PIC and GENESIS Simulations

Jun Ma, Roman Samulyak, Kwangmin Yu

Department of Applied Mathematics and Statistics
Stony Brook University

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$$\text{Modulator(PIC)} \Rightarrow \text{Amplifier(GENESIS)} \Rightarrow \text{Kicker(PIC)}$$

GENESIS parameters

- NSLICE : number of slices, 400
- NPART : number of particles per slice
- XLAMDS : optical wavelength (slice length), 1.293e-5m
- NWIG : number of wiggler period, 200

Bunching factor

Bunching factor of jth slice

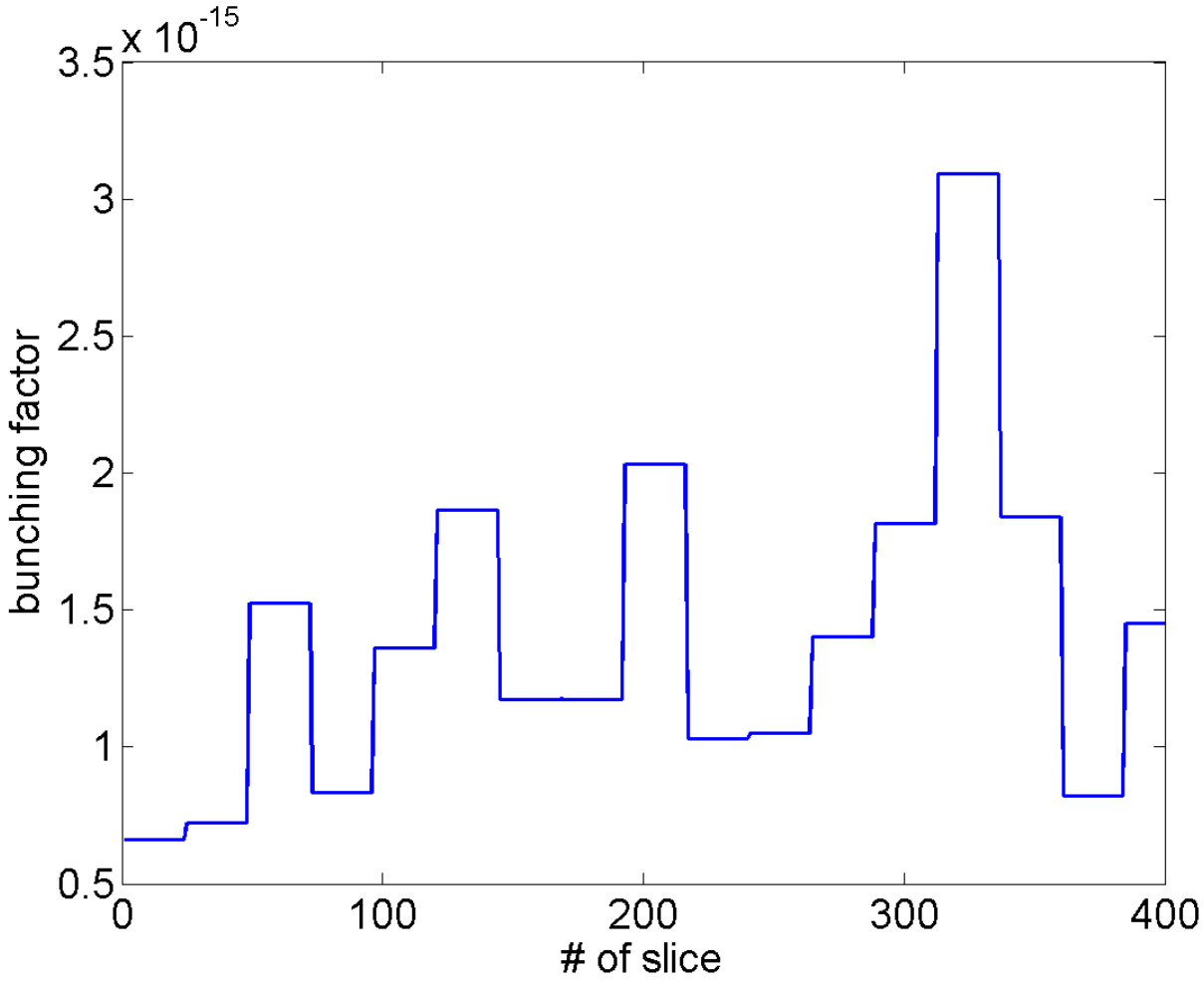
$$b_j = \frac{1}{N} \sum_{k=1+jN}^{(j+1)N} e^{i\theta_k}$$

