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Turn by Turn Measurements with the Tevatron BPM Production Electronics

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Abstract

Slides shown at the January 12, 2005 Tevatron BPM Upgrade Meeting. A few additional slides plus the text will appear in the next version of this document.

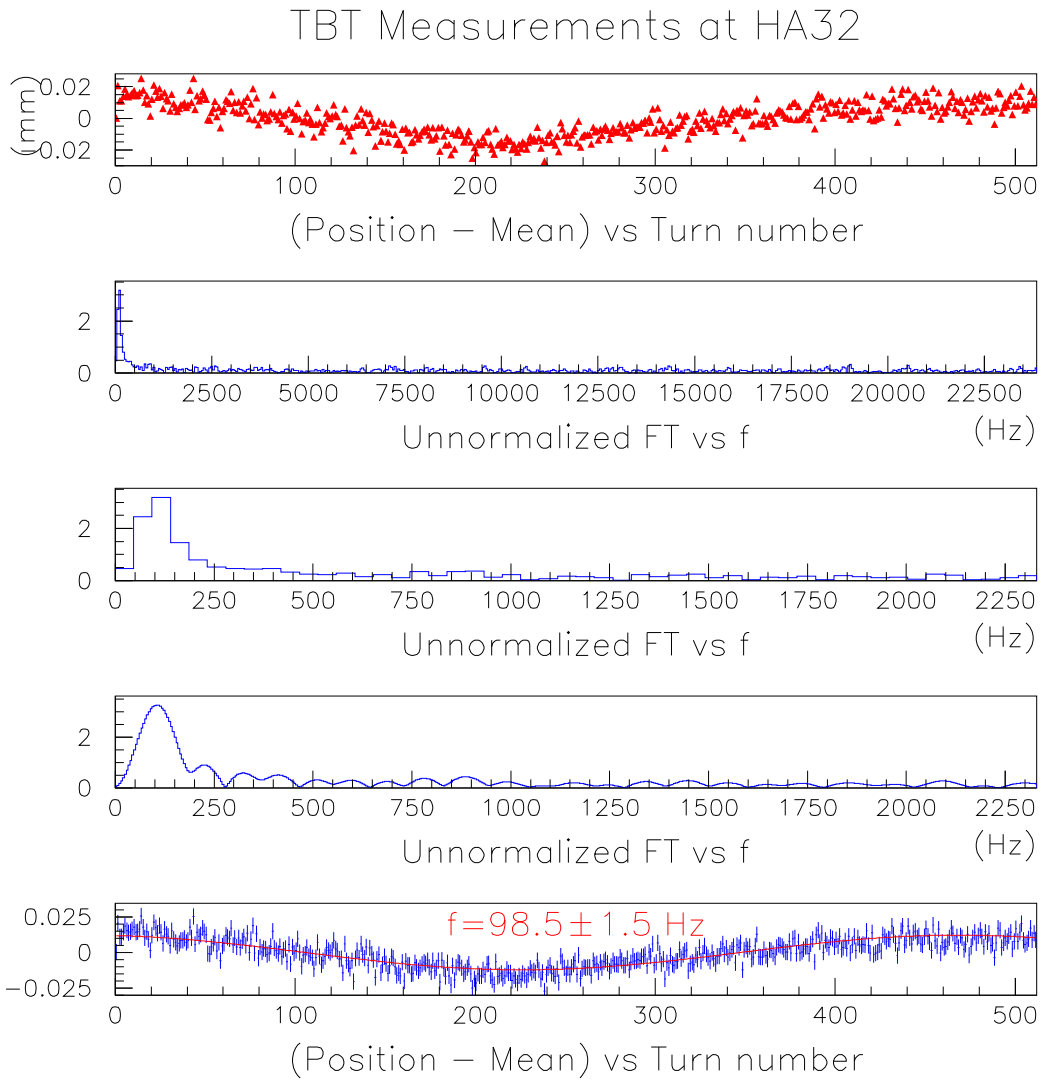
TBT Measurements at HA32
(mm)
0.02
0
-0.02
0
100
200
300
400
500
(Position − Mean) vs Turn number
2
0
0
2500
5000
7500
10000
12500
15000
17500
20000
22500
Unnormalized FT vs f
(Hz)
2
0
0
250
500
750
1000
1250
1500
1750
2000
2250
Unnormalized FT vs f
(Hz)
2
0
0
250
500
750
1000
1250
1500
1750
2000
2250
Unnormalized FT vs f
(Hz)
0.025
0
−0.025
f=98.5±1.5 Hz
0
100
200
300
400
500
(Position − Mean) vs Turn number

Figure 1: cc

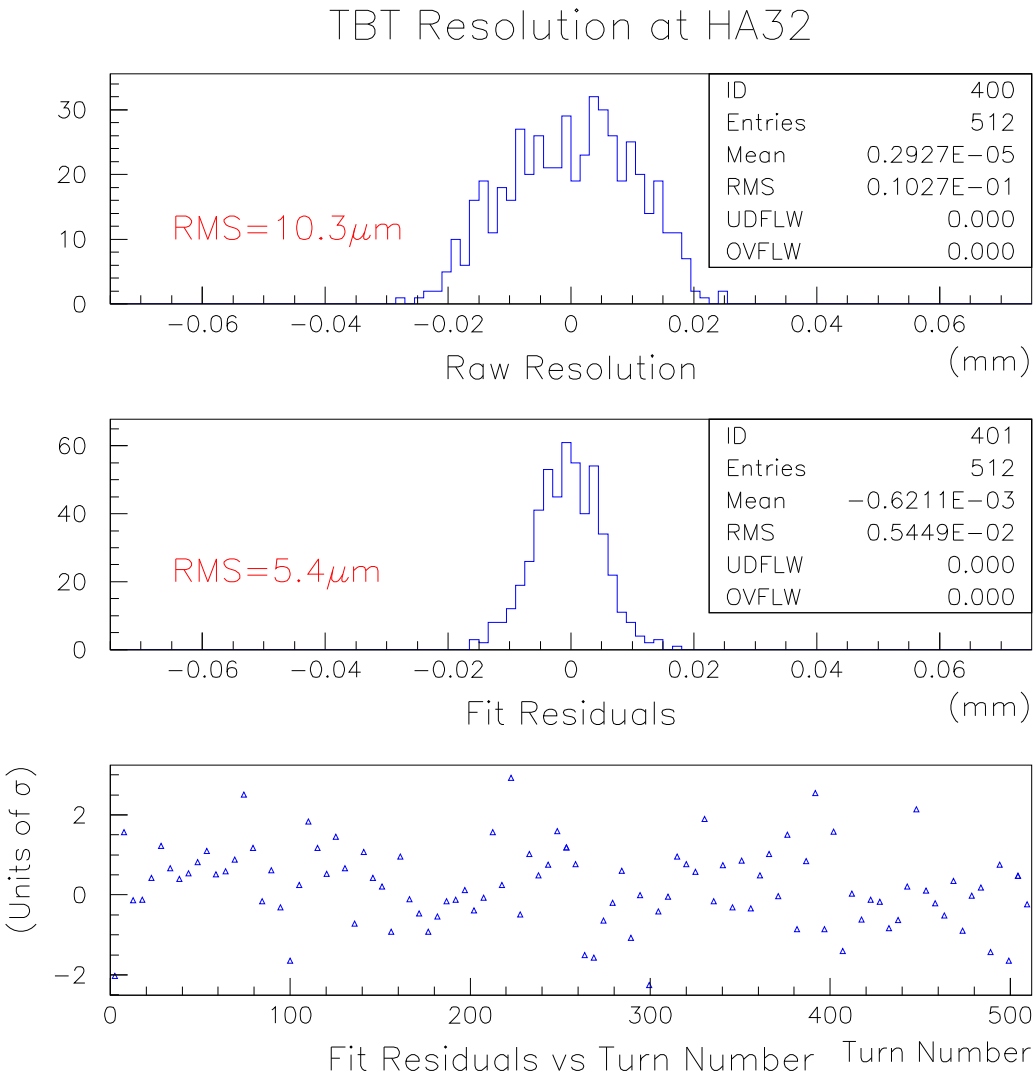
TBT Resolution at HA32
ID 400
Entries 512
Mean 0.2927E−05
RMS 0.1027E−01
UDFLW 0.000
OVFLW 0.000
RMS=10.3μm
Raw Resolution
(mm)
ID 401
Entries 512
Mean −0.6211E−03
RMS 0.5449E−02
UDFLW 0.000
OVFLW 0.000
RMS=5.4μm
Fit Residuals
(mm)
(Units of σ)
Fit Residuals vs Turn Number
Turn Number

