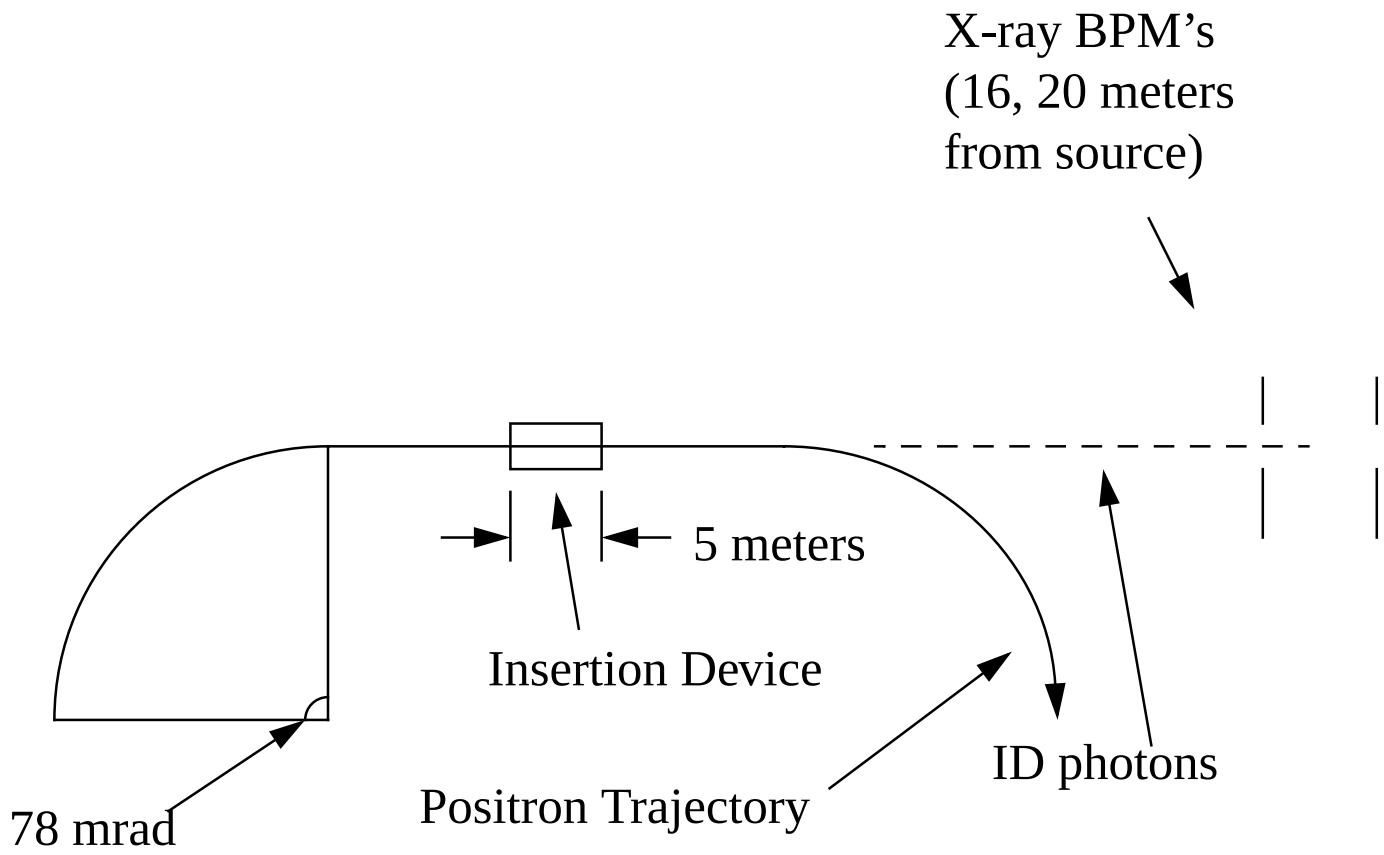
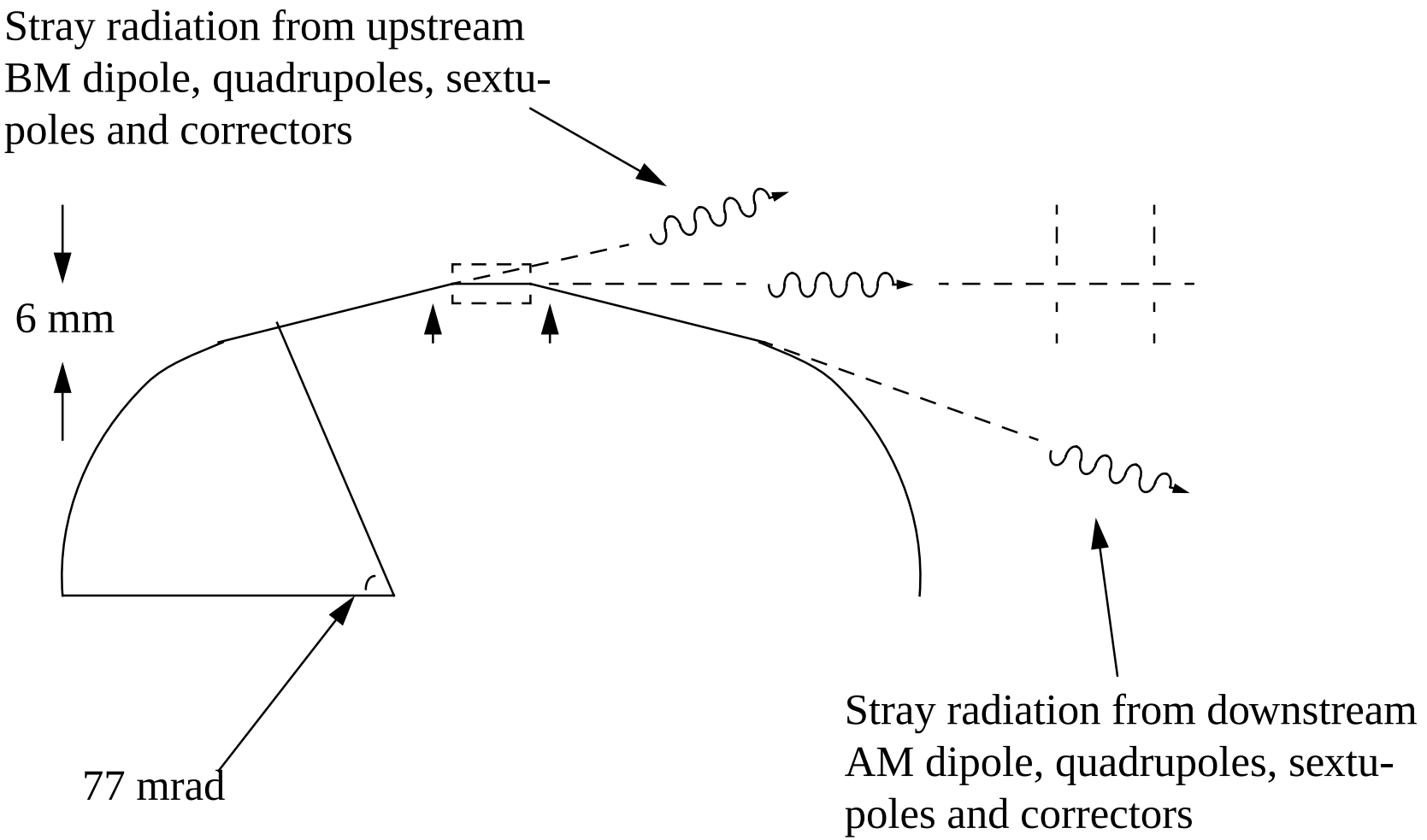
X-ray Beam Position Monitor Feedback and Feedforward Status and Plans