External distribution file

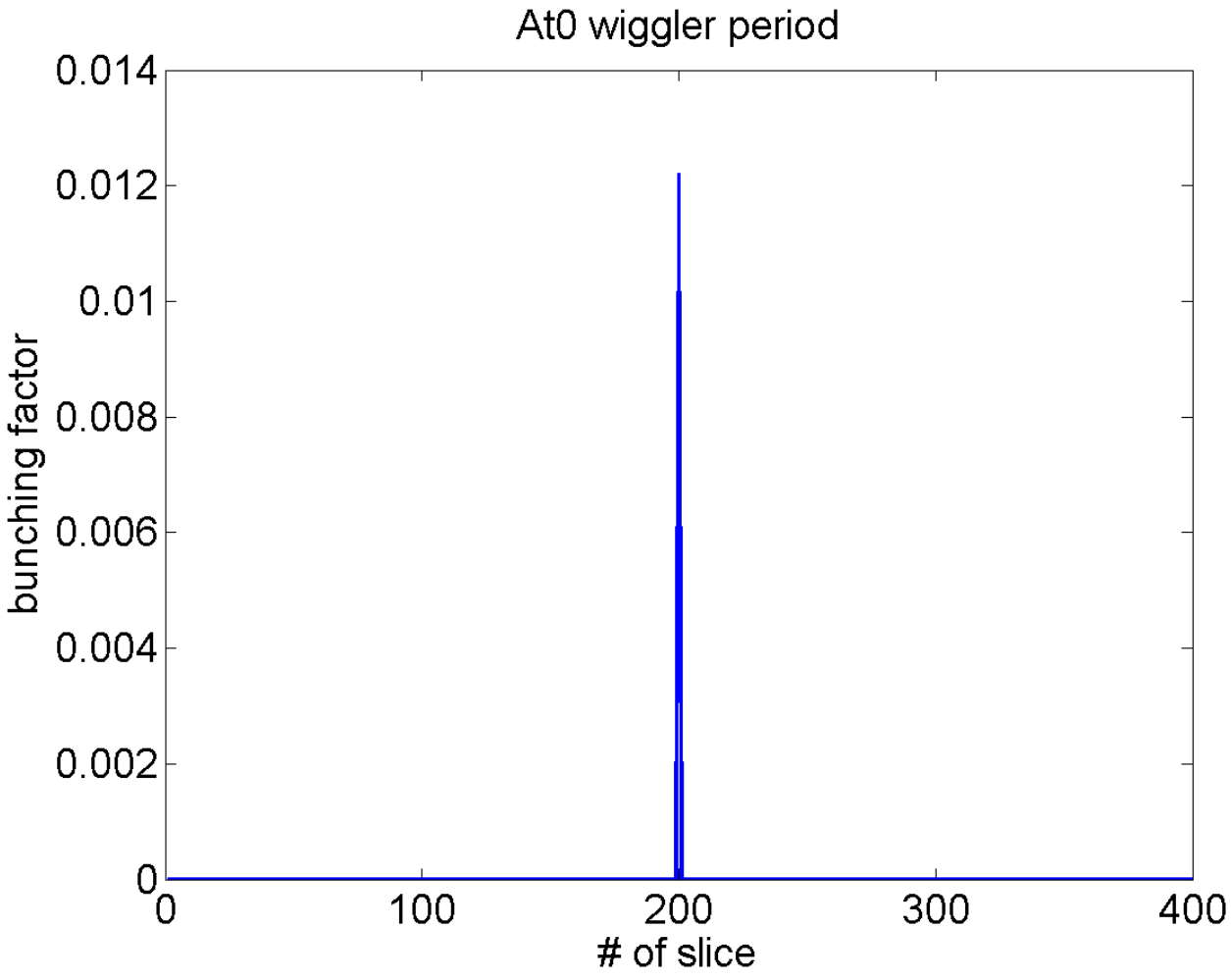
- DISTFILE : text file, generate mirror particles
- PARTFILE : binary file, no mirror particles

- Run GENESIS for 1 wiggler period to generate particles for 400 slices
- Replace one slice with distribution from modulator simulations (background beam and modulated beam)
- Run GENESIS with replaced slice
- Take difference between background beam and modulated beam