Figure 2: cc

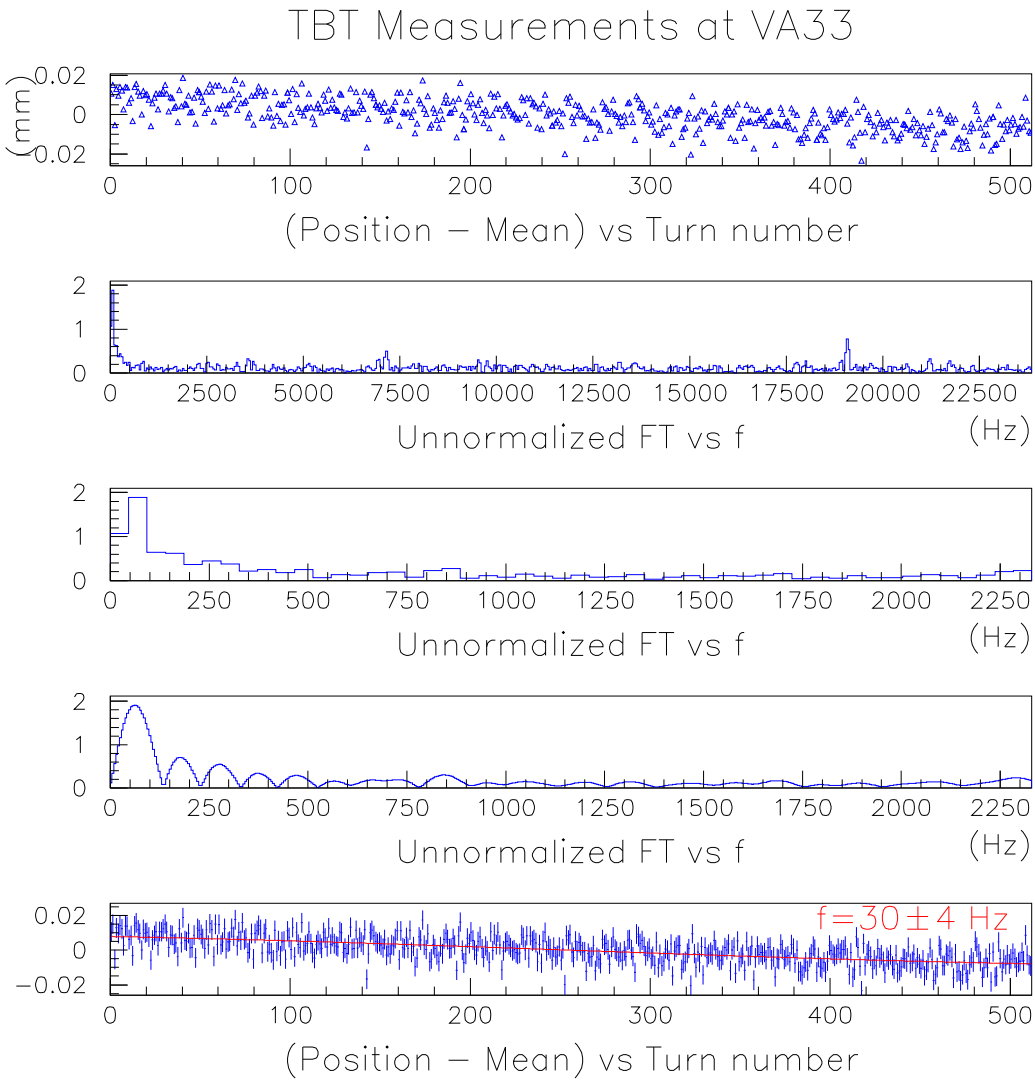
TBT Measurements at VA33
(mm)
0.02
0
-0.02
0
100
200
300
400
500
(Position − Mean) vs Turn number
2
1
0
0
2500
5000
7500
10000
12500
15000
17500
20000
22500
Unnormalized FT vs f
(Hz)
2
1
0
0
250
500
750
1000
1250
1500
1750
2000
2250
Unnormalized FT vs f
(Hz)
2
1
0
0
250
500
750
1000
1250
1500
1750
2000
2250
Unnormalized FT vs f
(Hz)
0.02
0
−0.02
f=30±4 Hz
0
100
200
300
400
500
(Position − Mean) vs Turn number

