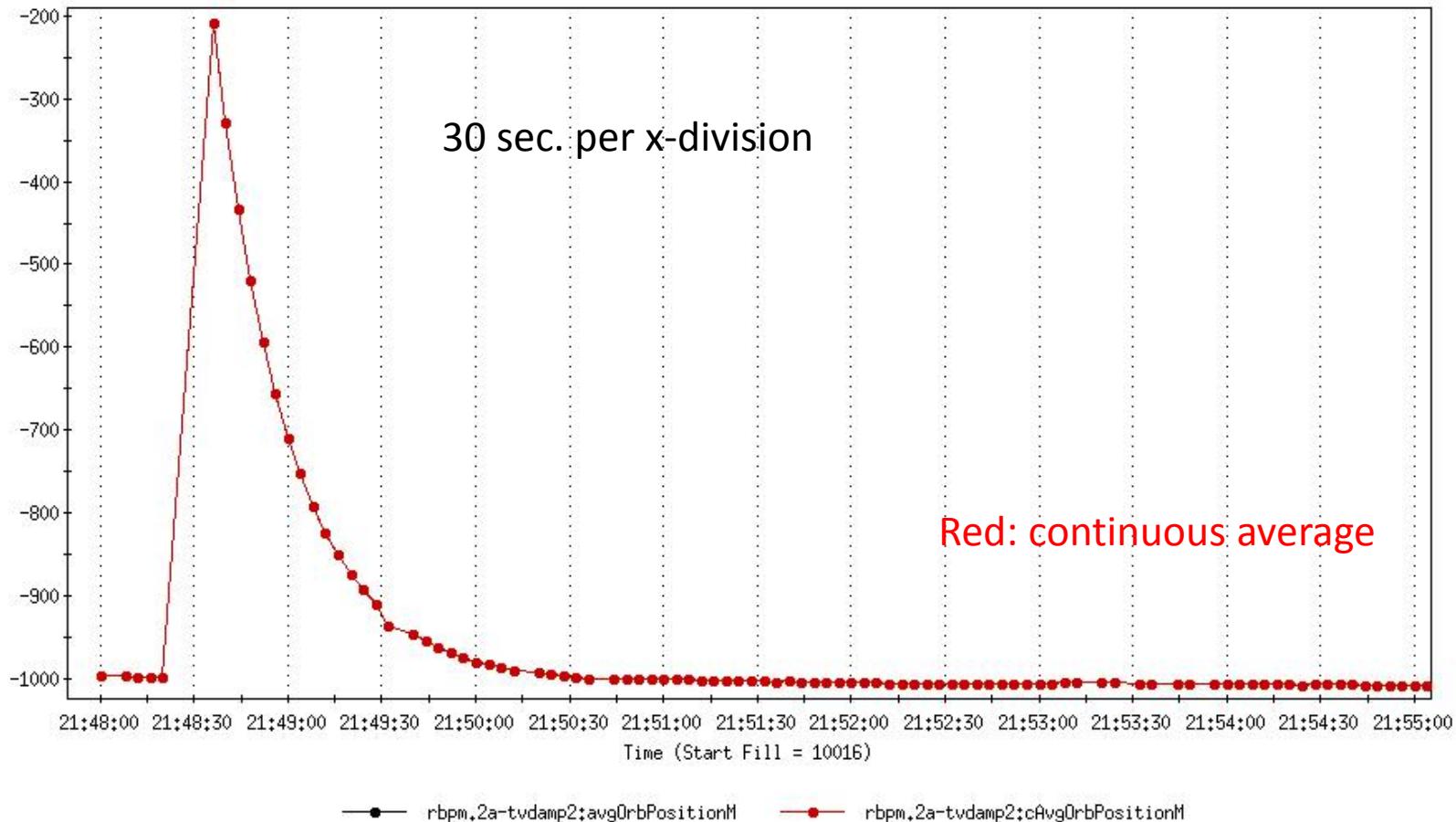
Simulation of response with divide factor = 8192



