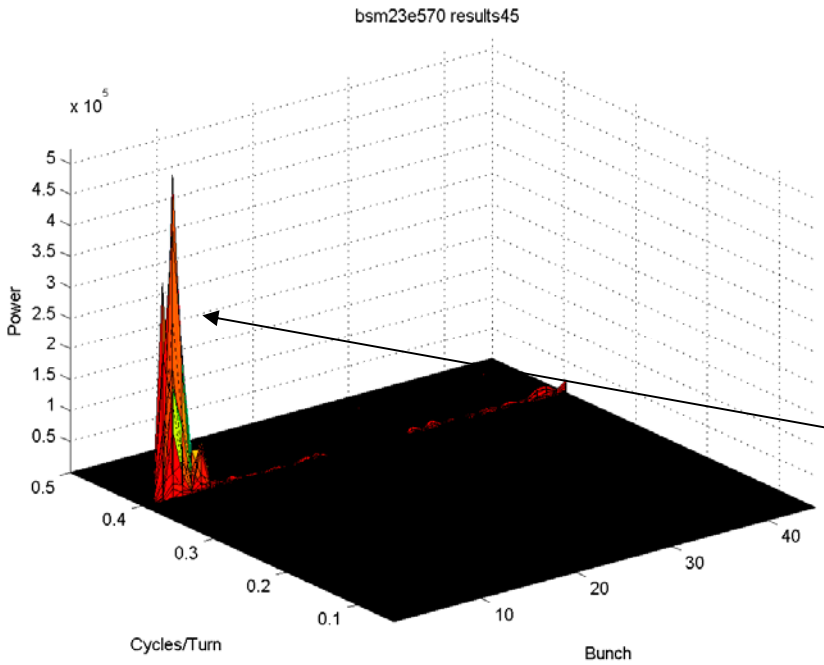
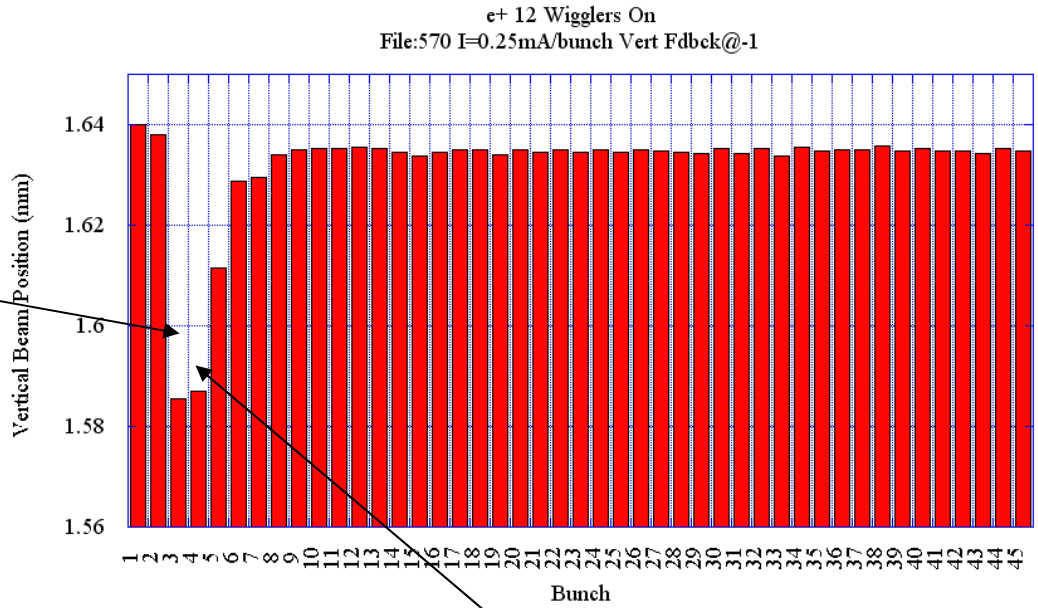
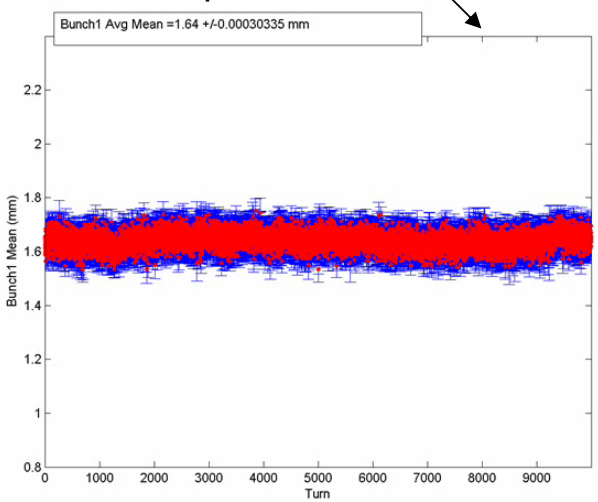
FFT Vertical position I_{e+}=0.25mA/bunch
File:570 e+ 12 wigglers on
Vert. Fdbck@-1