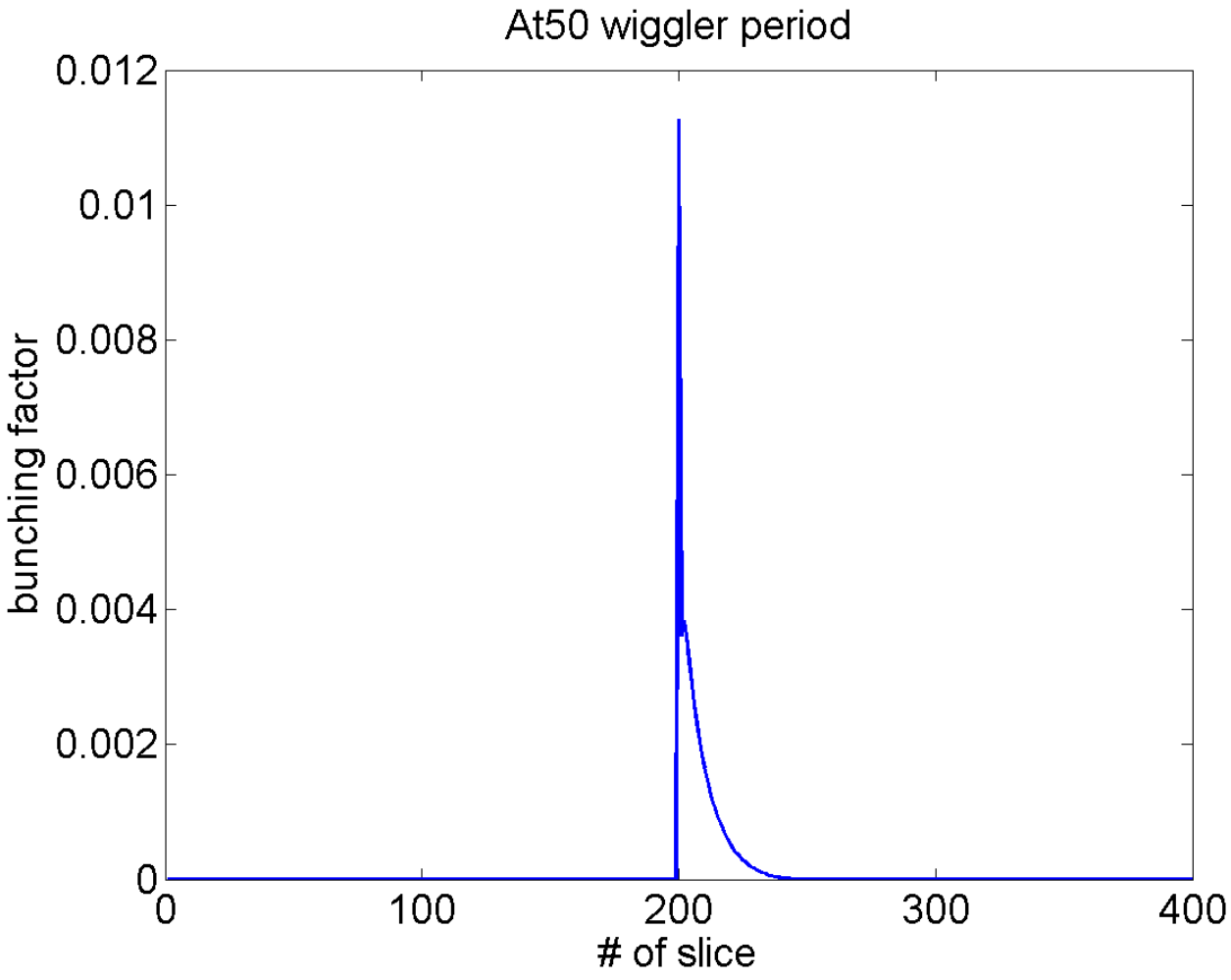
Bunching factor before replacing slice



Bunching factor evolution