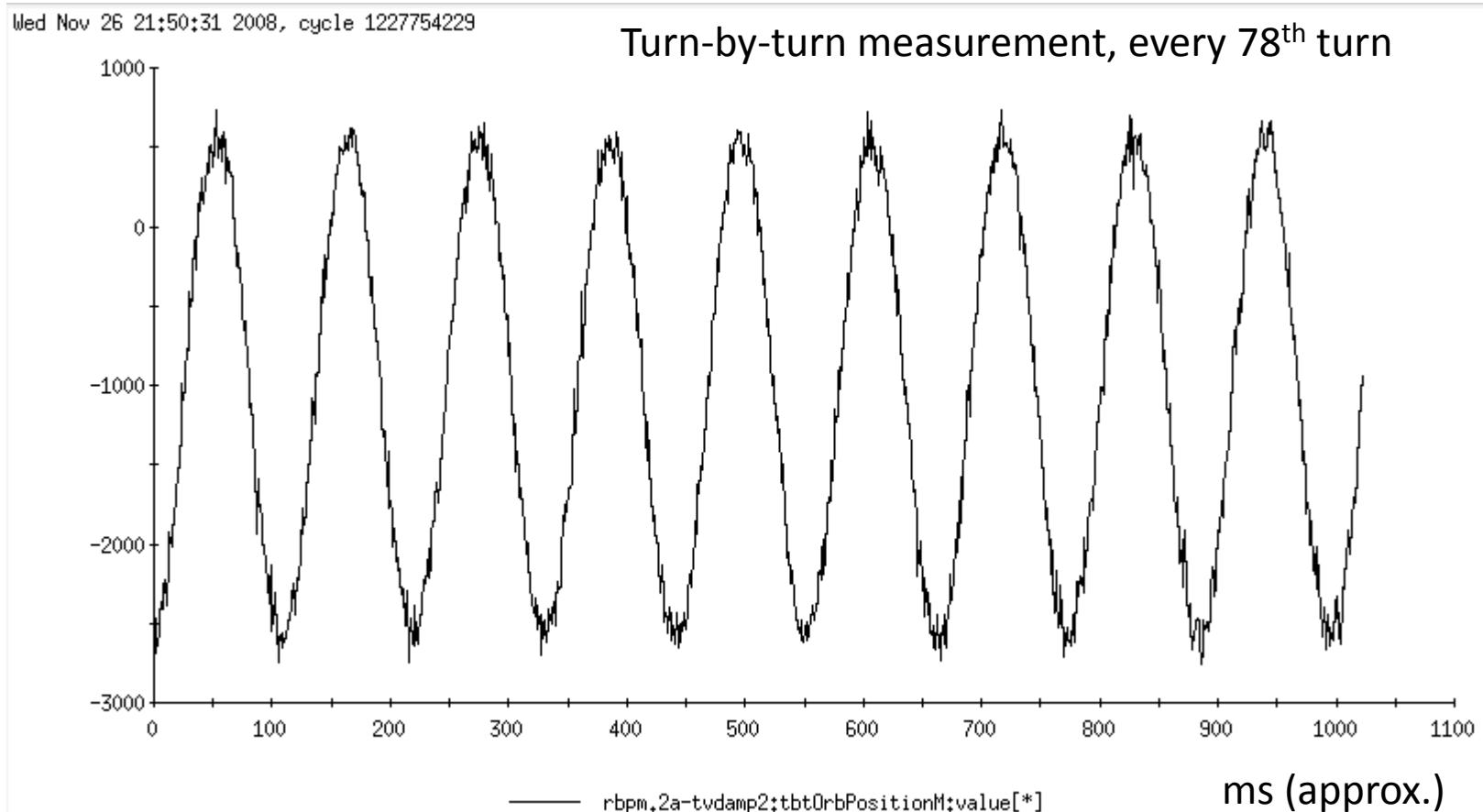
Response with simulated beam signal and divide factor = 4096