Figure 3: cc

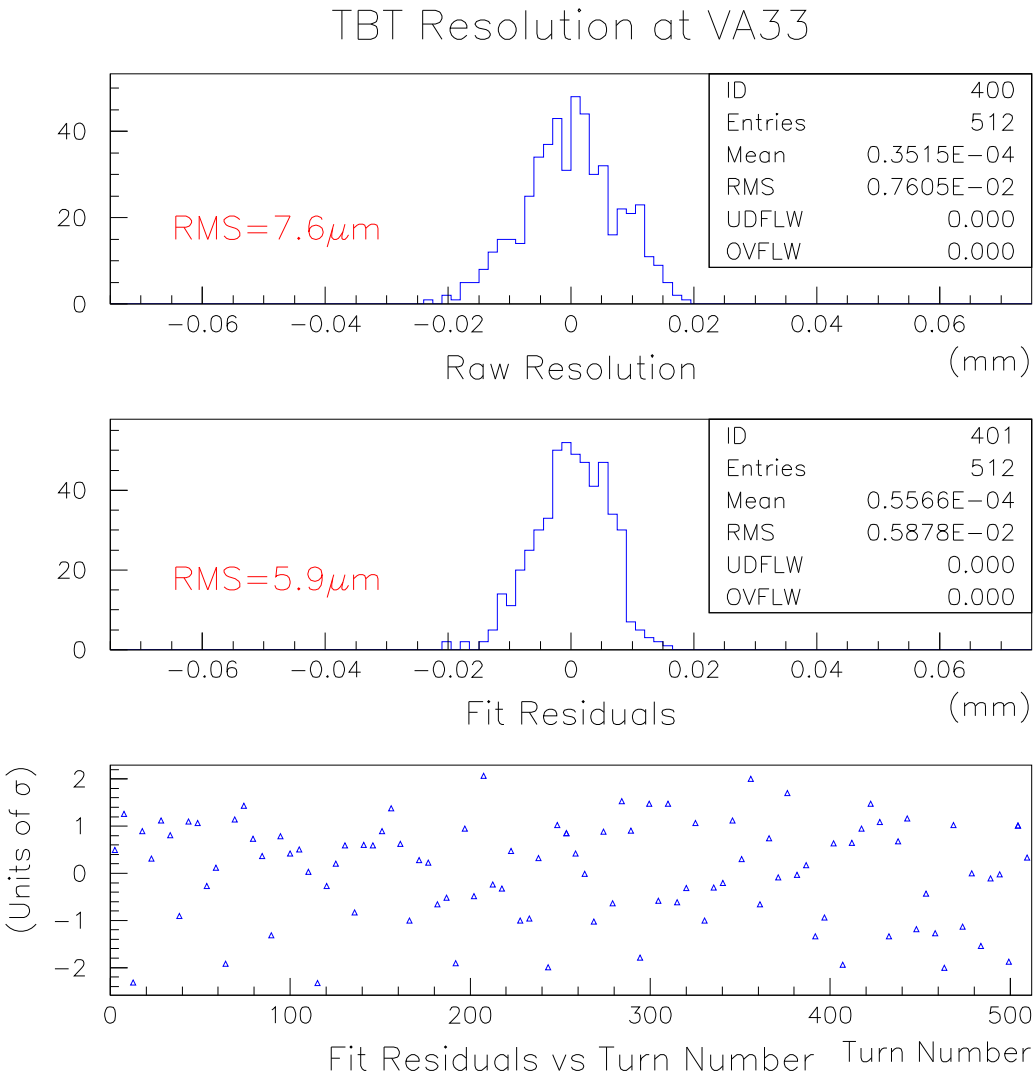
TBT Resolution at VA33
ID 400
Entries 512
Mean 0.3515E−04
RMS 0.7605E−02
UDFLW 0.000
OVFLW 0.000
RMS=7.6μm
Raw Resolution
(mm)
ID 401
Entries 512
Mean 0.5566E−04
RMS 0.5878E−02
UDFLW 0.000
OVFLW 0.000
RMS=5.9μm
Fit Residuals
(mm)
(Units of σ)
Fit Residuals vs Turn Number
Turn Number

Figure 4: cc

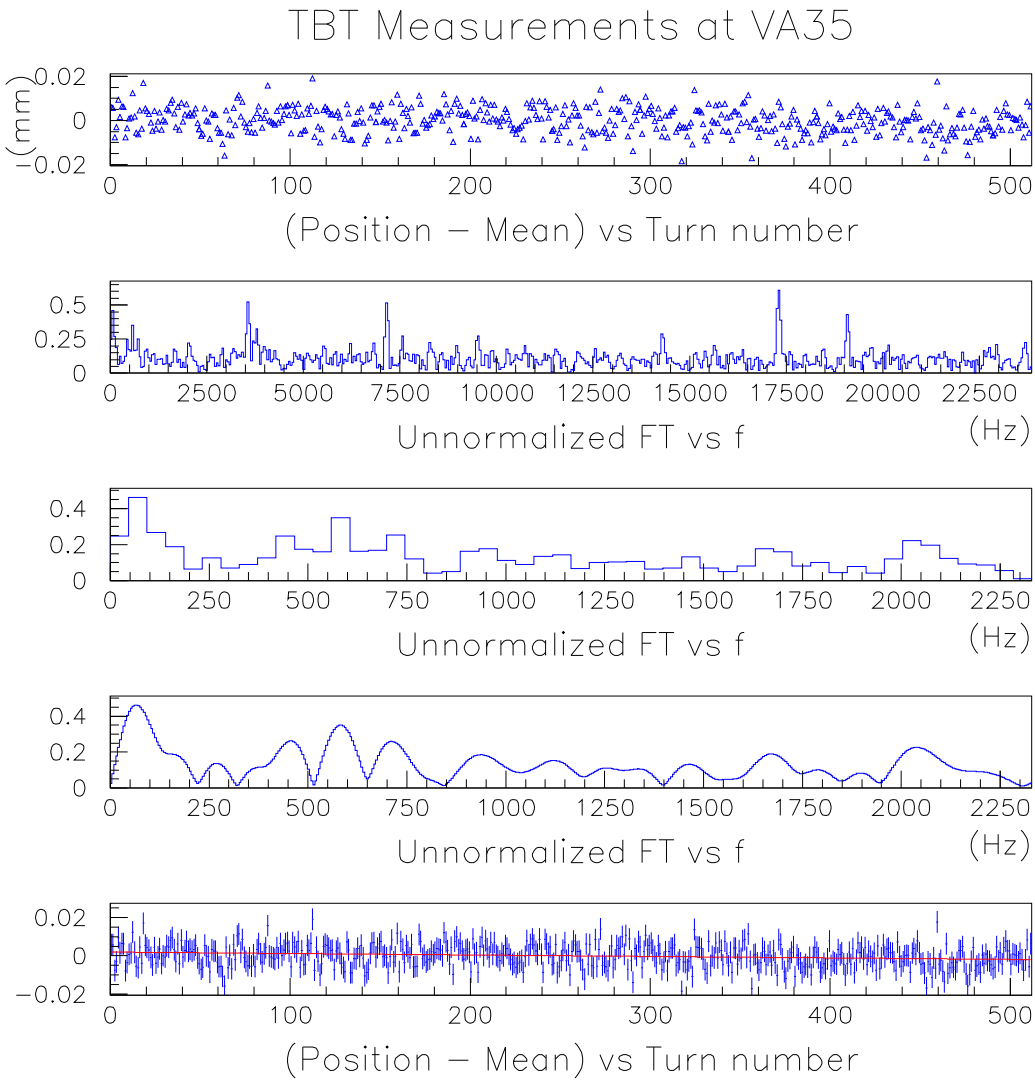
TBT Measurements at VA35
(mm)
0.02
0
−0.02
0
100
200
300
400
500
(Position − Mean) vs Turn number
0.5
0.25
0
0
2500
5000
7500
10000
12500
15000
17500
20000
22500
Unnormalized FT vs f
(Hz)
0.4
0.2
0
0
250
500
750
1000
1250
1500
1750
2000
2250
Unnormalized FT vs f
(Hz)
0.4
0.2
0
0
250
500
750
1000
1250
1500
1750
2000
2250
Unnormalized FT vs f
(Hz)
0.02
0
−0.02
0
100
200
300
400
500
(Position − Mean) vs Turn number