G. Decker

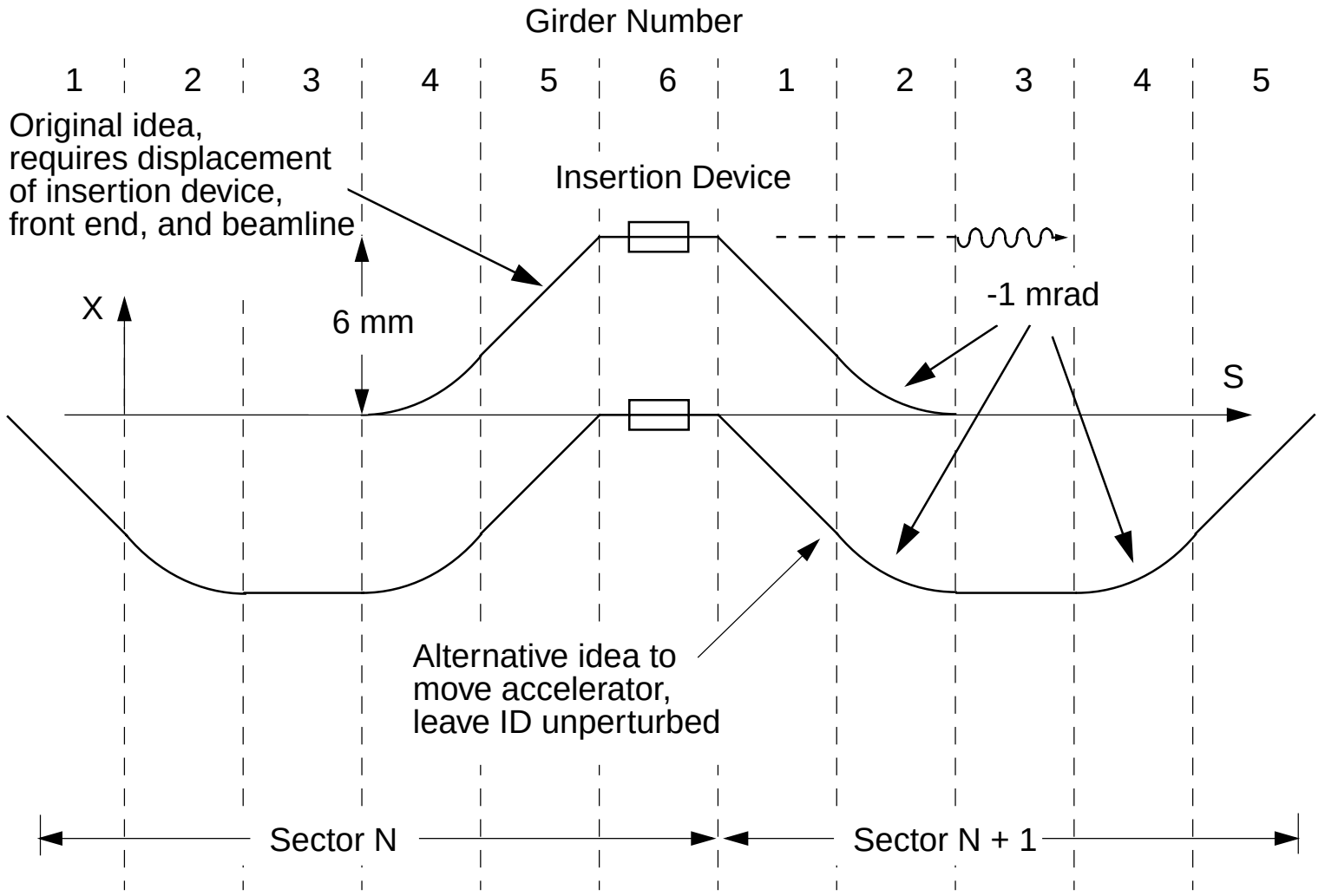
- Review of “Decker Distortion” concept
- Summary and status of hardware upgrade efforts
- Initial closed loop feedback results
- “Gap dependent offsets” and feedforward
- Early feedforward results

Concept for Elimination of X-bpm Background Signals



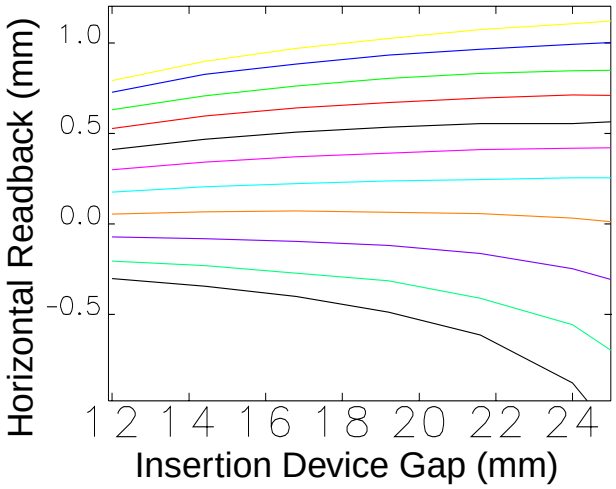

Stray radiation from upstream
BM dipole, quadrupoles, sextu-
poles and correctors
6 mm
77 mrad
Stray radiation from downstream
AM dipole, quadrupoles, sextu-
poles and correctors