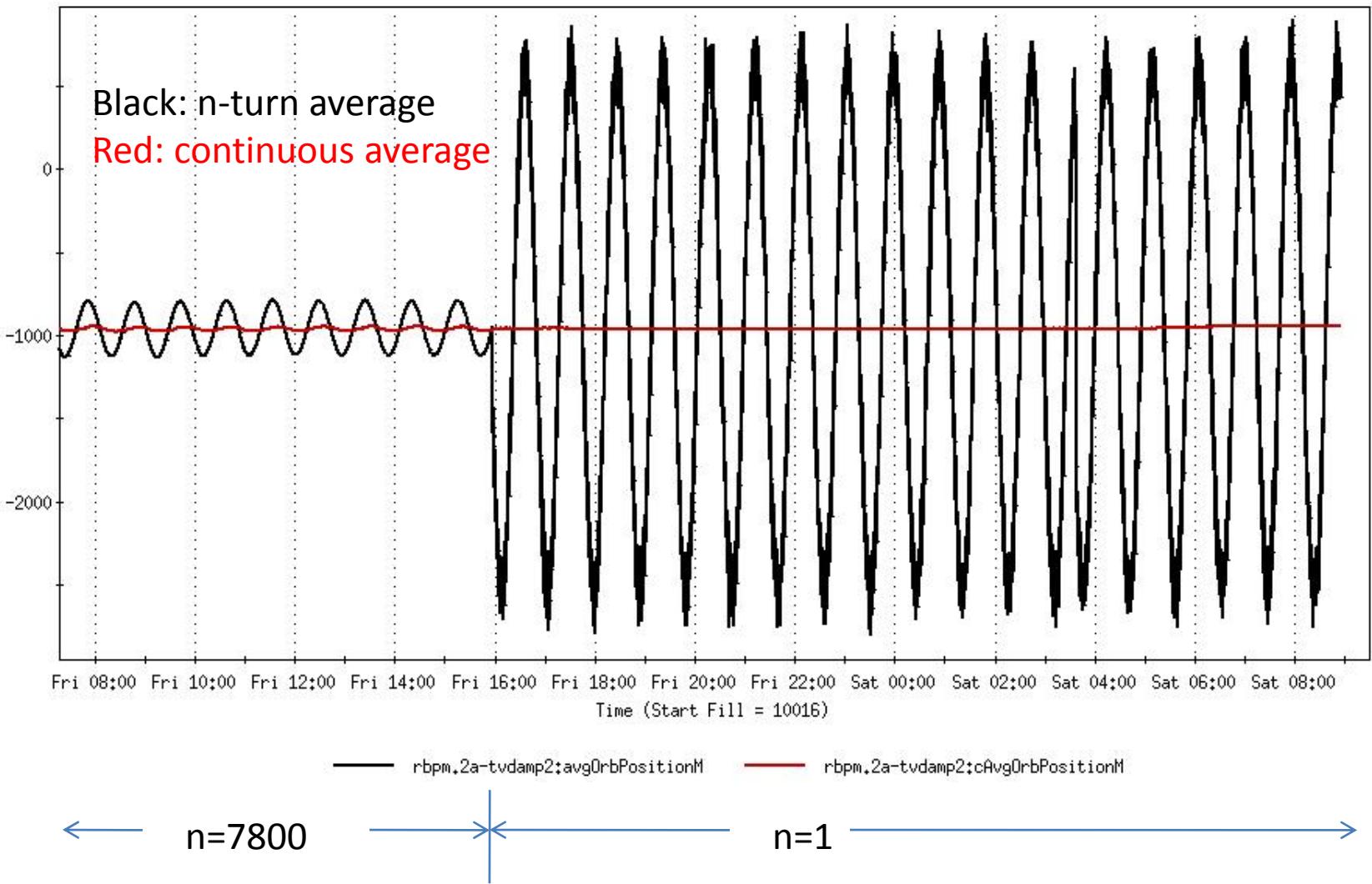
Response with simulated beam signal and divide factor = 16384