Figure 5: cc

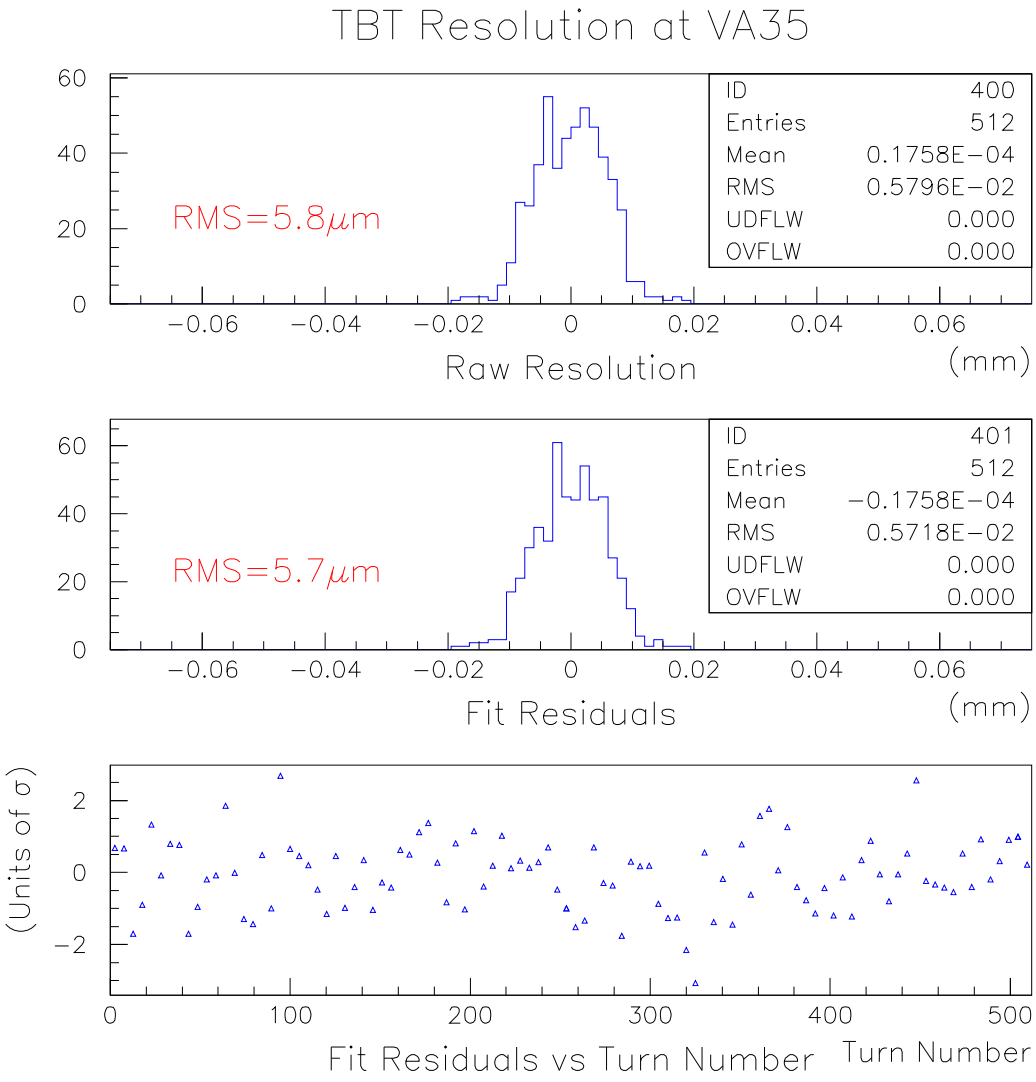
TBT Resolution at VA35
ID 400
Entries 512
Mean 0.1758E−04
RMS 0.5796E−02
UDFLW 0.000
OVFLW 0.000
RMS=5.8μm
Raw Resolution
(mm)
ID 401
Entries 512
Mean −0.1758E−04
RMS 0.5718E−02
UDFLW 0.000
OVFLW 0.000
RMS=5.7μm
Fit Residuals
(mm)
(Units of σ)
Fit Residuals vs Turn Number
Turn Number