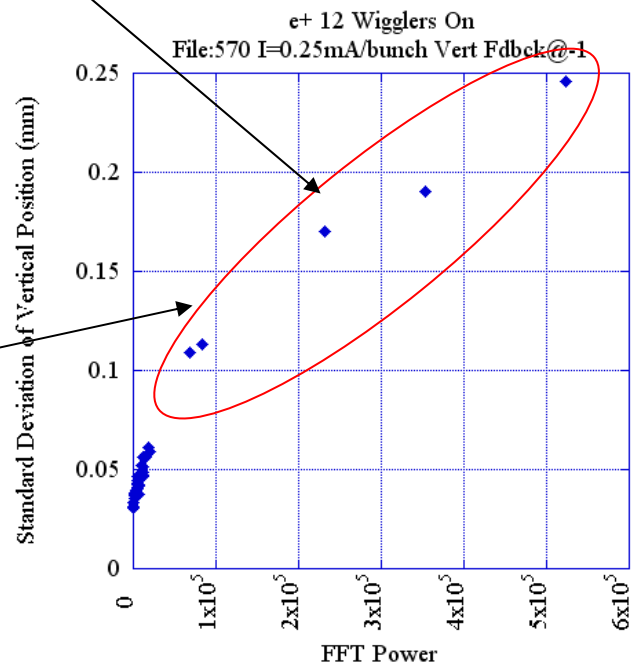




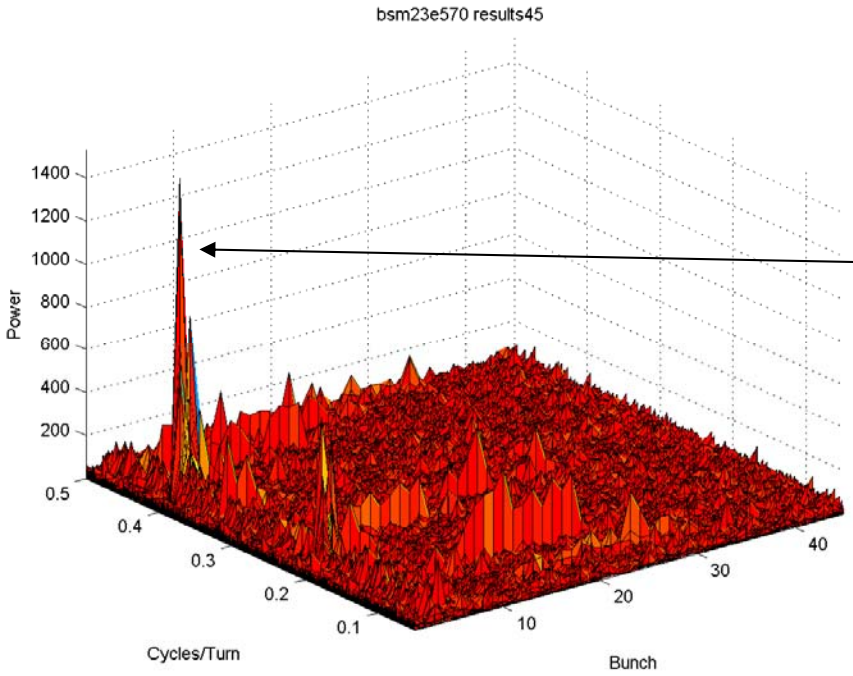
Vertical position movie

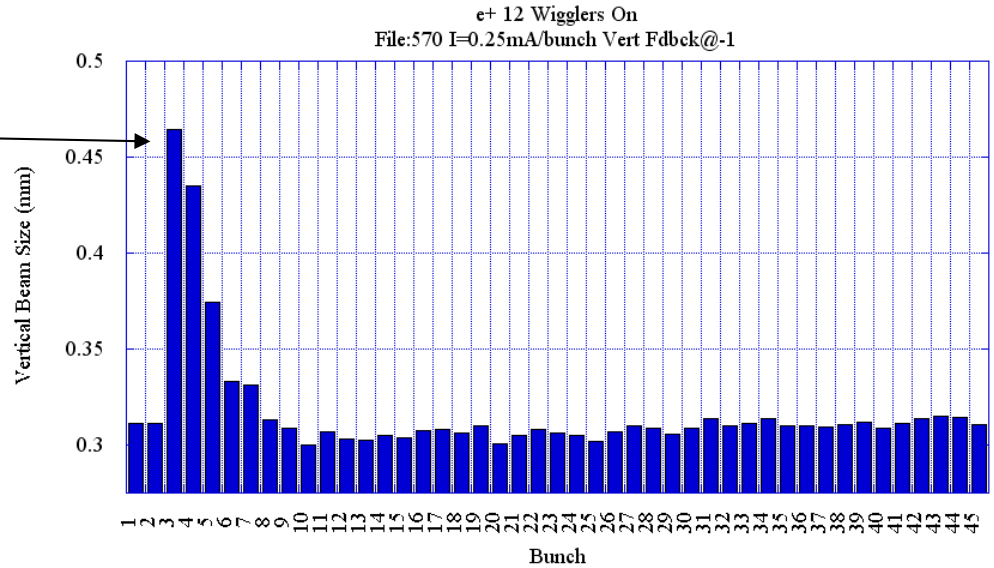


- Vertical position oscillation at f_{osc}=234.7kHz.
- Oscillation amplitude correlates with FFT Power.
- Large vertical position oscillation amplitude for bunches 3-7.

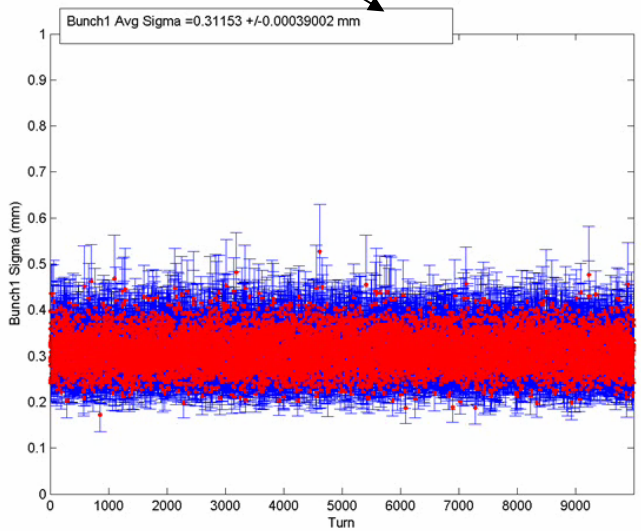


FFT σ_v I_{e+}=0.25mA/bunch
File:570 e+ 12 wigglers on
Vert. Fdbck@-1



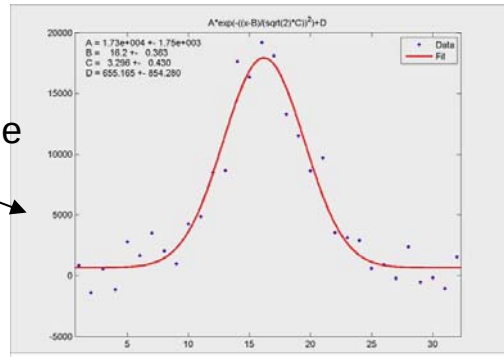


σ_v movie

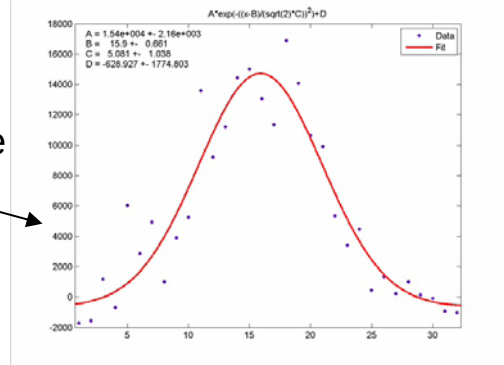


- Dramatic jump in σ_v for bunches 3-7 which correlates with a peak in the beam spectrum at f_{osc}=235.1kHz.
- Equilibrium σ_v is larger with 12 wigglers on (σ_v=0.31mm) than with 6 wigglers on/off (σ_v=0.26mm).
- No σ_v growth along the train after bunch 7.