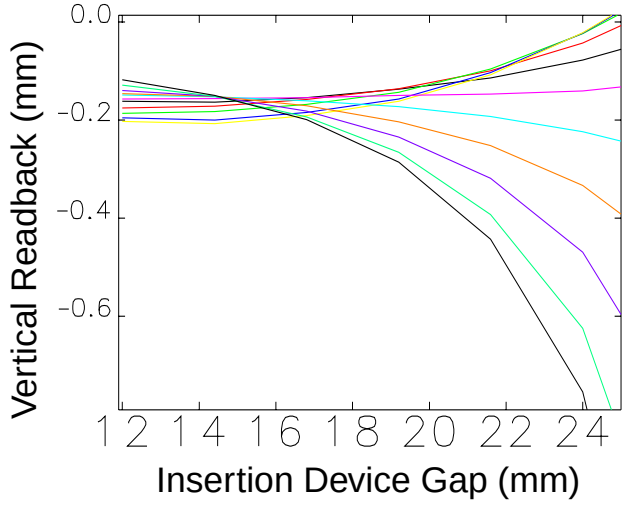
Insertion Device vs. Accelerator Displacements



Note - angle shown is dipole magnet strength _change_ ,
i.e. -1 mrad means 78 mrad total decreased to 77 mrad.

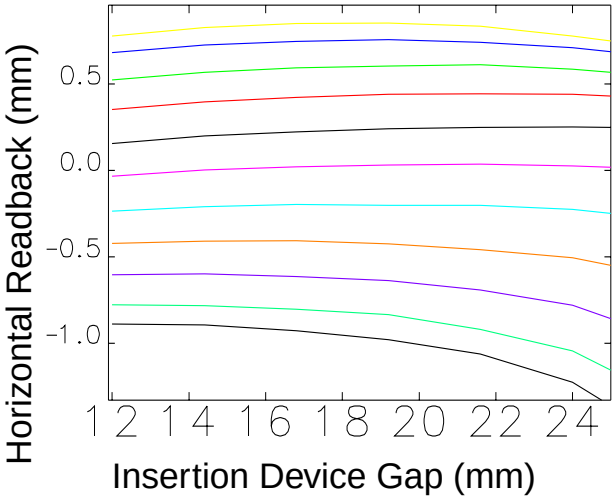
Unmodified Sector (1-ID) Upstream X-ray BPM

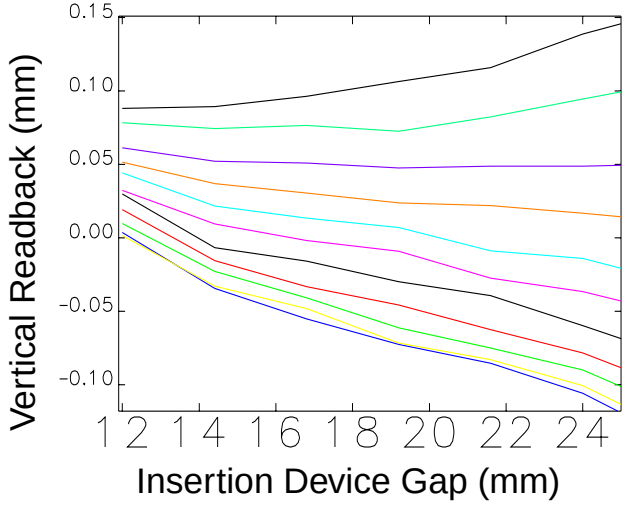




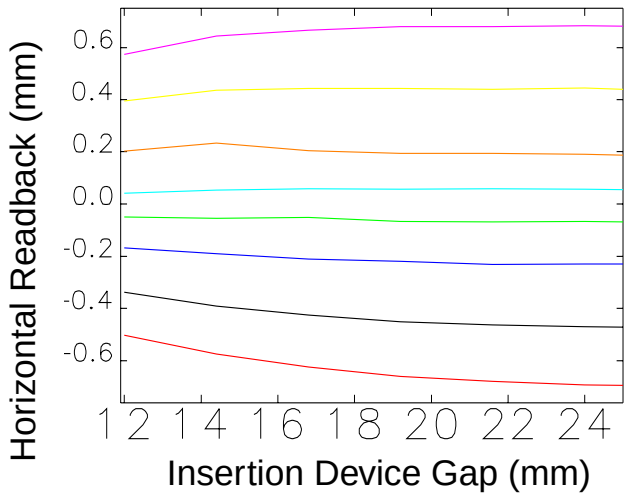
0.5 mm

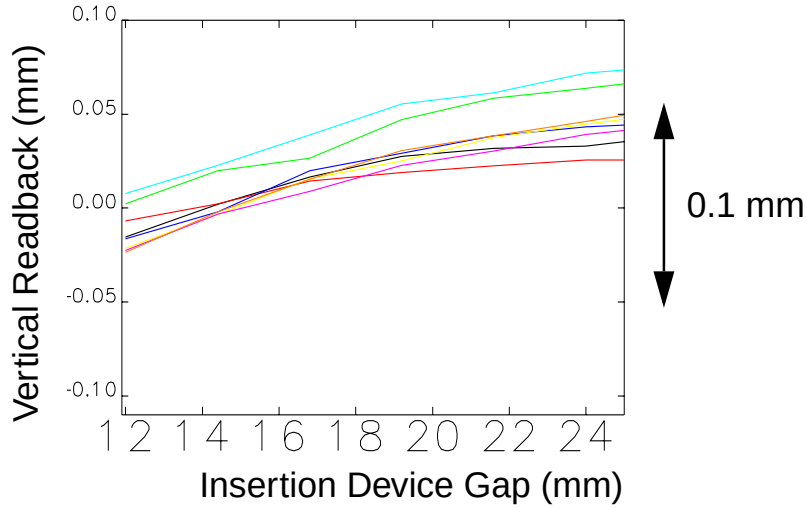
Unmodified Sector (1-ID) Downstream X-ray BPM