Bunching factor evolution



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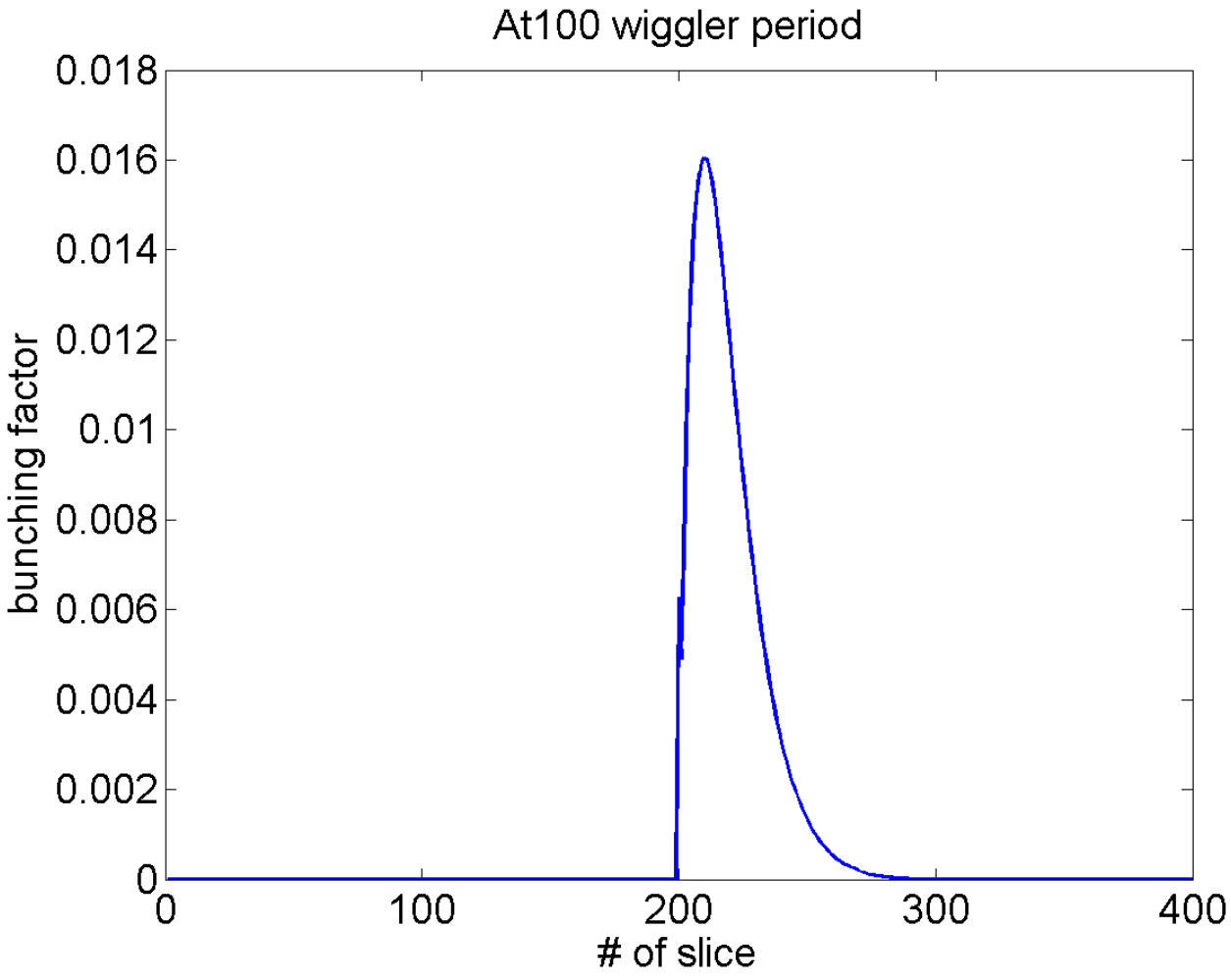
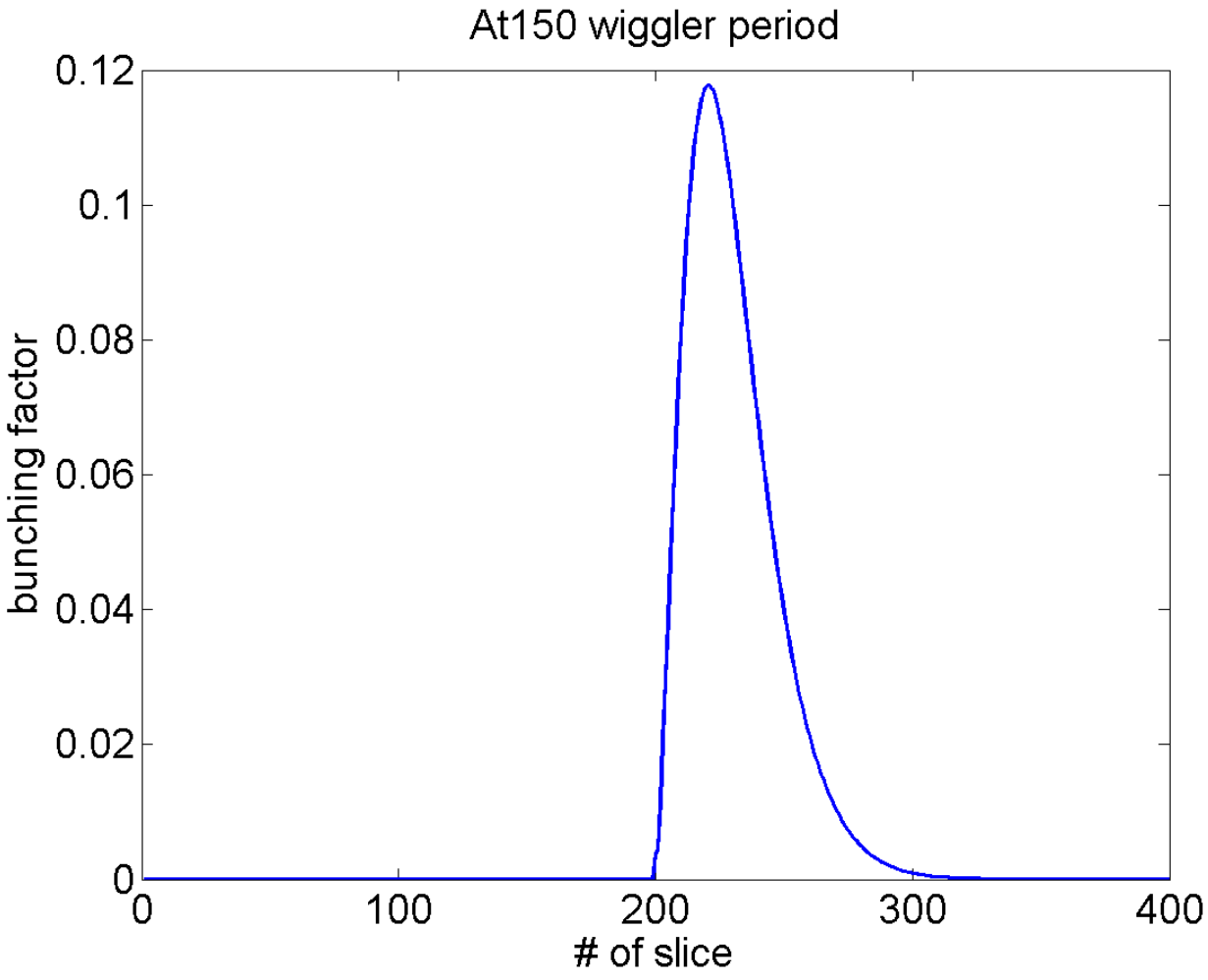
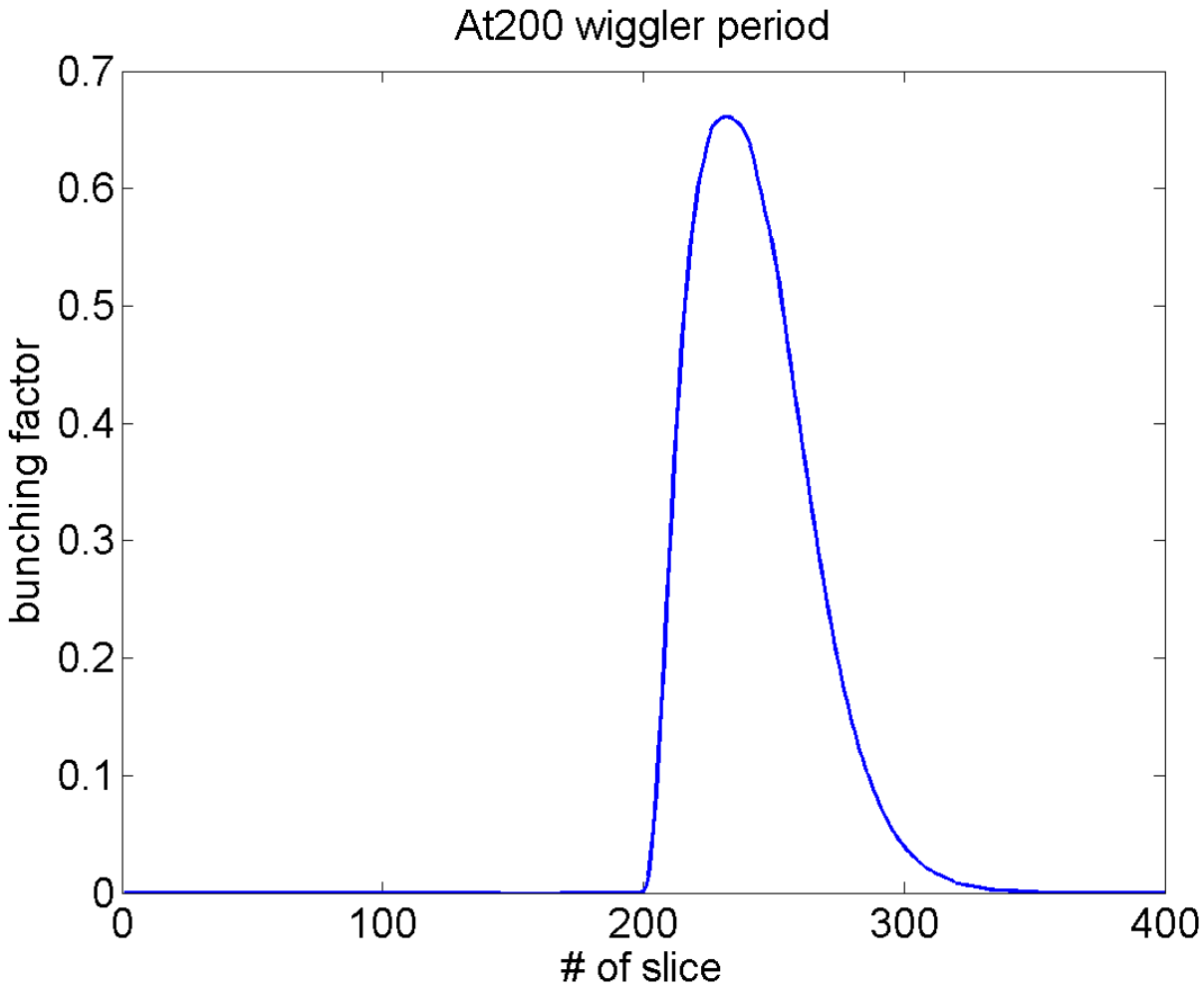