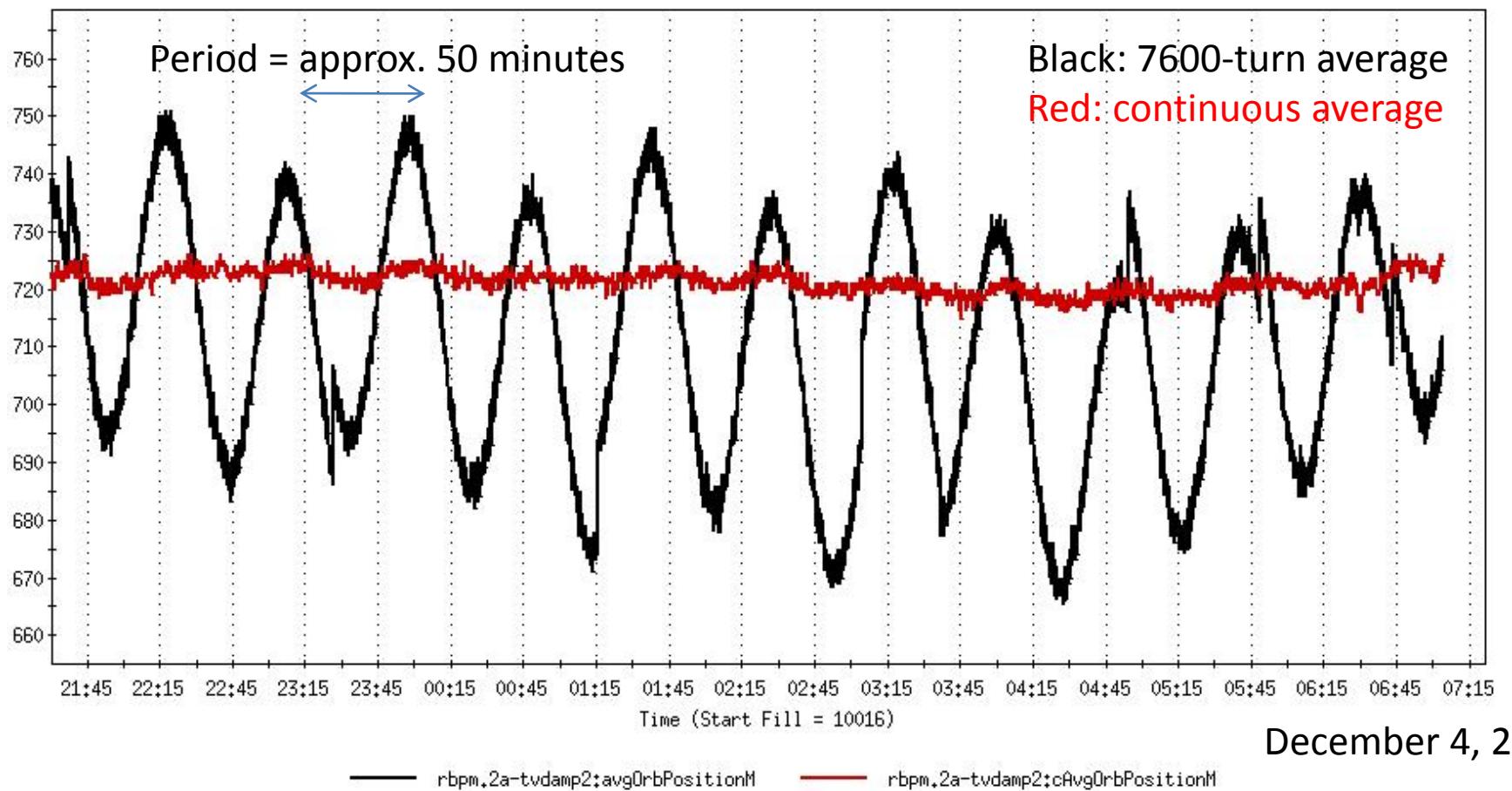
Simulated Beam Signal with 9 Hz modulation as measured by BPM