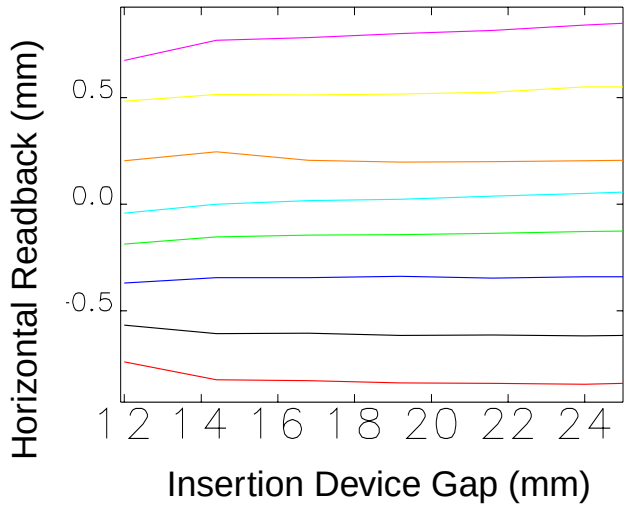


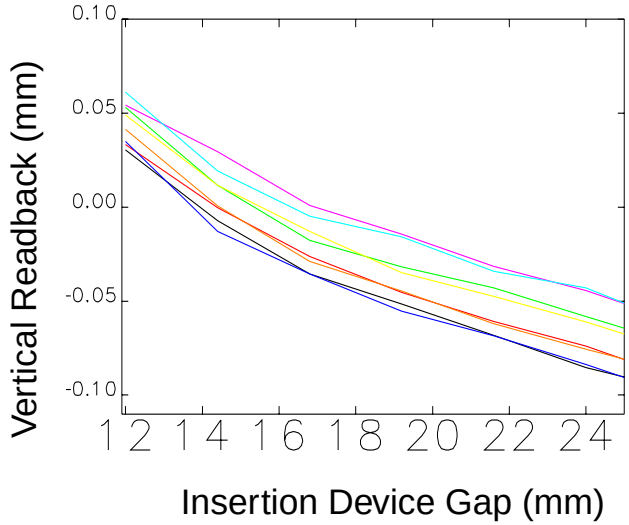
Modified Sector (34-ID) Upstream X-ray BPM