Figure 6: cc

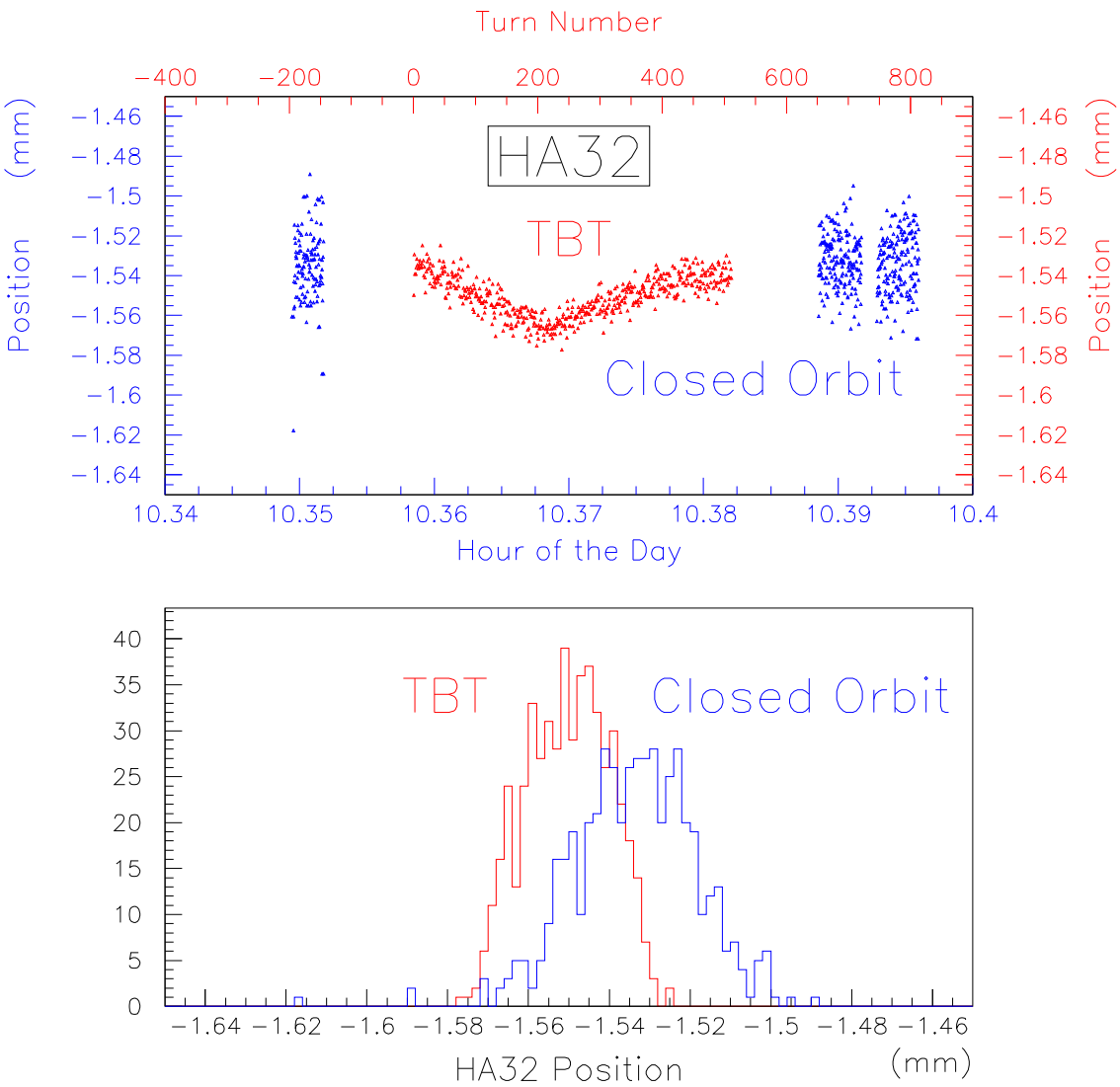
Turn Number
−400
−200
0
200
400
600
800
HA32
TBT
Closed Orbit
Position (mm)
−1.46
−1.48
−1.5
−1.52
−1.54
−1.56
−1.58
−1.6
−1.62
−1.64
10.34
10.35
10.36
10.37
10.38
10.39
10.4
Hour of the Day
TBT
Closed Orbit
40
35
30
25
20
15
10
5
0
−1.64 −1.62 −1.6 −1.58 −1.56 −1.54 −1.52 −1.5 −1.48 −1.46
HA32 Position
(mm)

Figure 7: cc

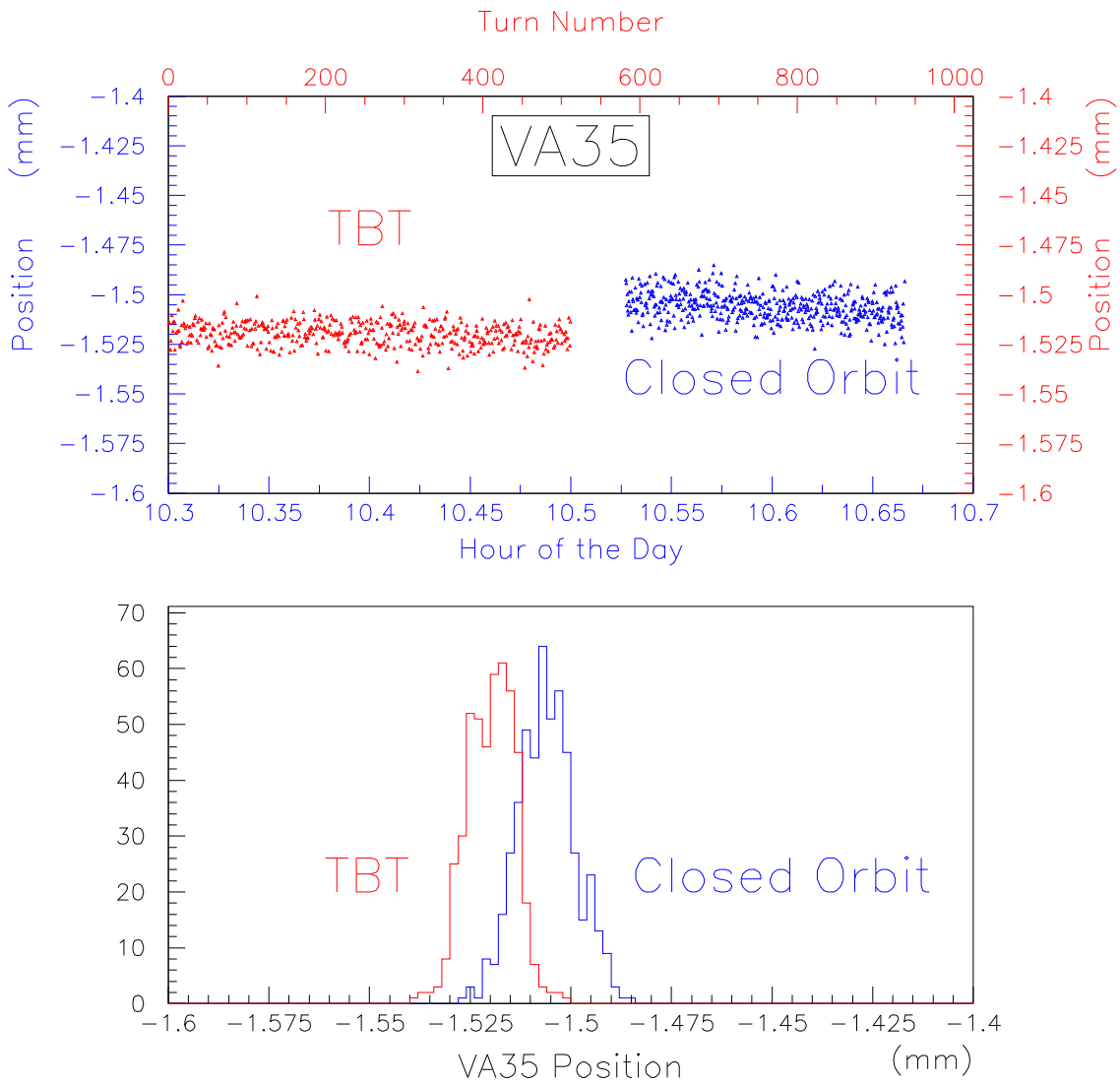
Turn Number
0
200
400
600
800
1000
VA35
TBT
Closed Orbit
Position (mm)
−1.4
−1.425
−1.45
−1.475
−1.5
−1.525
−1.55
−1.575
−1.6
10.3
10.35
10.4
10.45
10.5
10.55
10.6
10.65
10.7
Hour of the Day
70
60
50
40
30
20
10
0
TBT
Closed Orbit
VA35 Position
(mm)