Averaging of simulated beam signal with 10 Hz modulation

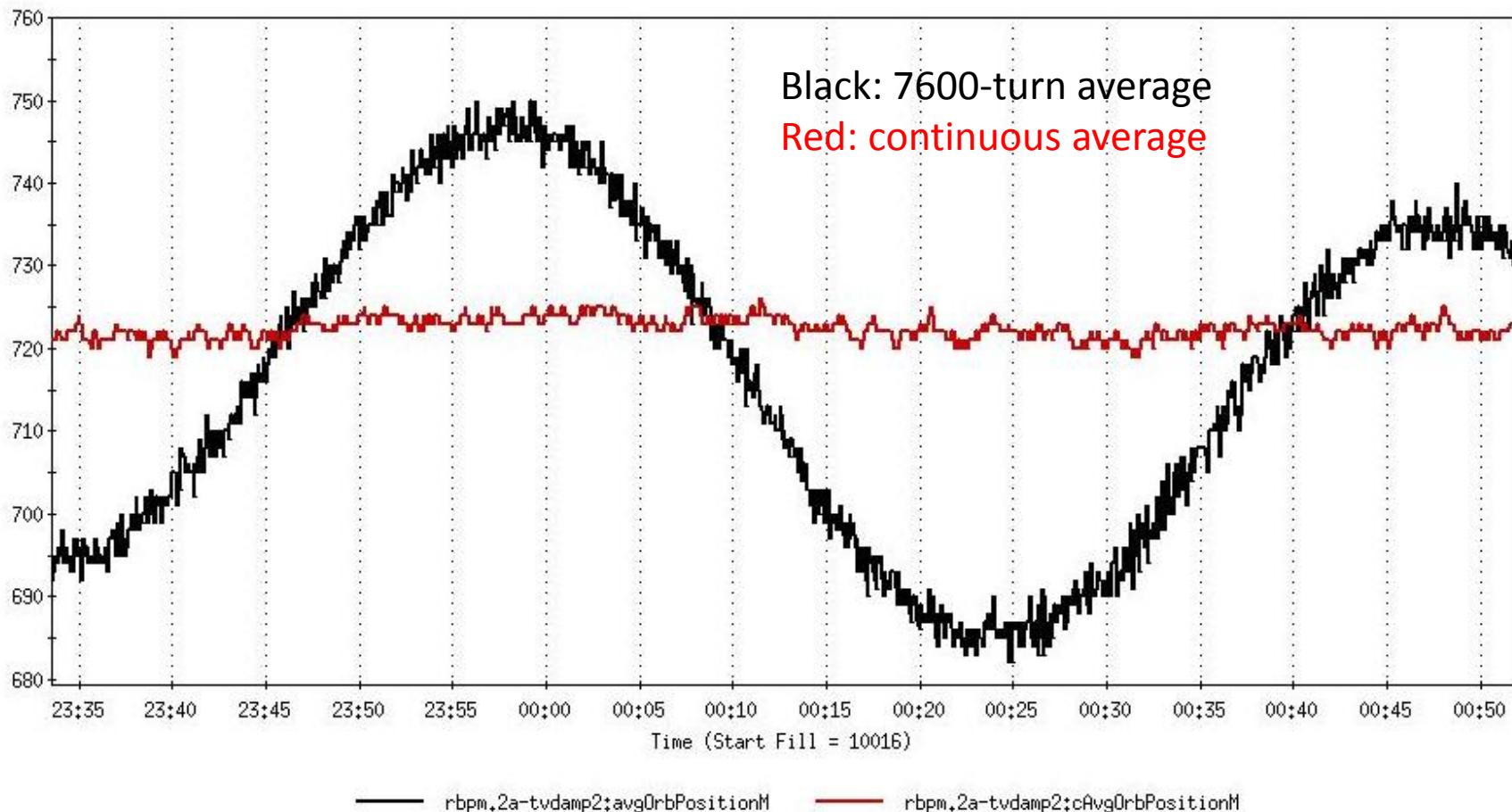


7600-Turn Avg. vs. Continuous Avg. with 10 Hz Modulated Signal