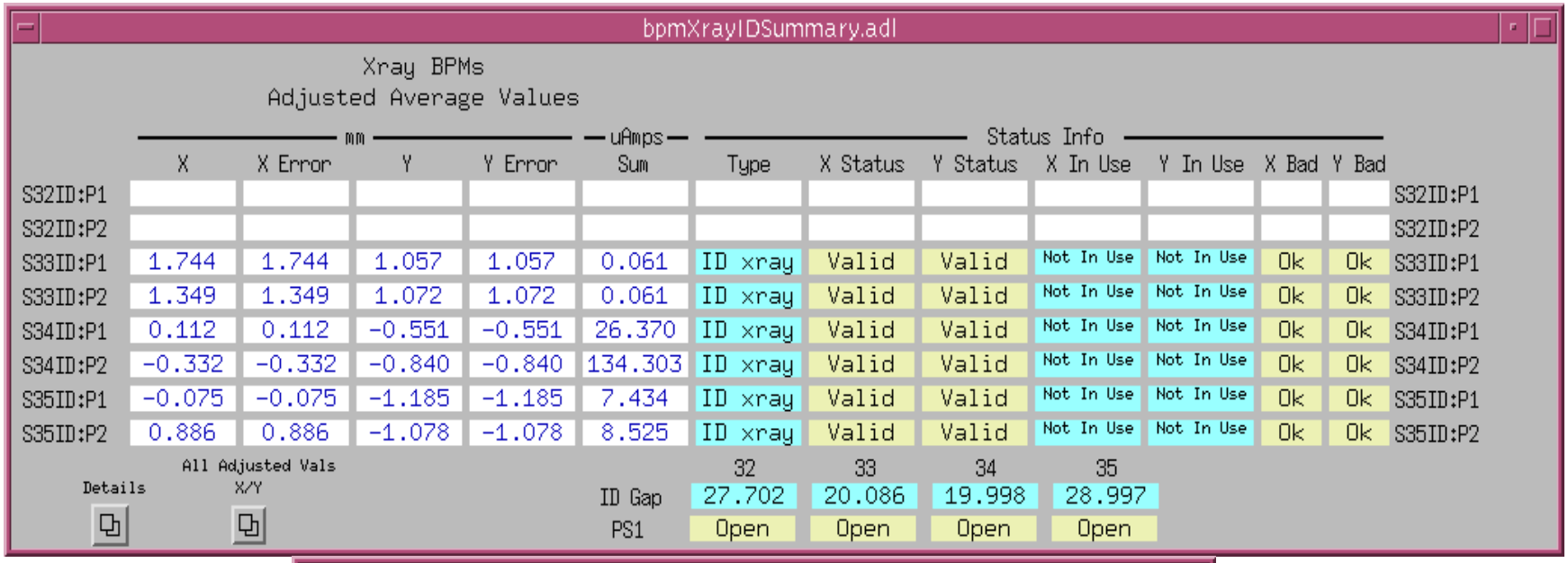


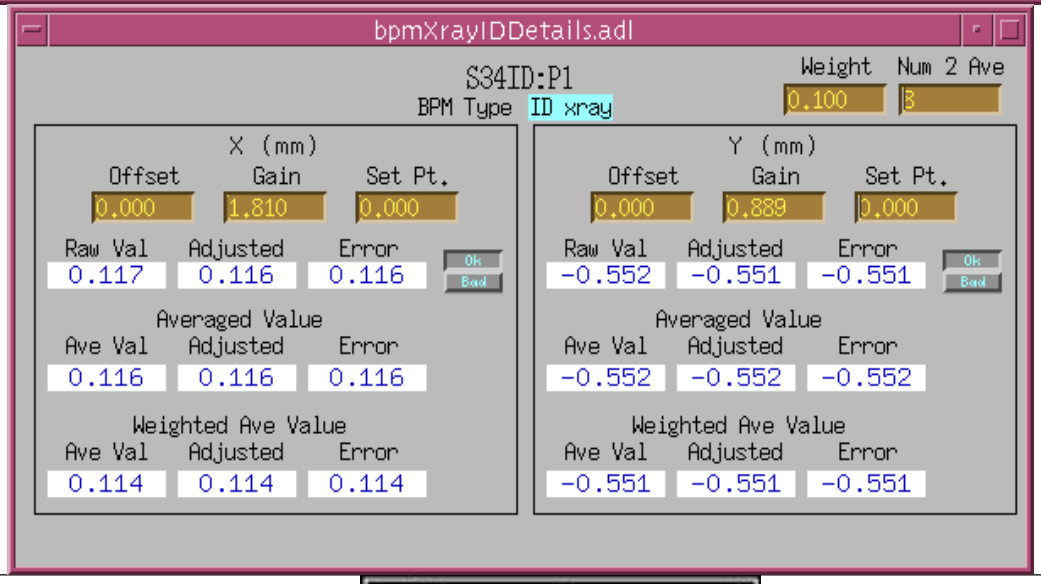


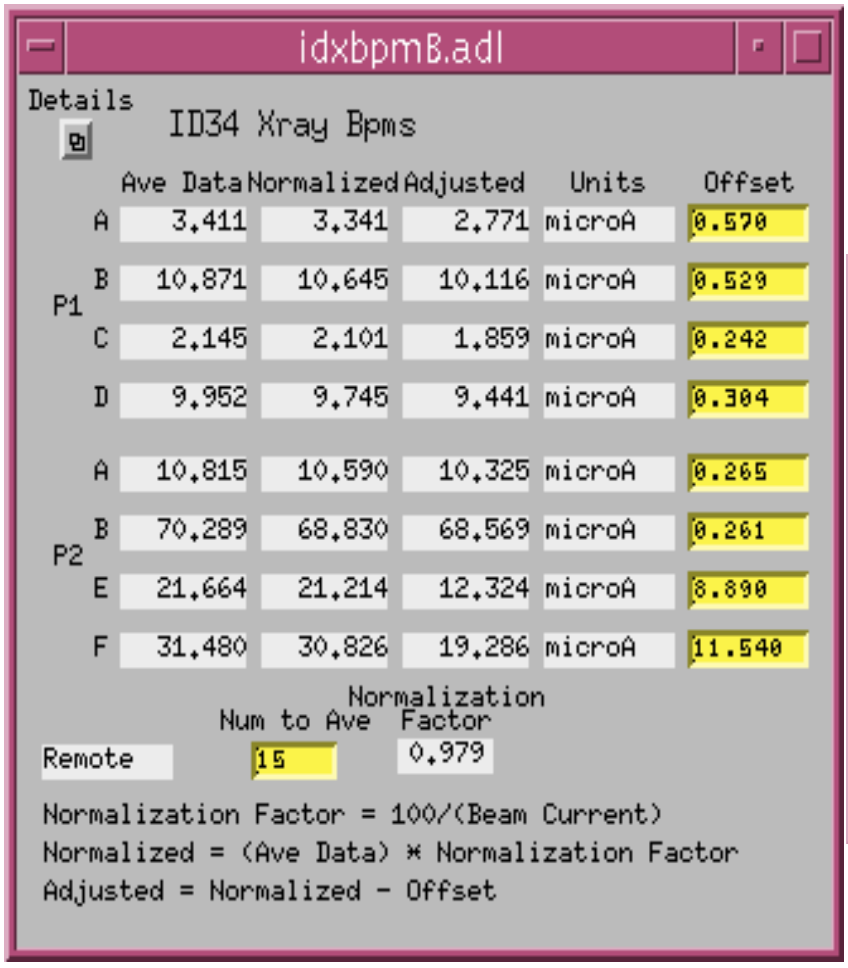
Modified Sector (34-ID) Downstream X-ray BPM

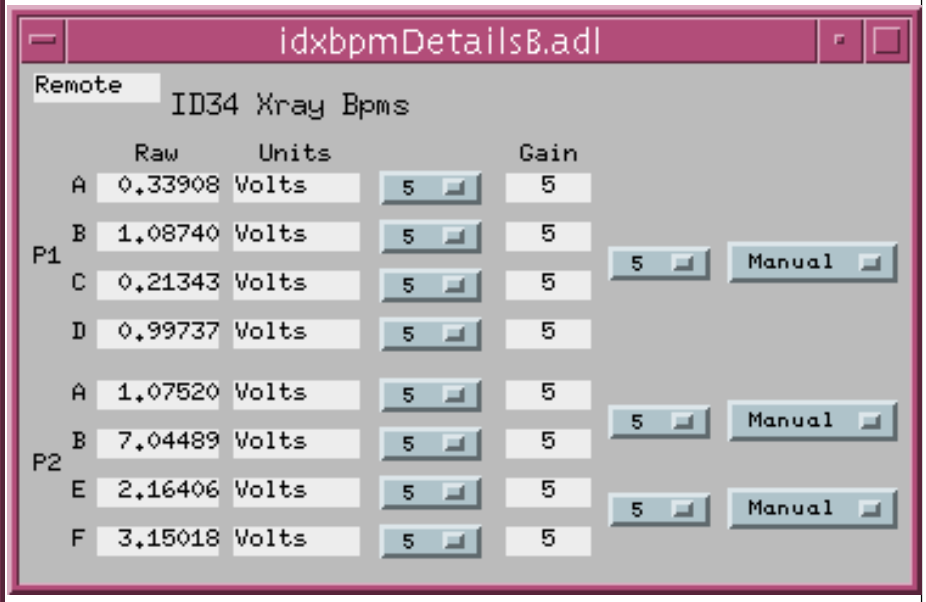





bpmXrayIDSummary.adl
Xray BPMs
Adjusted Average Values
mm
uAmps
Status Info
X
X Error
Y
Y Error
Sum
Type
X Status
Y Status
X In Use
Y In Use
X Bad
Y Bad
S32ID:P1
S32ID:P2
S33ID:P1 1.744 1.744 1.057 1.057 0.061 ID xray Valid Valid Not In Use Not In Use Ok Ok
S33ID:P2 1.349 1.349 1.072 1.072 0.061 ID xray Valid Valid Not In Use Not In Use Ok Ok
S34ID:P1 0.112 0.112 -0.551 -0.551 26.370 ID xray Valid Valid Not In Use Not In Use Ok Ok
S34ID:P2 -0.332 -0.332 -0.840 -0.840 134.303 ID xray Valid Valid Not In Use Not In Use Ok Ok
S35ID:P1 -0.075 -0.075 -1.185 -1.185 7.434 ID xray Valid Valid Not In Use Not In Use Ok Ok
S35ID:P2 0.886 0.886 -1.078 -1.078 8.525 ID xray Valid Valid Not In Use Not In Use Ok Ok
Details
All Adjusted Vals
X/Y
32 33 34 35
ID Gap 27.702 20.086 19.998 28.997
PS1 Open Open Open Open