Figure 8: cc

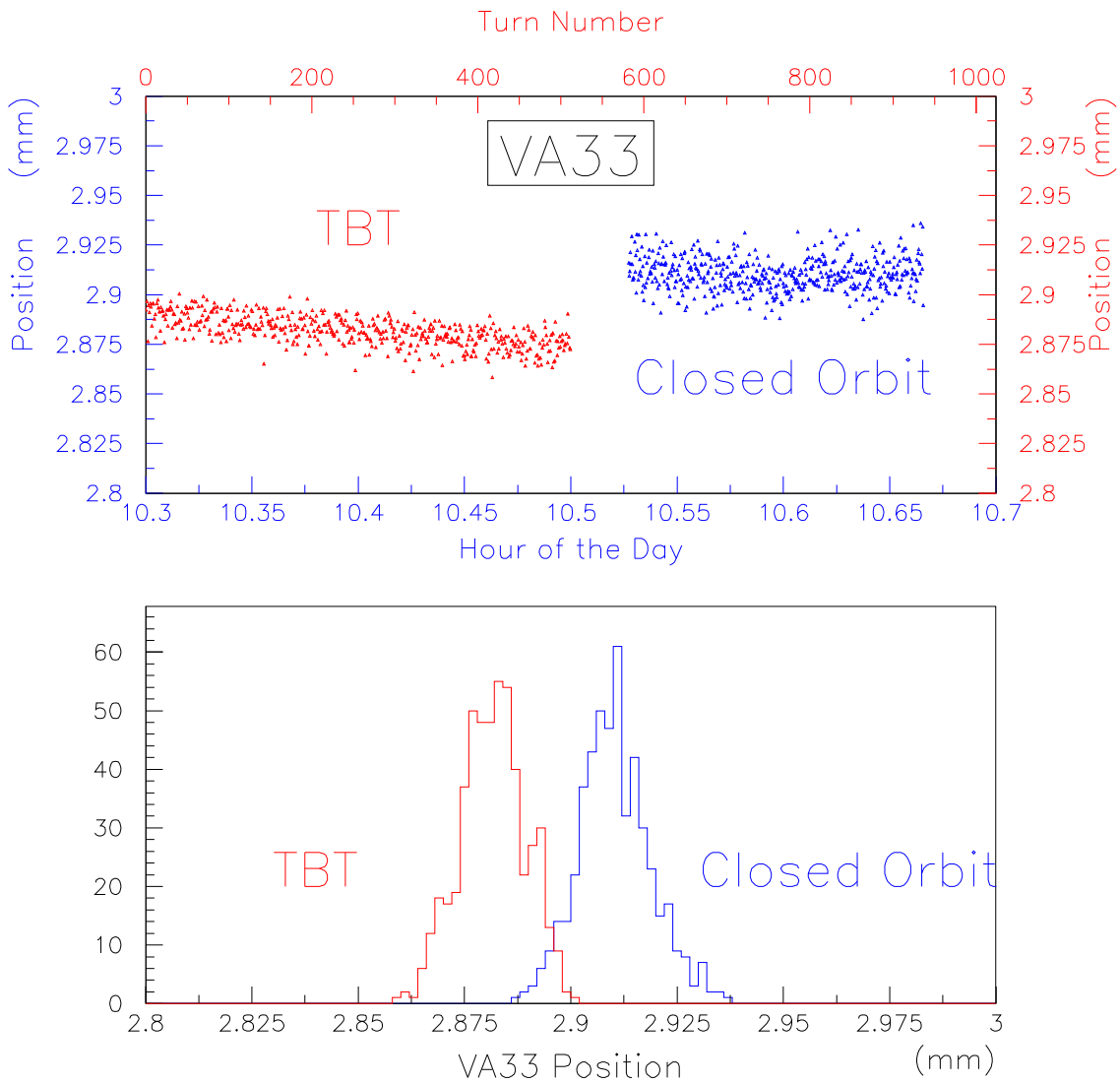
Turn Number
0
200
400
600
800
1000
VA33
TBT
Closed Orbit
Position (mm)
3
2.975
2.95
2.925
2.9
2.875
2.85
2.825
2.8
10.3
10.35
10.4
10.45
10.5
10.55
10.6
10.65
10.7
Hour of the Day
60
50
40
30
20
10
0
TBT
Closed Orbit
VA33 Position
(mm)

Figure 9: cc

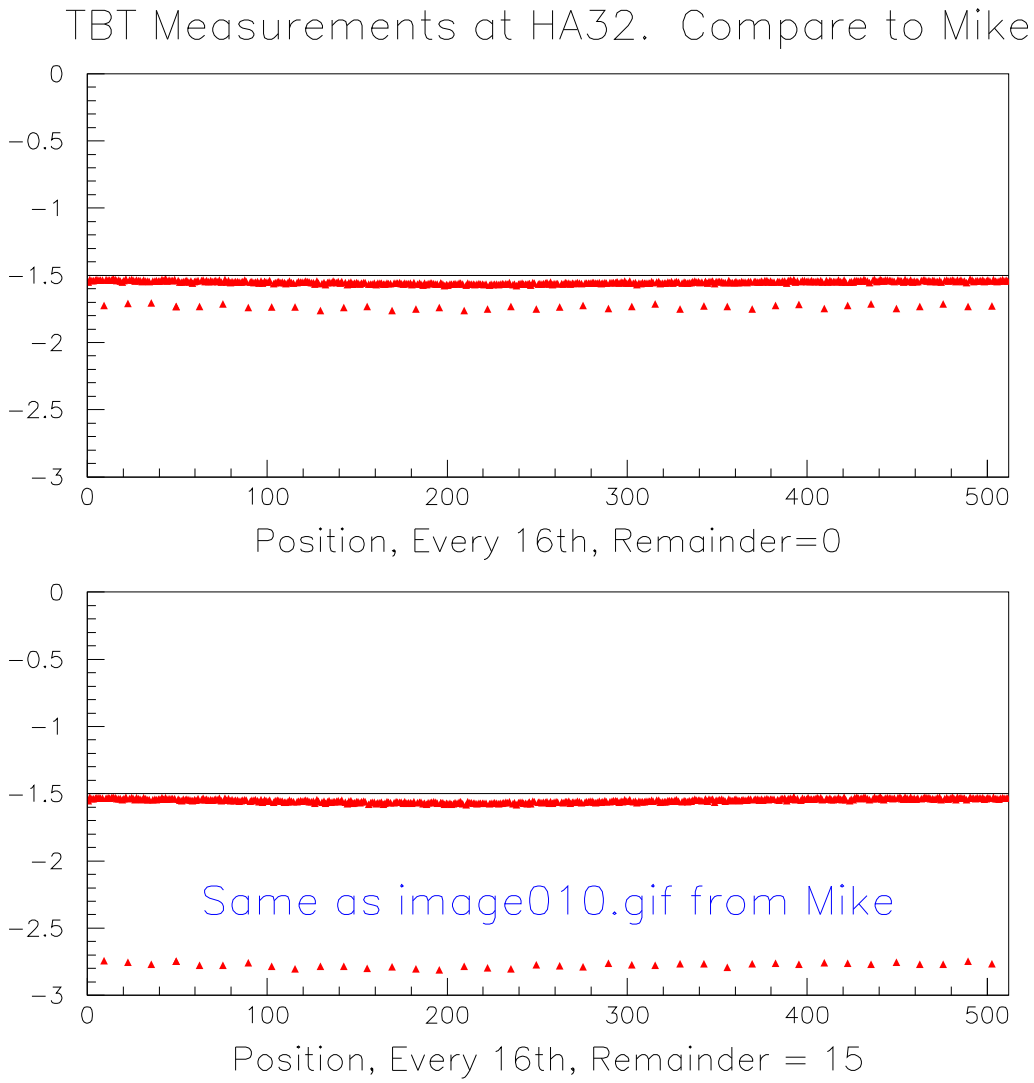
TBT Measurements at HA32. Compare to Mike
0
−0.5
−1
−1.5
−2
−2.5
−3
0
100
200
300
400
500
Position, Every 16th, Remainder=0
Same as image010.gif from Mike
Position, Every 16th, Remainder = 15