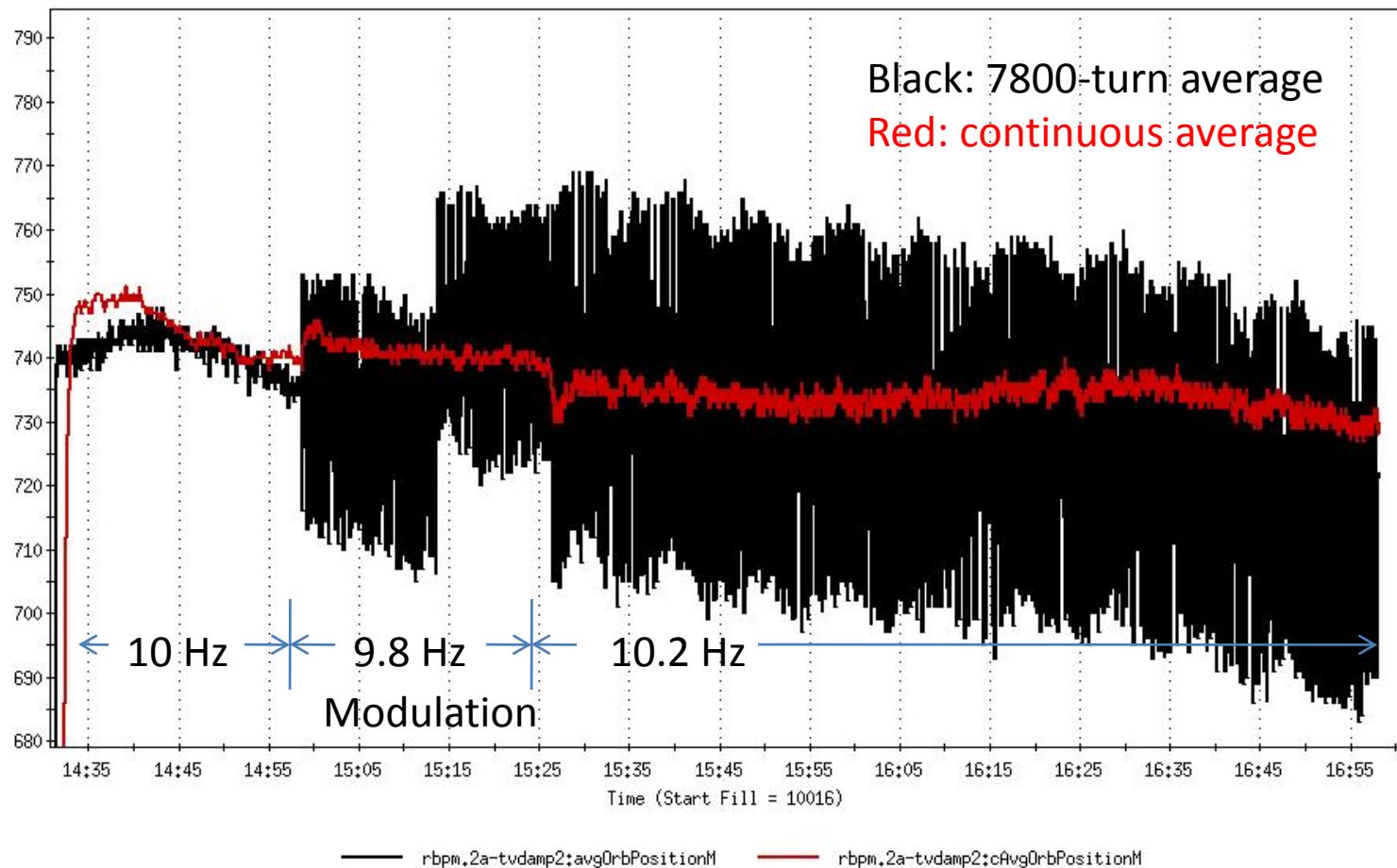


7600-Turn Avg. vs. Continuous Avg. with 10 Hz Modulated Signal

(zoom-in of previous)