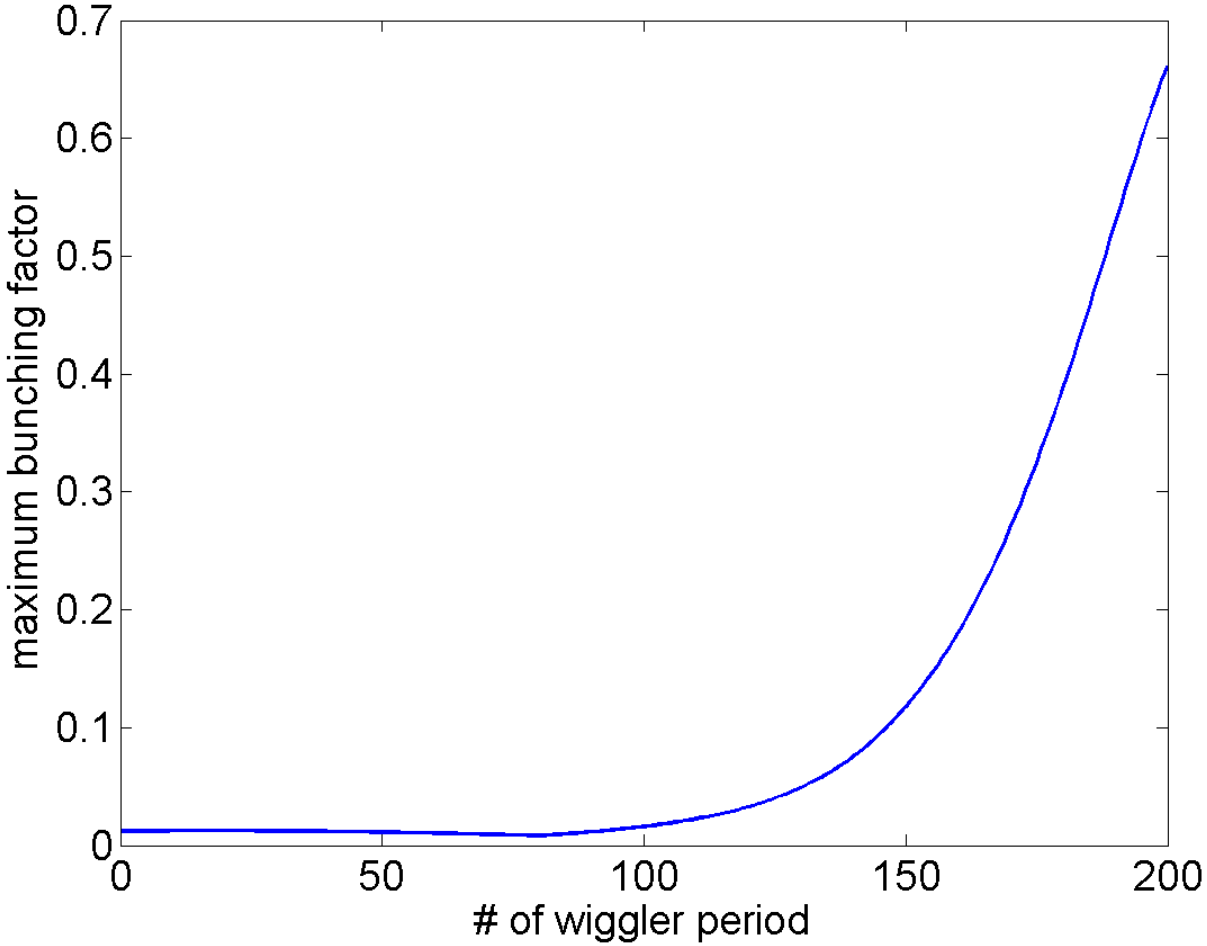
Bunching factor evolution



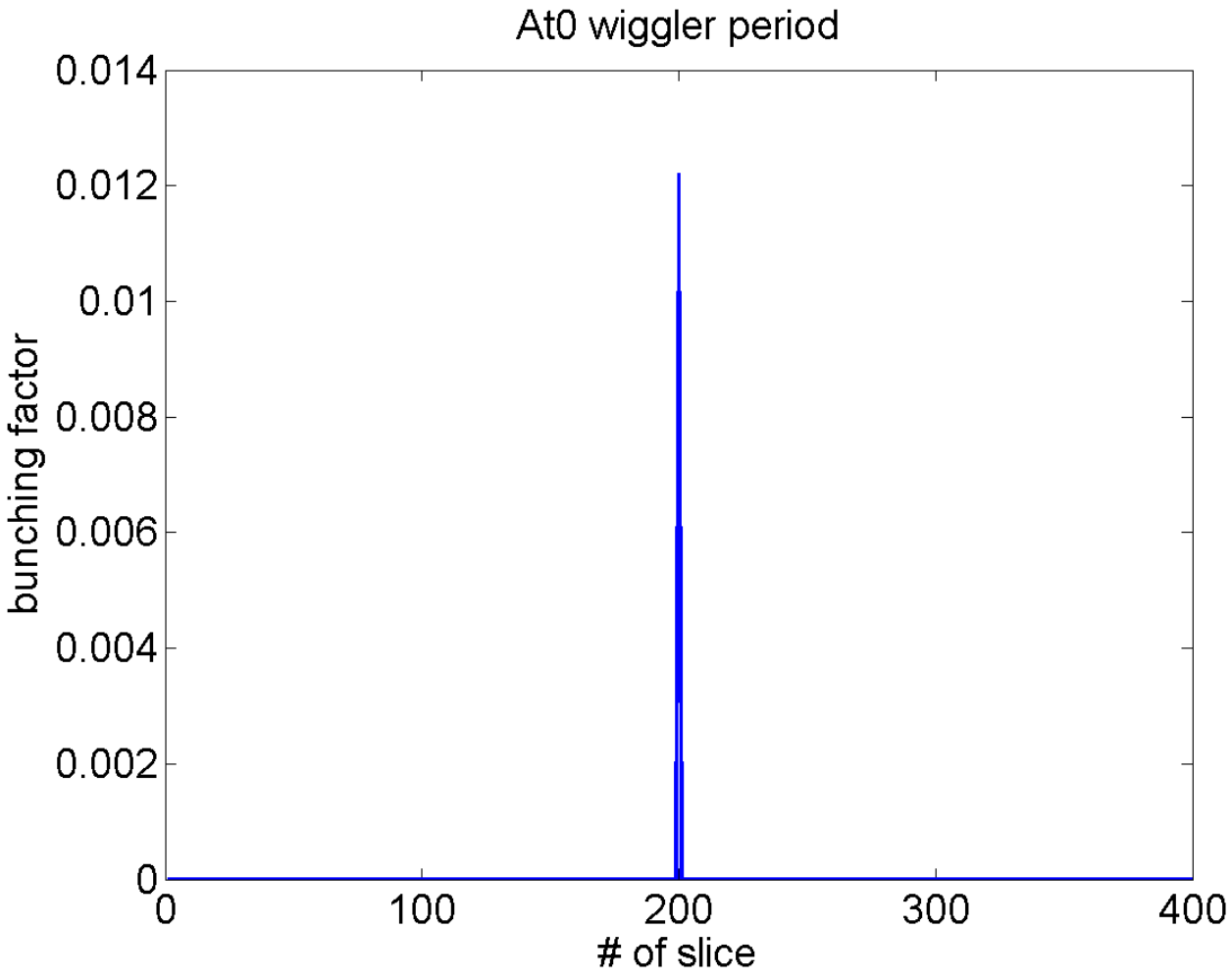