Figure 10: cc

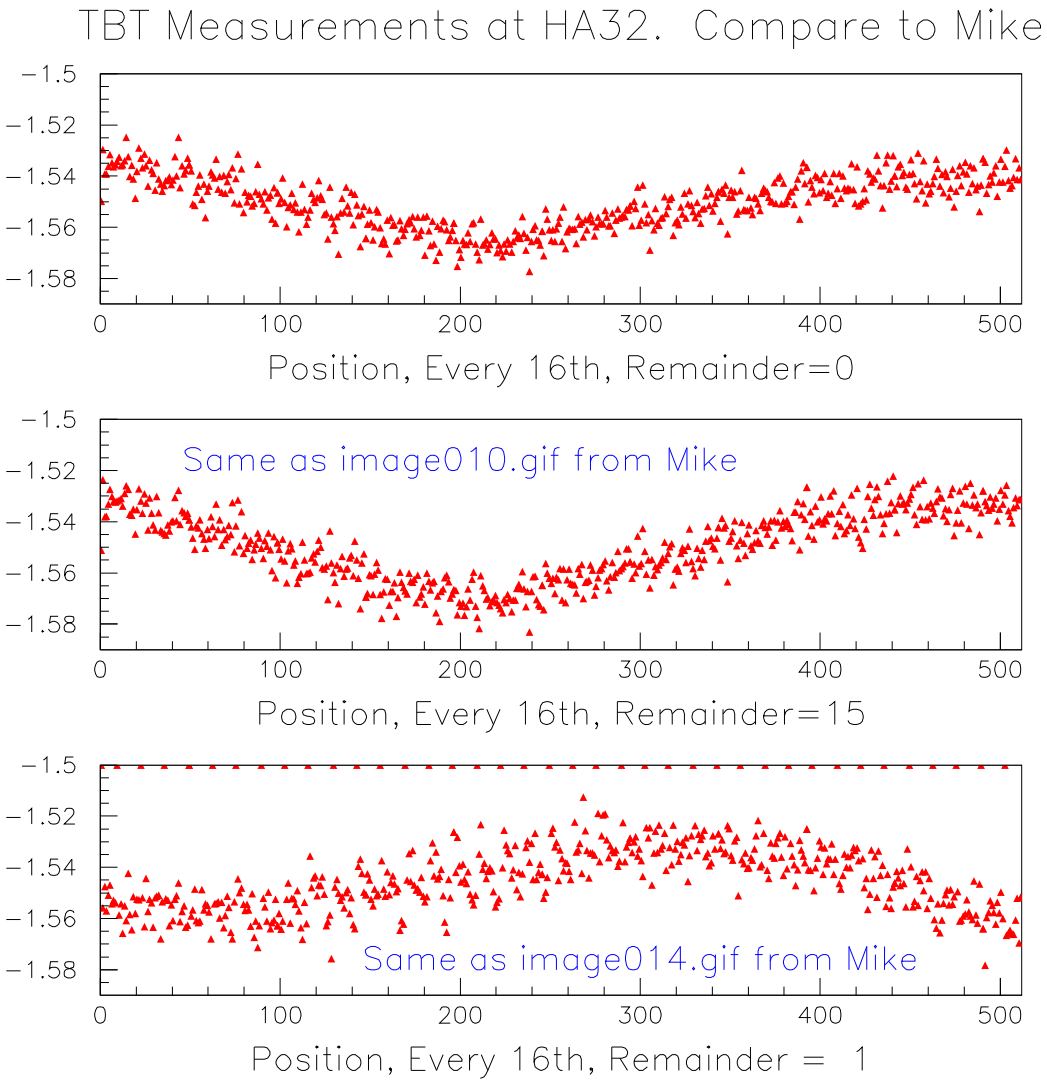
TBT Measurements at HA32. Compare to Mike
−1.5
−1.52
−1.54
−1.56
−1.58
0
100
200
300
400
500
Position, Every 16th, Remainder=0
Same as image010.gif from Mike
Position, Every 16th, Remainder=15
Same as image014.gif from Mike
Position, Every 16th, Remainder = 1