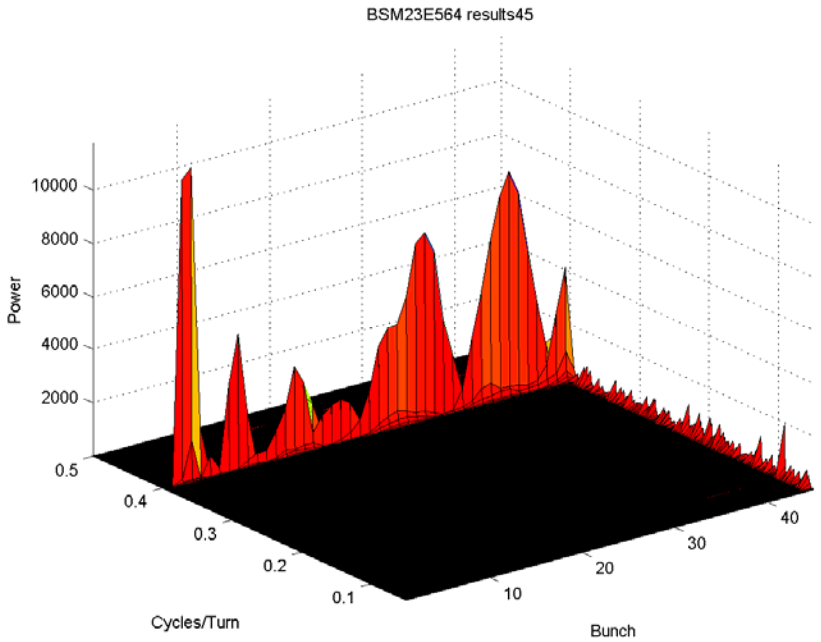
Bunch 1
Dist. Movie

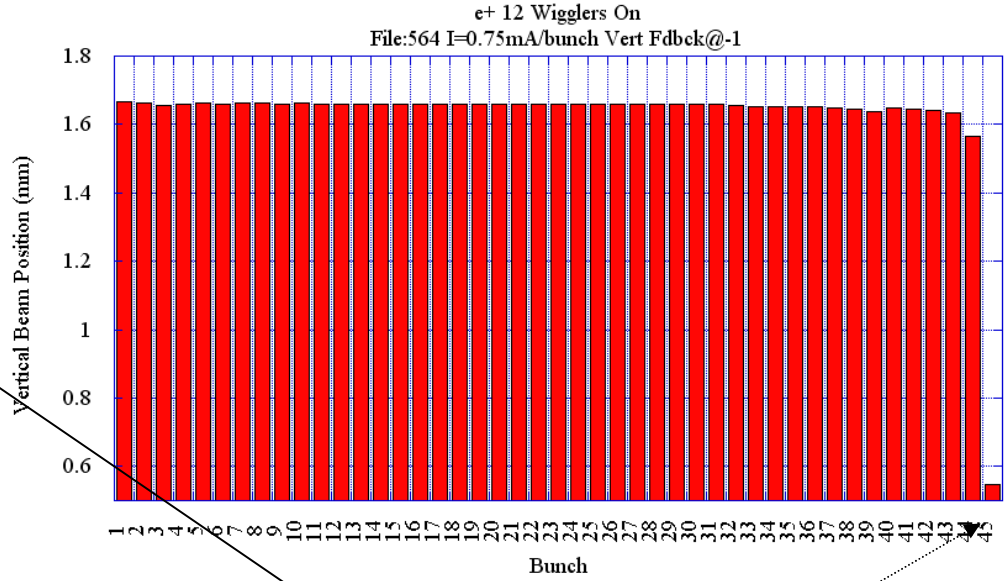


Bunch 3
Dist. Movie

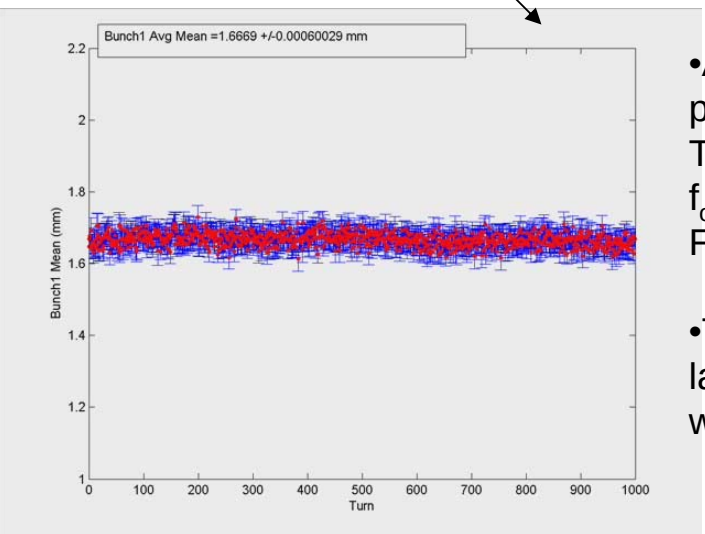


FFT Vertical position I_{e+}=0.75mA/bunch
File:564 e+ 12 wigglers on
Vert. Fdbck@-1





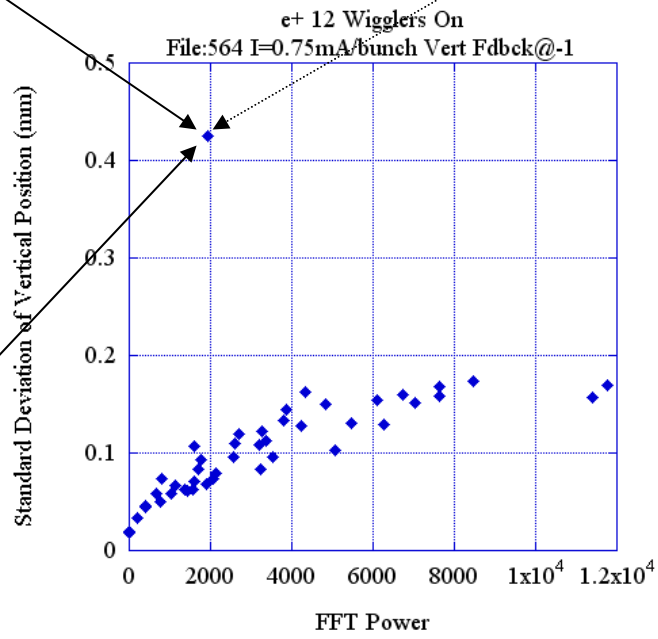
Vertical position movie

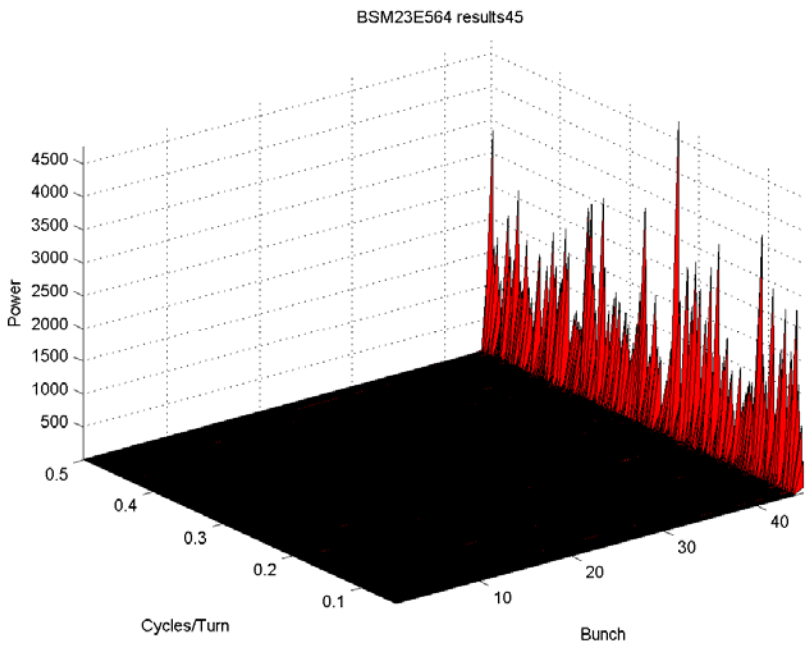


Increasing the current and with vertical feedback off causes a:

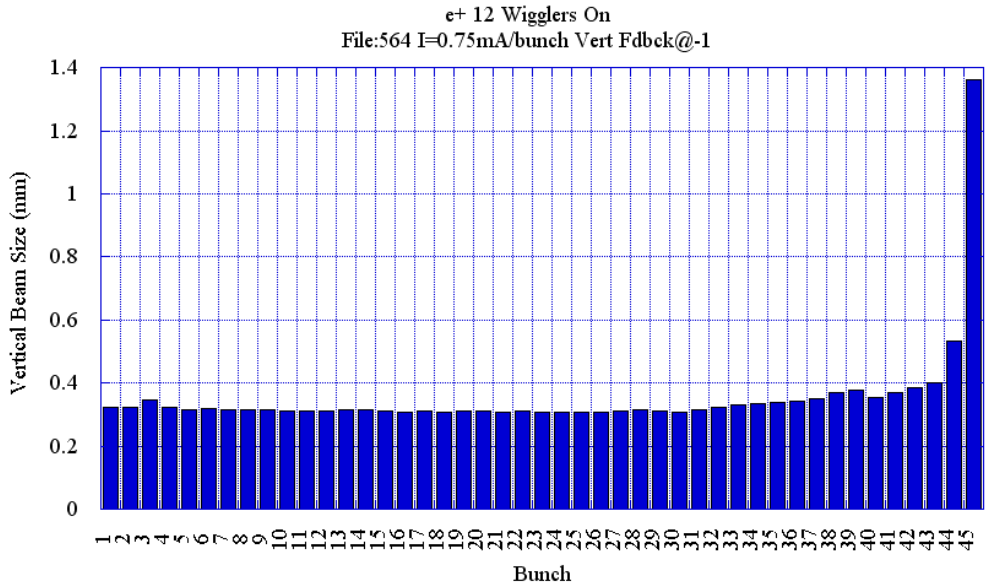
•An increase in the vertical position oscillation amplitude. The amplitude as a frequency of f_{osc}=234.6kHz and correlates with FFT power.

•The last bunch in the train has a large oscillation amplitude over a wide frequency spectrum.

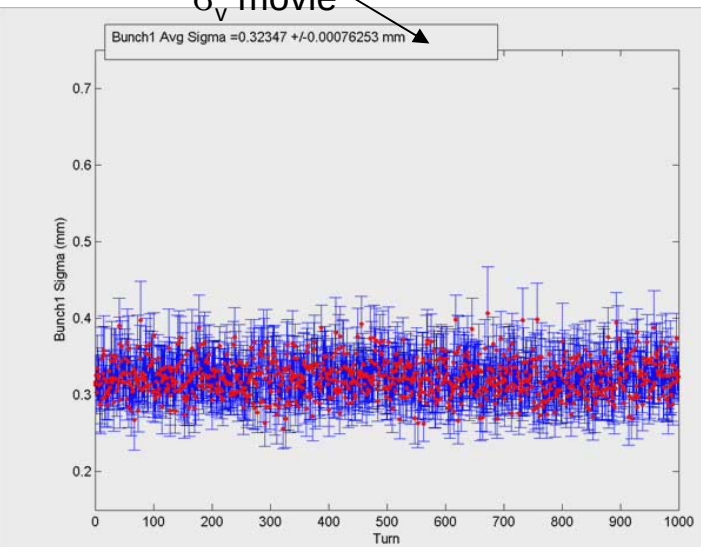




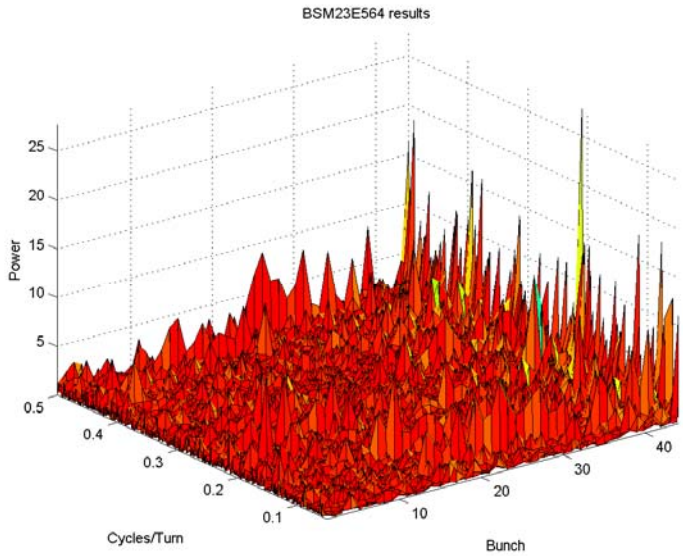
FFT σ_v I_{e+}=0.75mA/bunch
File:564 e+ 12 wigglers on
Vert. Fdbck@-1