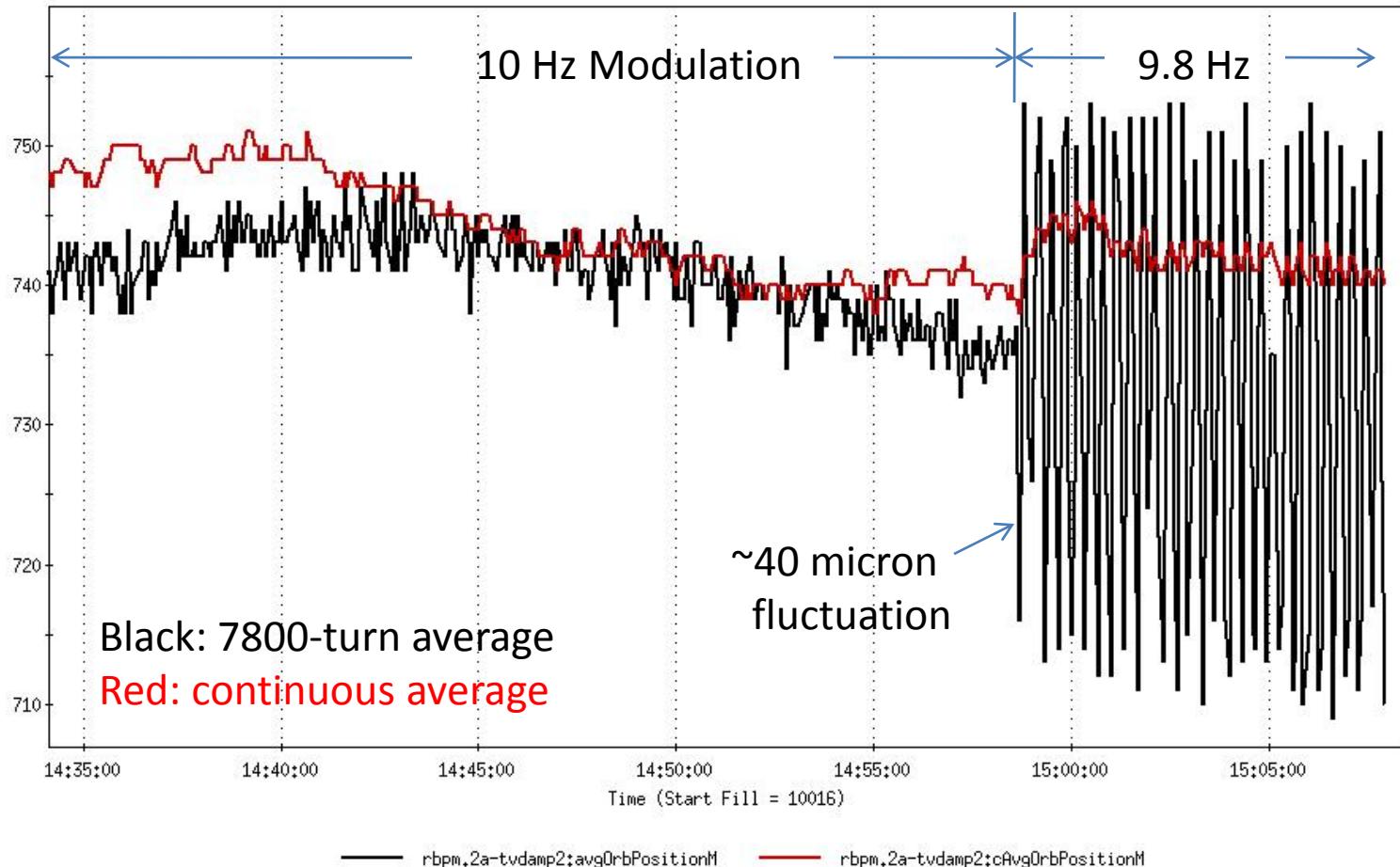


Effect on 7800-turn Average when modulation frequency is changed



Effect on 7800-turn Average when modulation frequency is changed

(zoom-in of previous)



Experiments with beam

- Compare n-turn average orbit with new continuous average orbit, with various beam conditions
 - Minimal 10 Hz modulation
 - Larger 10 Hz modulation
 - Induced beam modulations
 - One option is to use the 10 Hz orbit feedback magnets
 - Other options?
- Optimize divide factor for fastest response and lowest variations

Summary

- Although the RHIC BPM system has been in operation since 2000, a significant amount of work still exists in order to provide robust, quality measurements.