bpmXrayIDDetails.adl
S34ID:P1
BPM Type ID xray
Weight 0.100
Num 2 Ave 8
X (mm)
Offset 0.000
Gain 1.810
Set Pt. 0.000
Raw Val 0.117
Adjusted 0.116
Error 0.116
Ok
Bad
Averaged Value
Ave Val 0.116
Adjusted 0.116
Error 0.116
Weighted Ave Value
Ave Val 0.114
Adjusted 0.114
Error 0.114
Y (mm)
Offset 0.000
Gain 0.889
Set Pt. 0.000
Raw Val -0.552
Adjusted -0.551
Error -0.551
Averaged Value
Ave Val -0.552
Adjusted -0.552
Error -0.552
Weighted Ave Value
Ave Val -0.551
Adjusted -0.551
Error -0.551

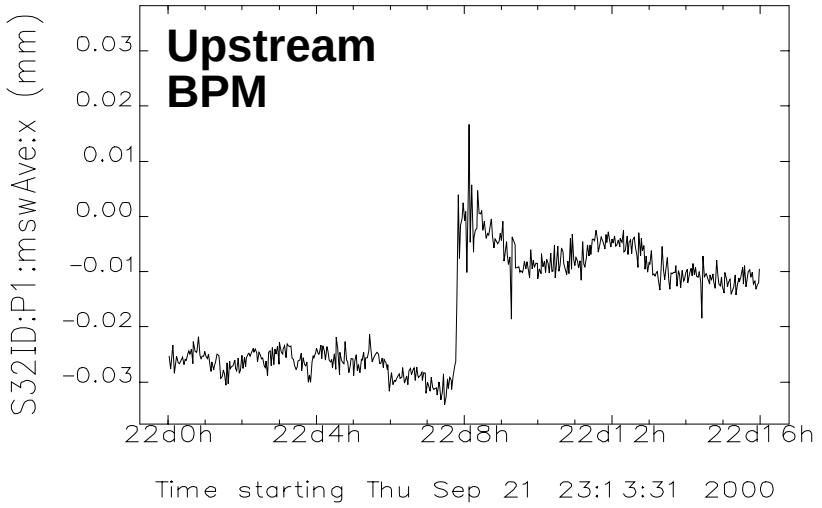

idxbpmB.adl
Details
ID34 Xray Bpms
Ave Data Normalized Adjusted Units Offset
P1
A 3.411 3.341 2.771 microA 0.570
B 10.871 10.645 10.116 microA 0.529
C 2.145 2.101 1.859 microA 0.242
D 9.952 9.745 9.441 microA 0.304
P2
A 10.815 10.590 10.325 microA 0.265
B 70.289 68.830 68.569 microA 0.261
E 21.664 21.214 12.324 microA 8.890
F 31.480 30.826 19.286 microA 11.540
Normalization
Num to Ave Factor
Remote
15
0.979
Normalization Factor = 100/(Beam Current)
Normalized = (Ave Data) * Normalization Factor
Adjusted = Normalized - Offset

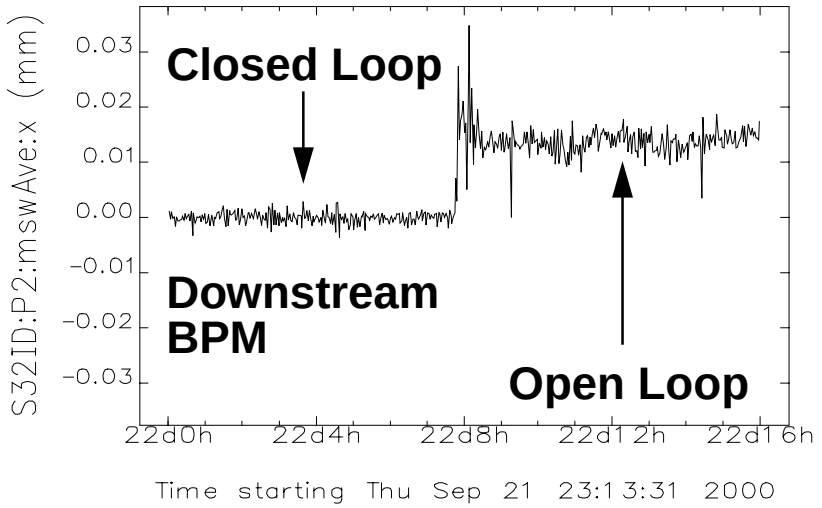

idxbpmDetailsB.adl
Remote
ID34 Xray Bpms
Raw Units Gain
P1
A 0.33908 Volts 5 5
B 1.08740 Volts 5 5
C 0.21343 Volts 5 5
D 0.99737 Volts 5 5
5 Manual
P2
A 1.07520 Volts 5 5
B 7.04489 Volts 5 5
E 2.16406 Volts 5 5
F 3.15018 Volts 5 5
5 Manual
5 Manual