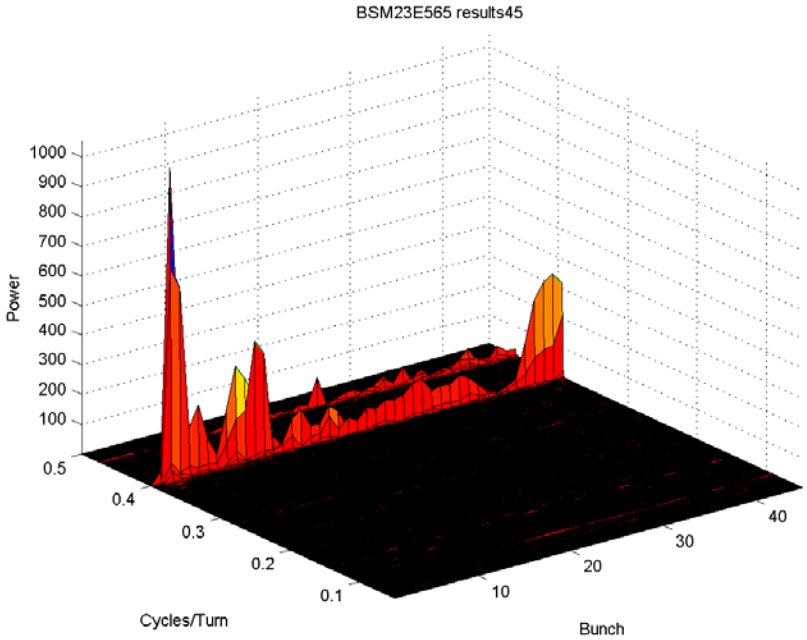


σ_v movie

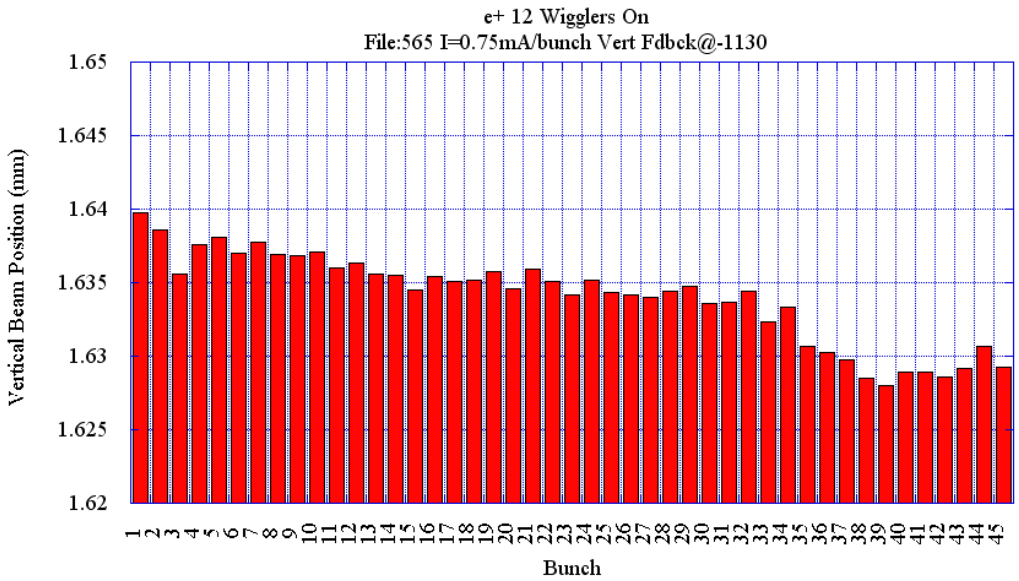


- At higher current, σ_v for bunch 3 is reduced.
- A gradual σ_v growth occurs at ~bunch 30.
- No single σ_v oscillation frequency is in the beam spectrum leading up to the bunch 45 σ_v blow-up.

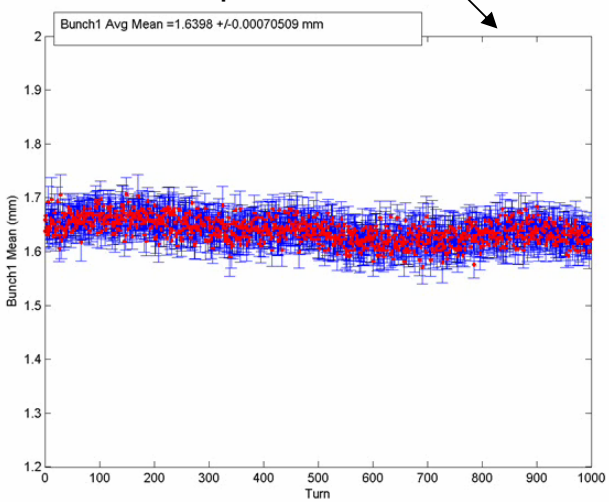




FFT Vertical position I_{e+}=0.75mA/bunch
File:565 e+ 12 wigglers on
Vert. Fdbck@-1130



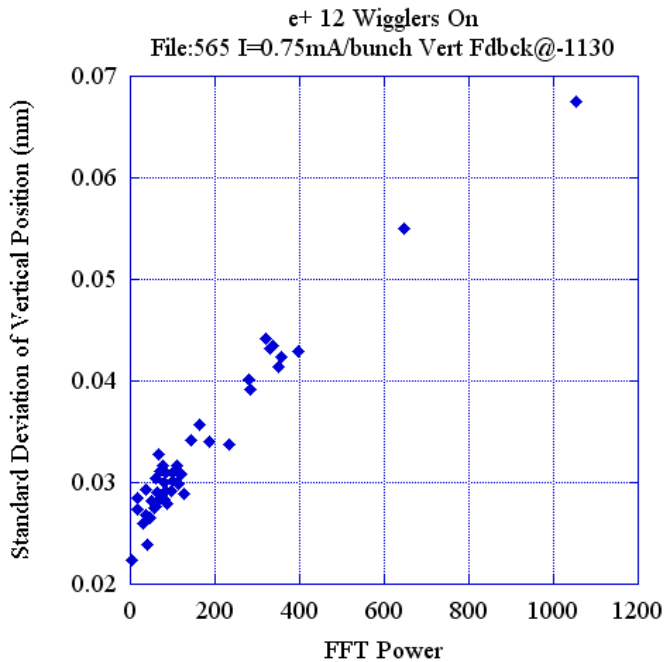
Vertical position movie

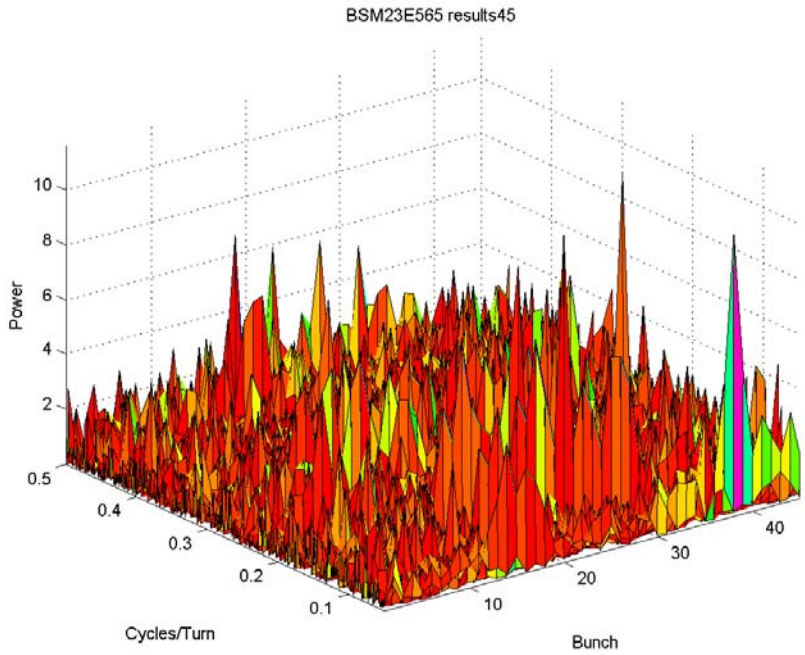


Turn vertical feedback on results in:

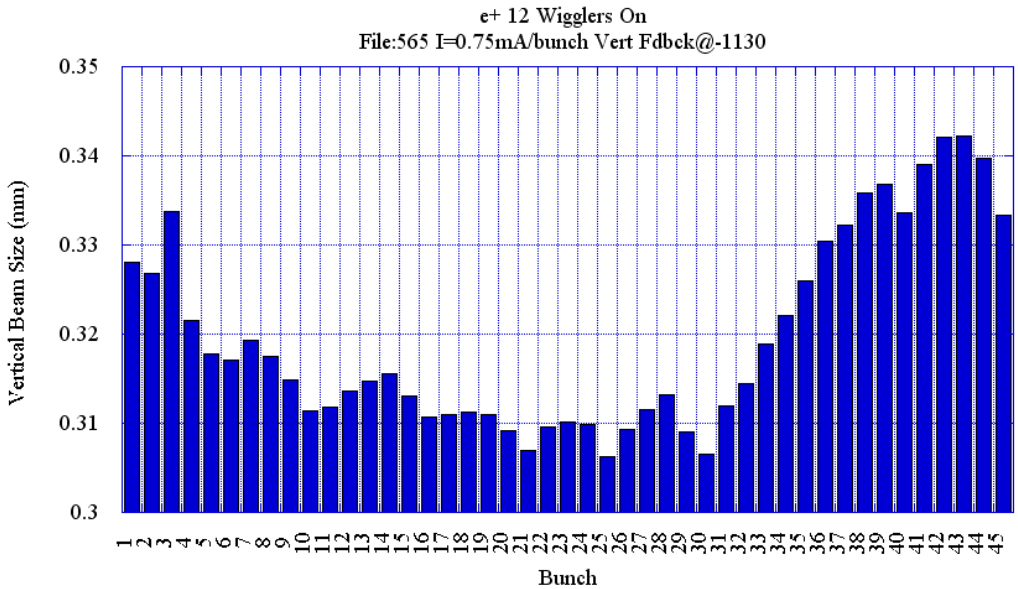
•A substantial reduction in the vertical position oscillation amplitude (f_{osc}=234.2kHz). The amplitude still correlates with FFT power.

•A second oscillation frequency is detected at f_{osc}=209.36kHz (0.463 cycles/turn).



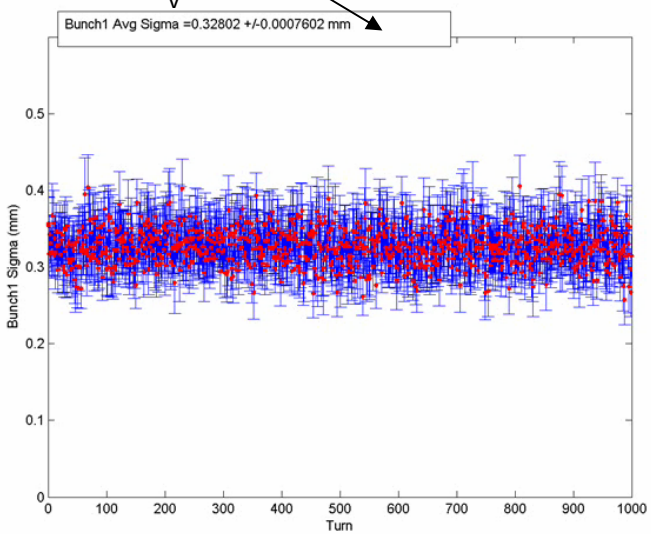


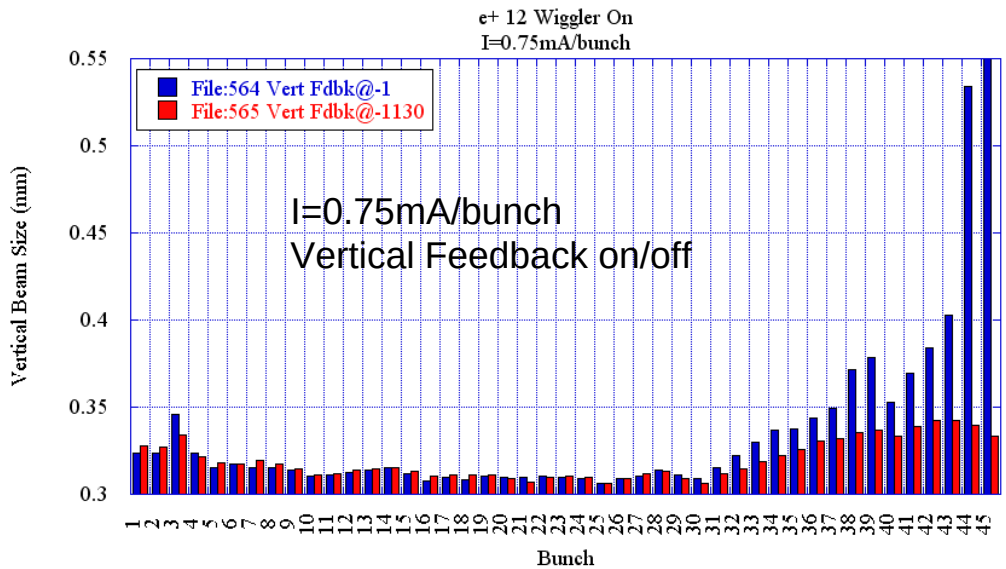
FFT σ_v I_{e+}=0.75mA/bunch
File:565 e+ 12 wigglers on
Vert. Fdbck@-1130



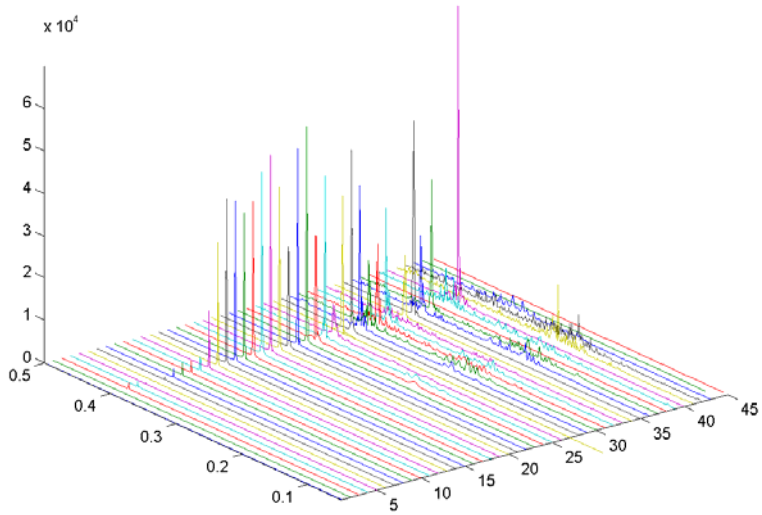
• σ_v growth occurs at bunch 31 but at a slower rate compared to no feedback on. The reduction of the vertical position oscillation amplitude eliminates the σ_v blow-up at the end of the train.