Bunching factor evolution



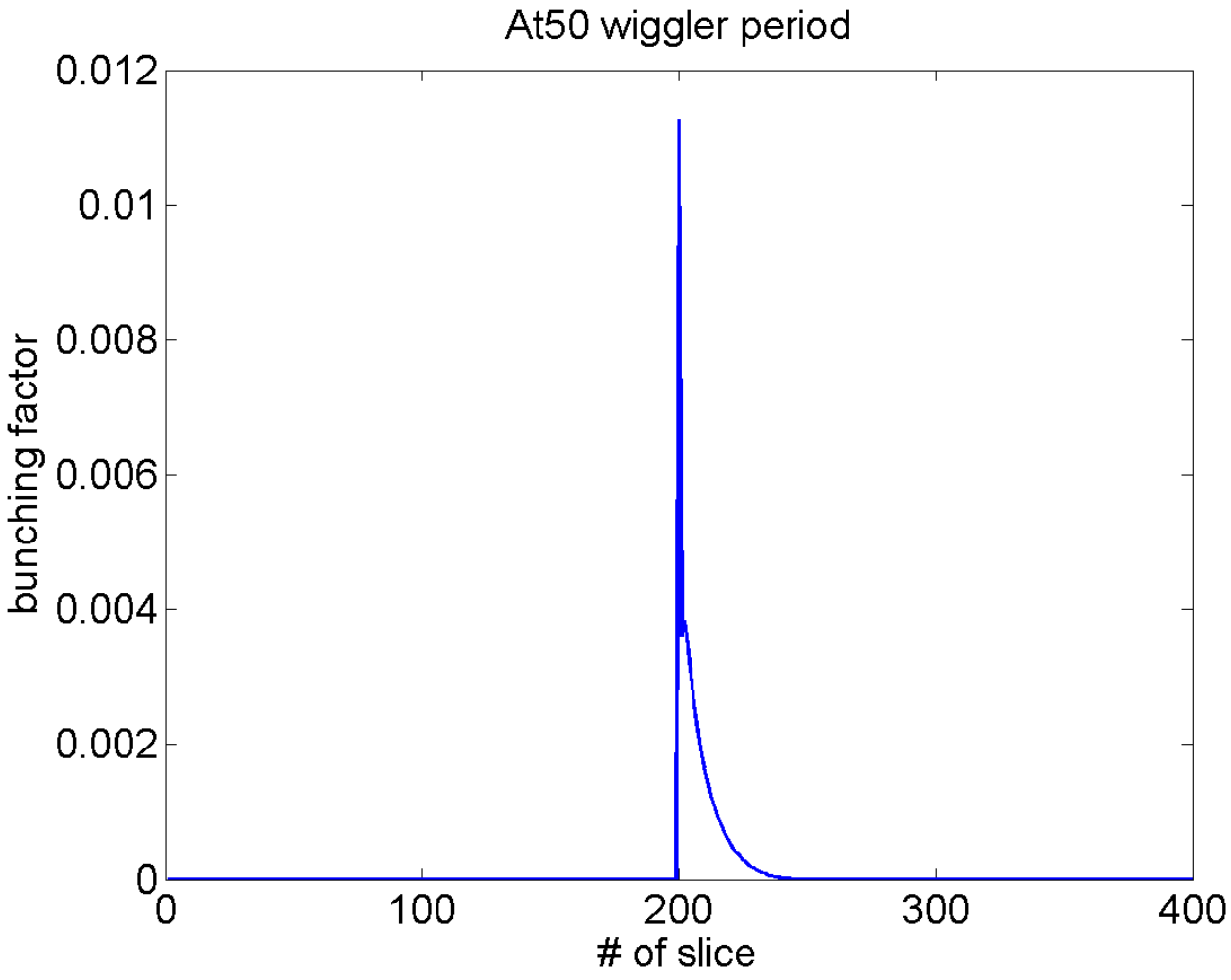
Bunching factor change along time



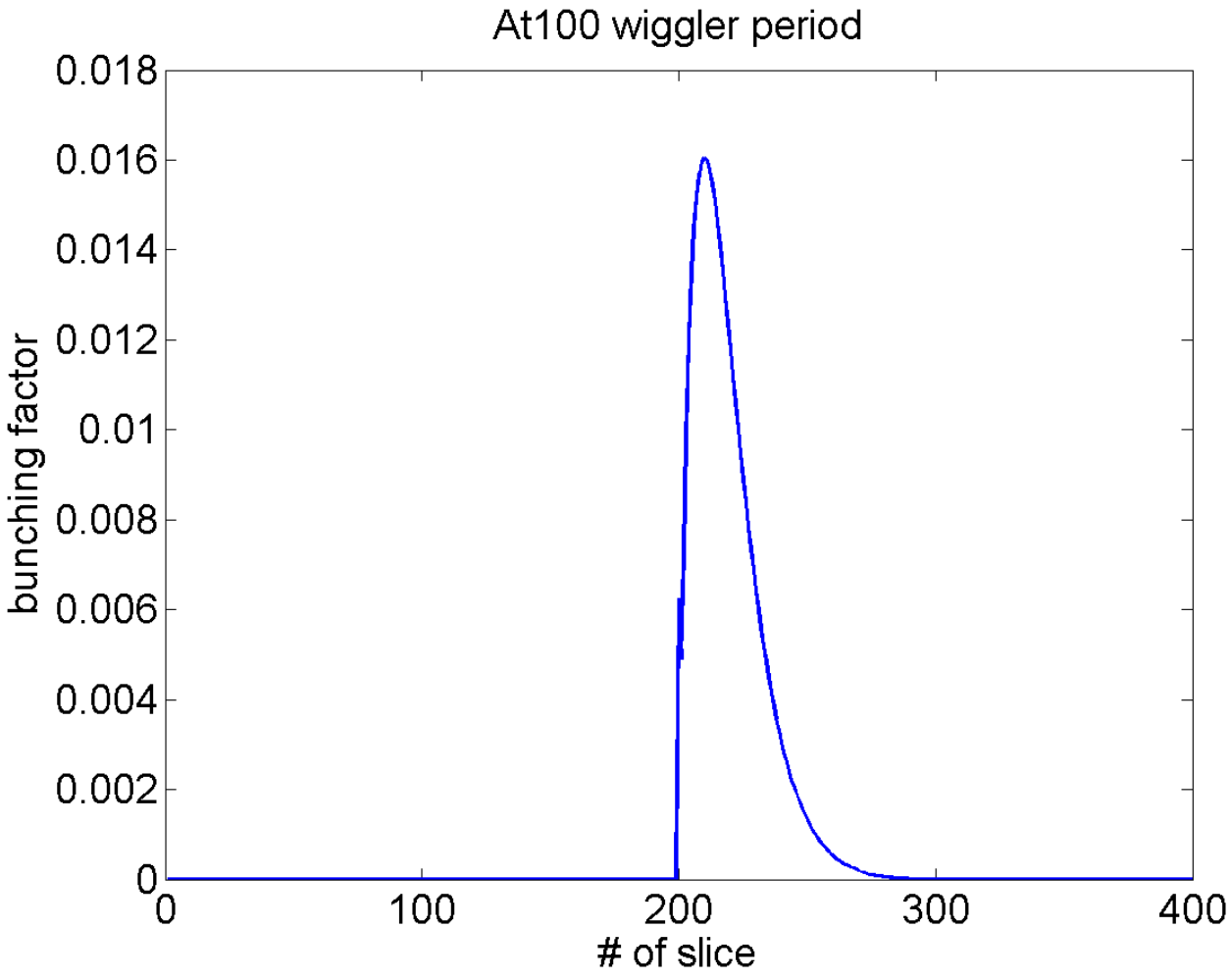