Sector 32-ID X-bpm Feedback Results

Gap = 27.5 mm

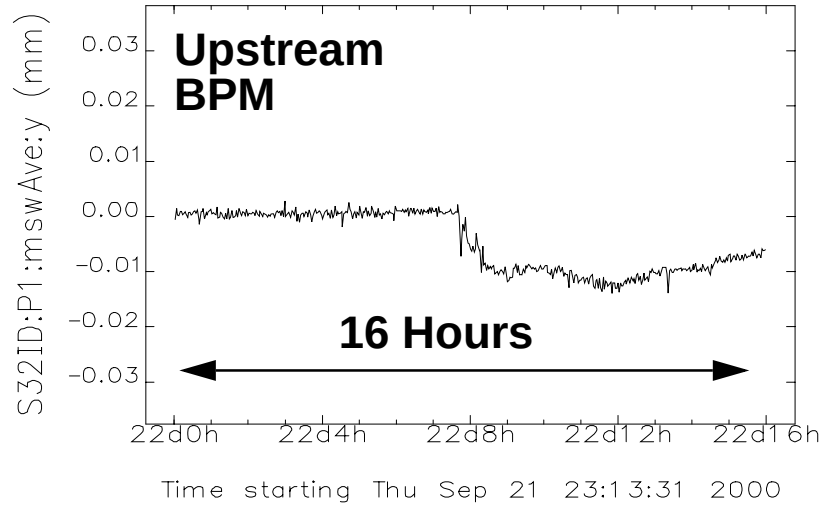
Horizontal

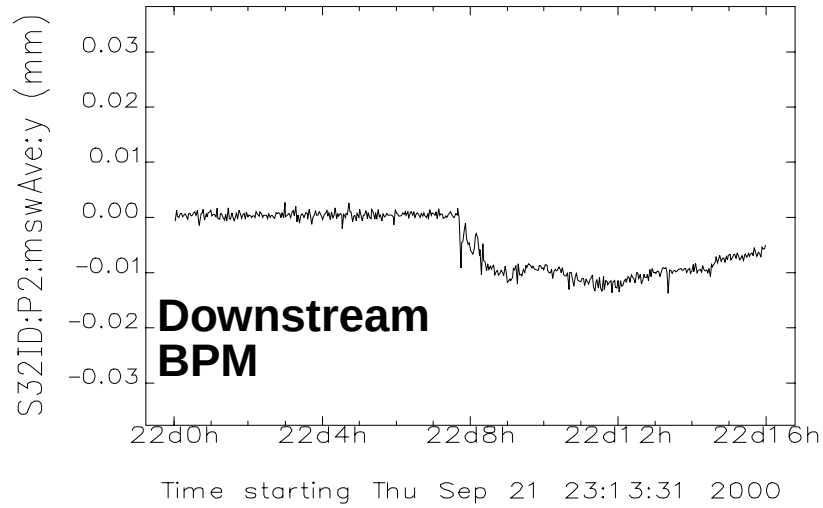




60 microns

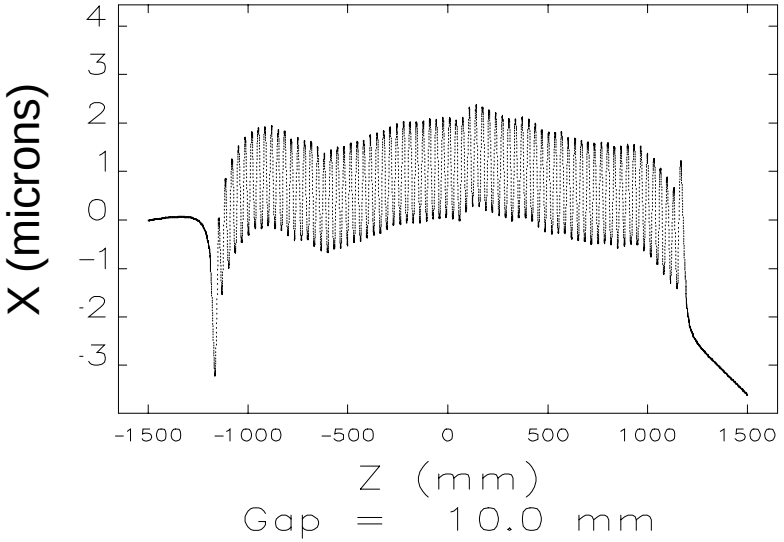
Vertical

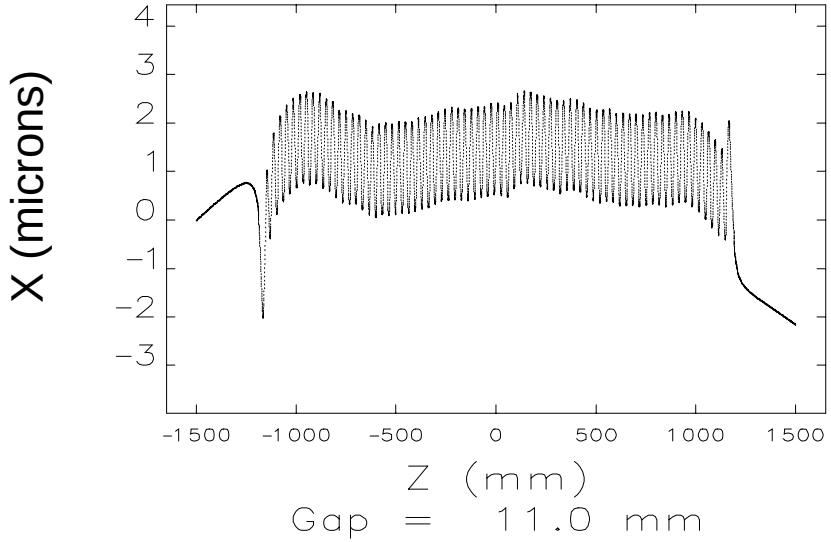


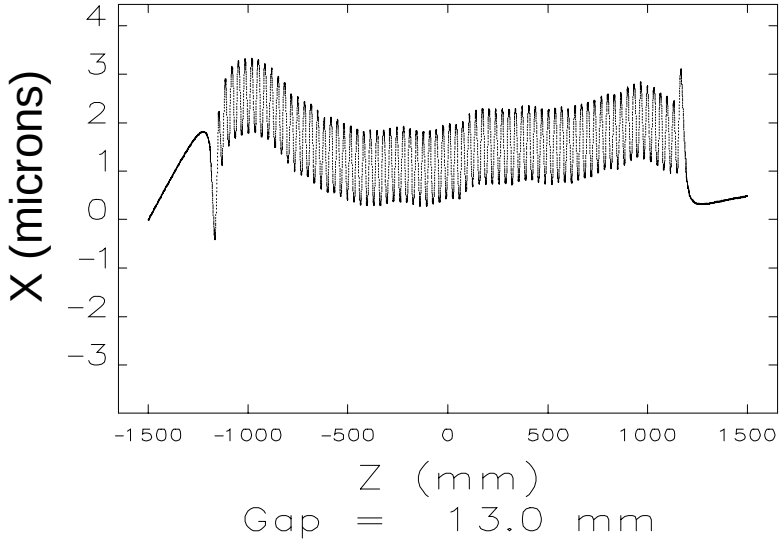


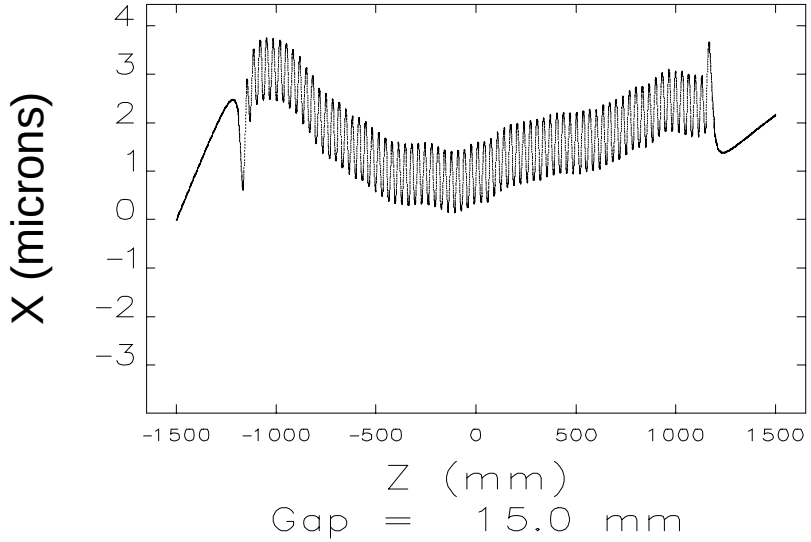
Variation of Particle Trajectory Through Insertion Device vs Gap