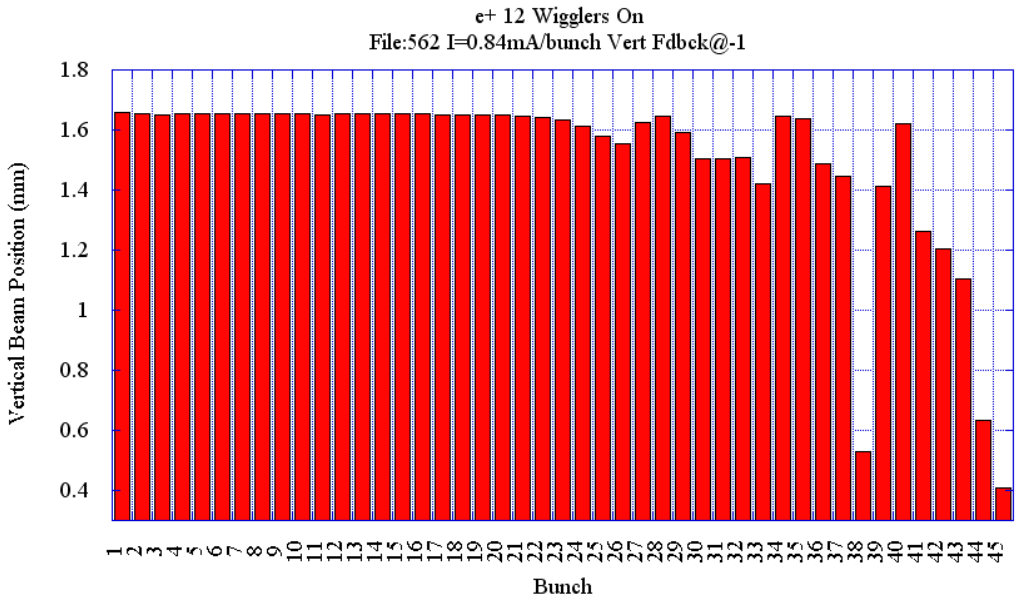
σ_v movie



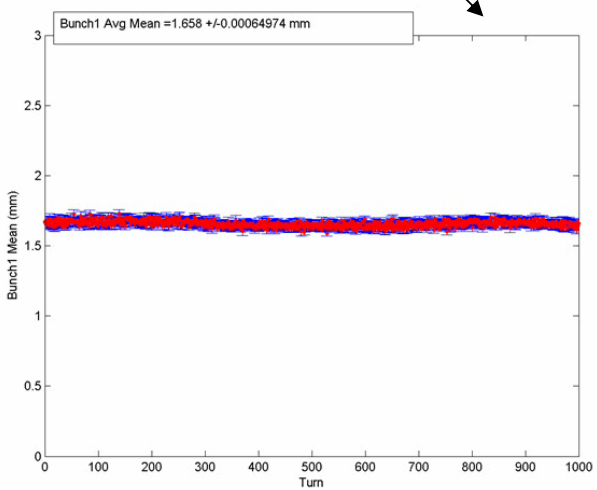


FFT Vertical position I_{e+}=0.84mA/bunch
File:562 e+ 12 wigglers on
Vert. Fdbck@-1





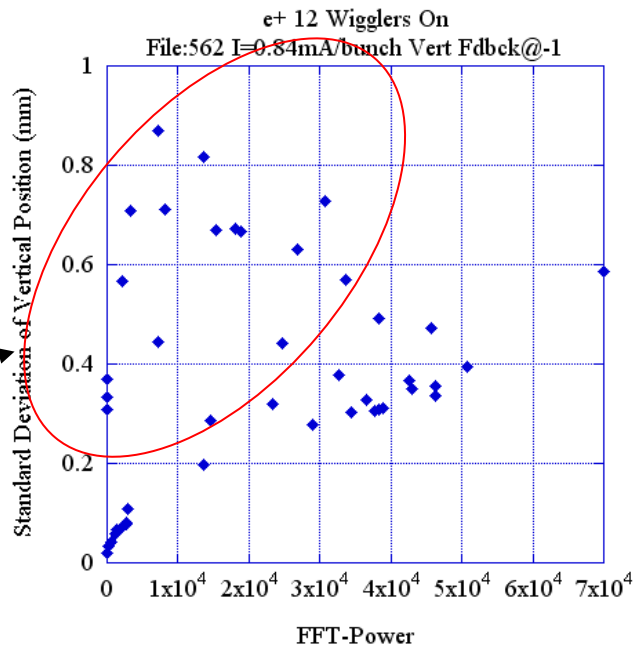
Vertical position movie

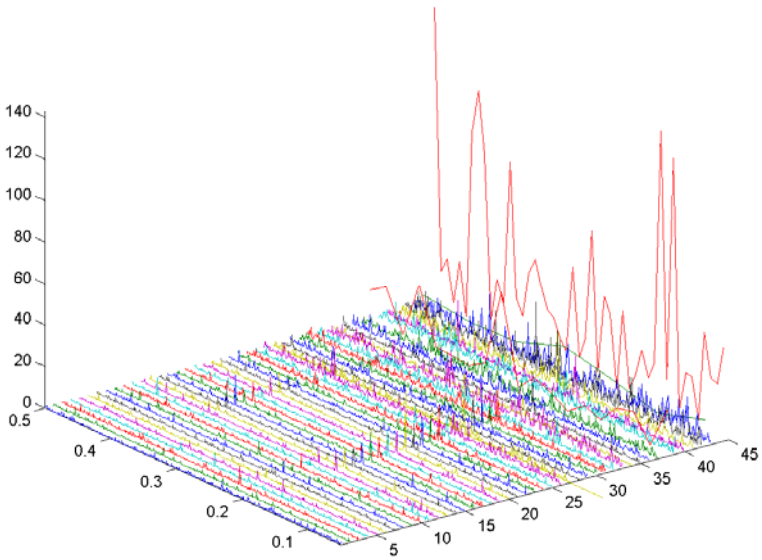


Slightly higher I and turning off vertical feedback results in:

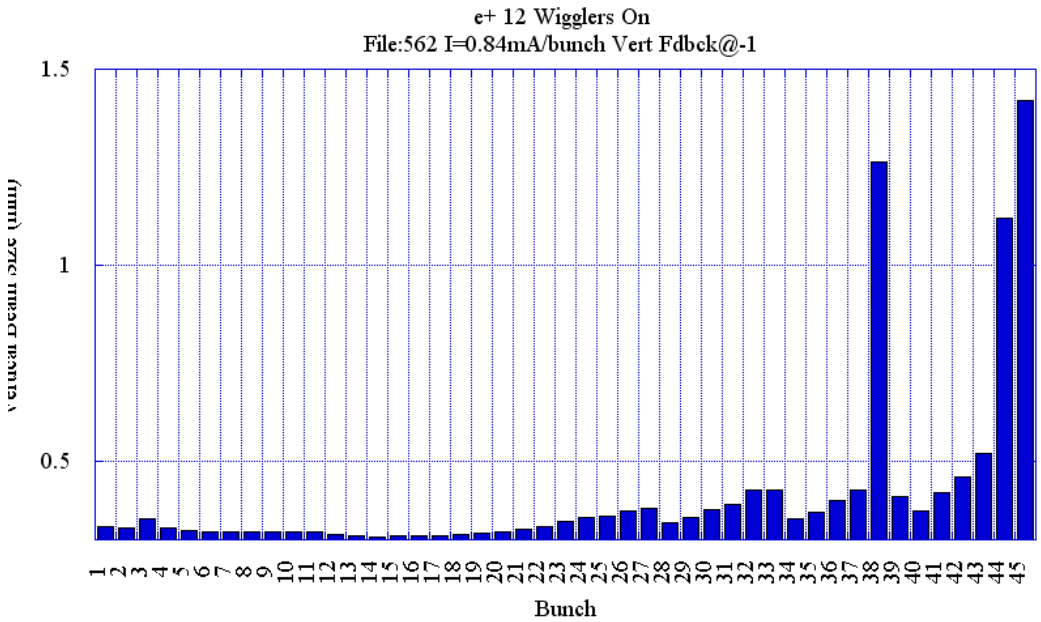
•A large vertical position oscillation amplitude that does not correlate with FFT power.