Figure 11: cc

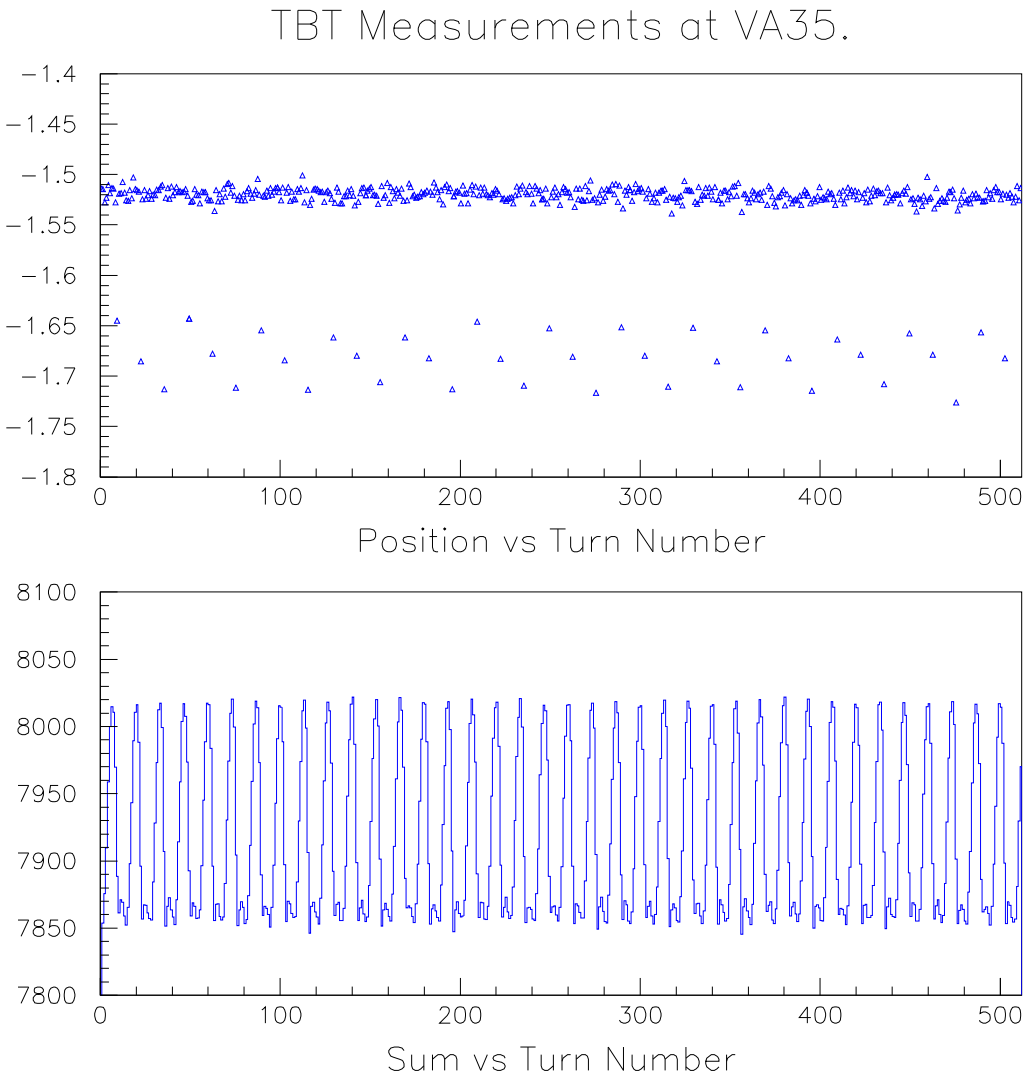
TBT Measurements at VA35.
−1.4
−1.45
−1.5
−1.55
−1.6
−1.65
−1.7
−1.75
−1.8
0
100
200
300
400
500
Position vs Turn Number
8100
8050
8000
7950
7900
7850
7800
0
100
200
300
400
500
Sum vs Turn Number

Figure 12: cc

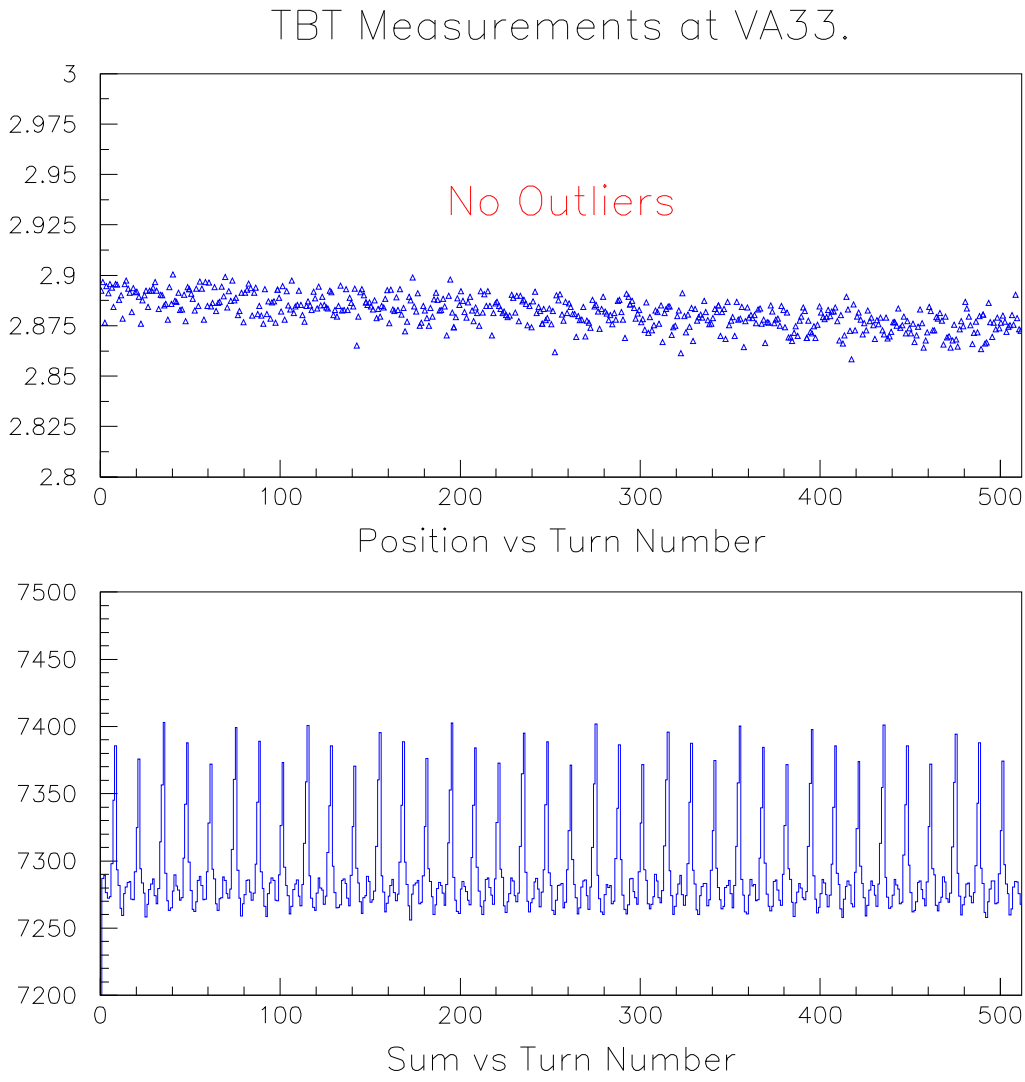
TBT Measurements at VA33.
No Outliers
3
2.975
2.95
2.925
2.9
2.875
2.85
2.825
2.8
0
100
200
300
400
500
Position vs Turn Number
7500
7450
7400
7350
7300
7250
7200
0
100
200
300
400
500
Sum vs Turn Number

Figure 13: cc