(Derived from Second Field Integral of Magnetic Measurement Data)

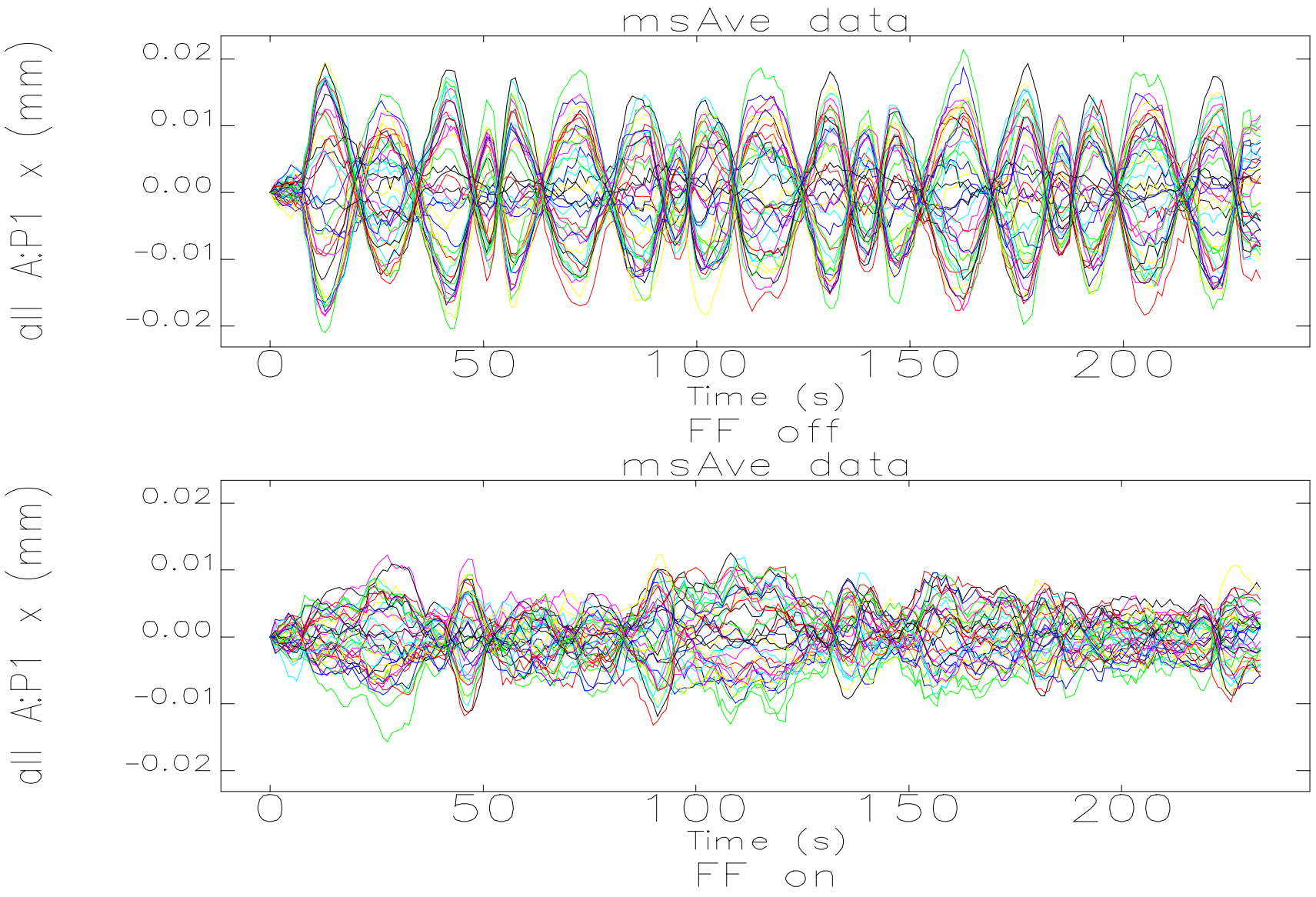








Variation of RF bpm's while cycling 33ID from 15 to 30 mm gap- FF on vs off



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Advanced Photon Source
ASD Diagnostics

Advanced Photon Source

TWG Meeting
Glenn Decker
March 15, 2001