•A position oscillation (coherent) amplitude that correlates with FFT power and an oscillation amplitude (incoherent) that does not correlate with FFT power.

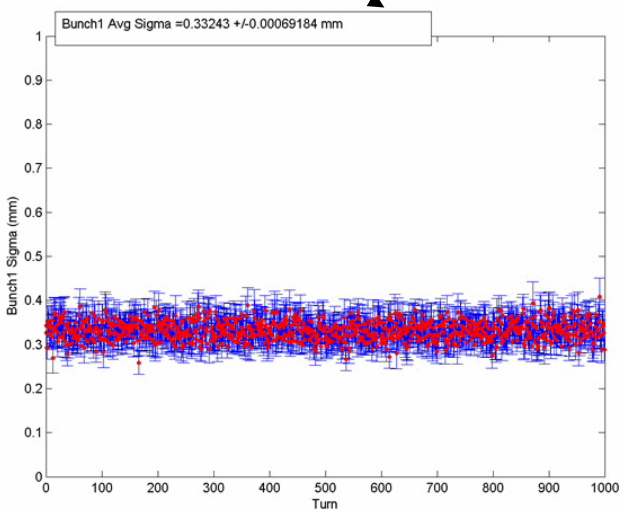




FFT σ_v I_{e+}=0.84mA/bunch
File:562 e+ 12 wigglers on
Vert. Fdbck@-1



σ_v movie

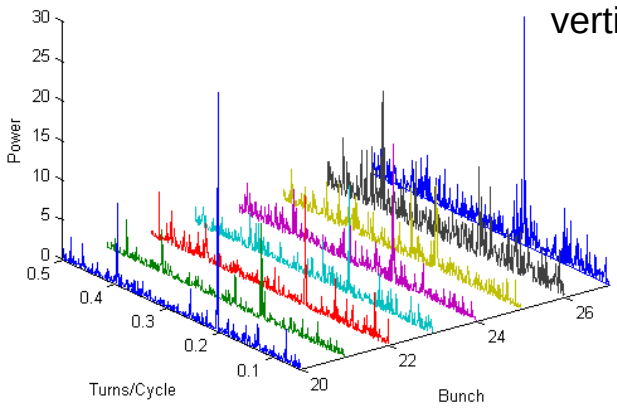


- σ_v growth along the train starts at ~bunch 21.
- Two main peaks in the beam spectrum at f_{osc}=235.4 and 310kHz.
- Large vertical position oscillation amplitude leads to a σ_v blow-up occurs at several locations in the 45 bunch train.

Spectrum and bunch distribution leading up to beam blow-up with I=0.84mA/bunch and vertical feedback off

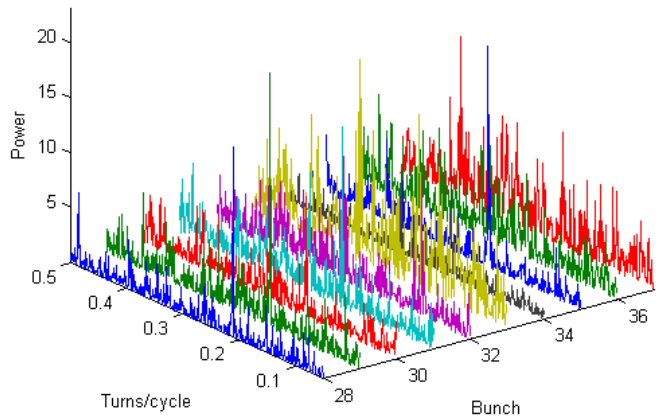
bsm23e562 gofcut

Bunches 20-27



bsm23e562 gofcut

Bunches 28-37

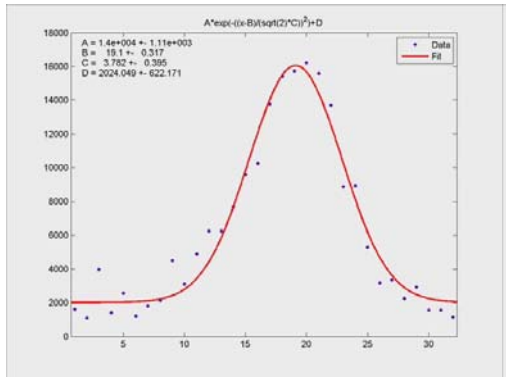


Characteristics of σ_v blow-up along the train:

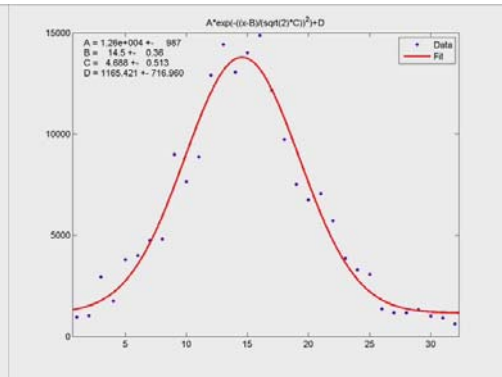
- Increase in FFT power at f_{osc}=236.6kHz and f_{osc}=306.5kHz.
- Increase in vertical position oscillation amplitude (bunch 36-37).
- Substantial increase in σ_v (bunches 38).
- large vertical position oscillation amplitude but reduced σ_v (bunch 39).
- Repeat process.

Movies

Bunch 36 I=0.66mA

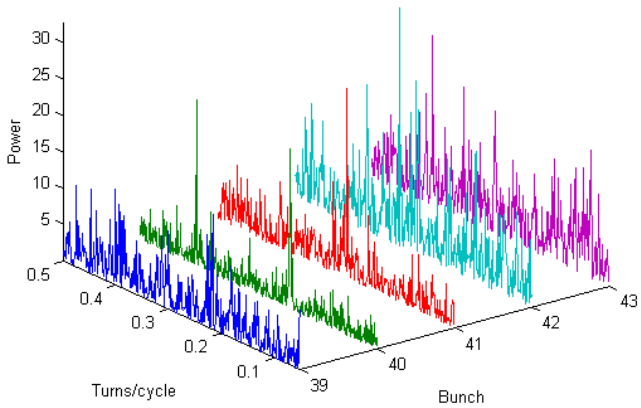


Bunch 37 I=0.92mA

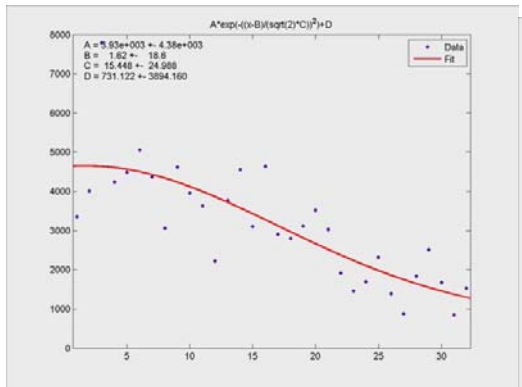


bsm23e562 gofcut

Bunches 39-43



Bunch 38 I=0.91mA



Bunch 39 I=0.91mA