Bunching factor evolution



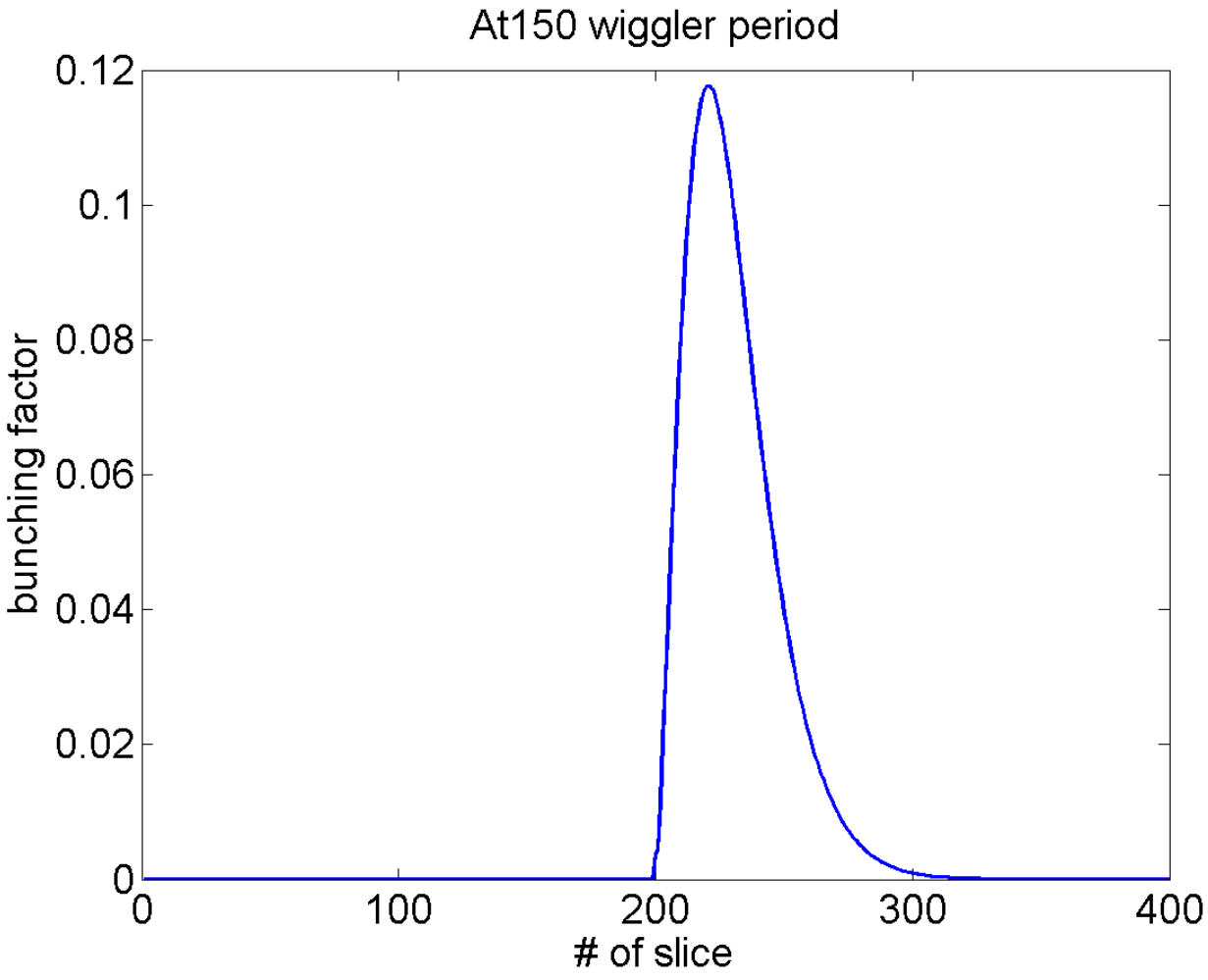
Bunching factor evolution



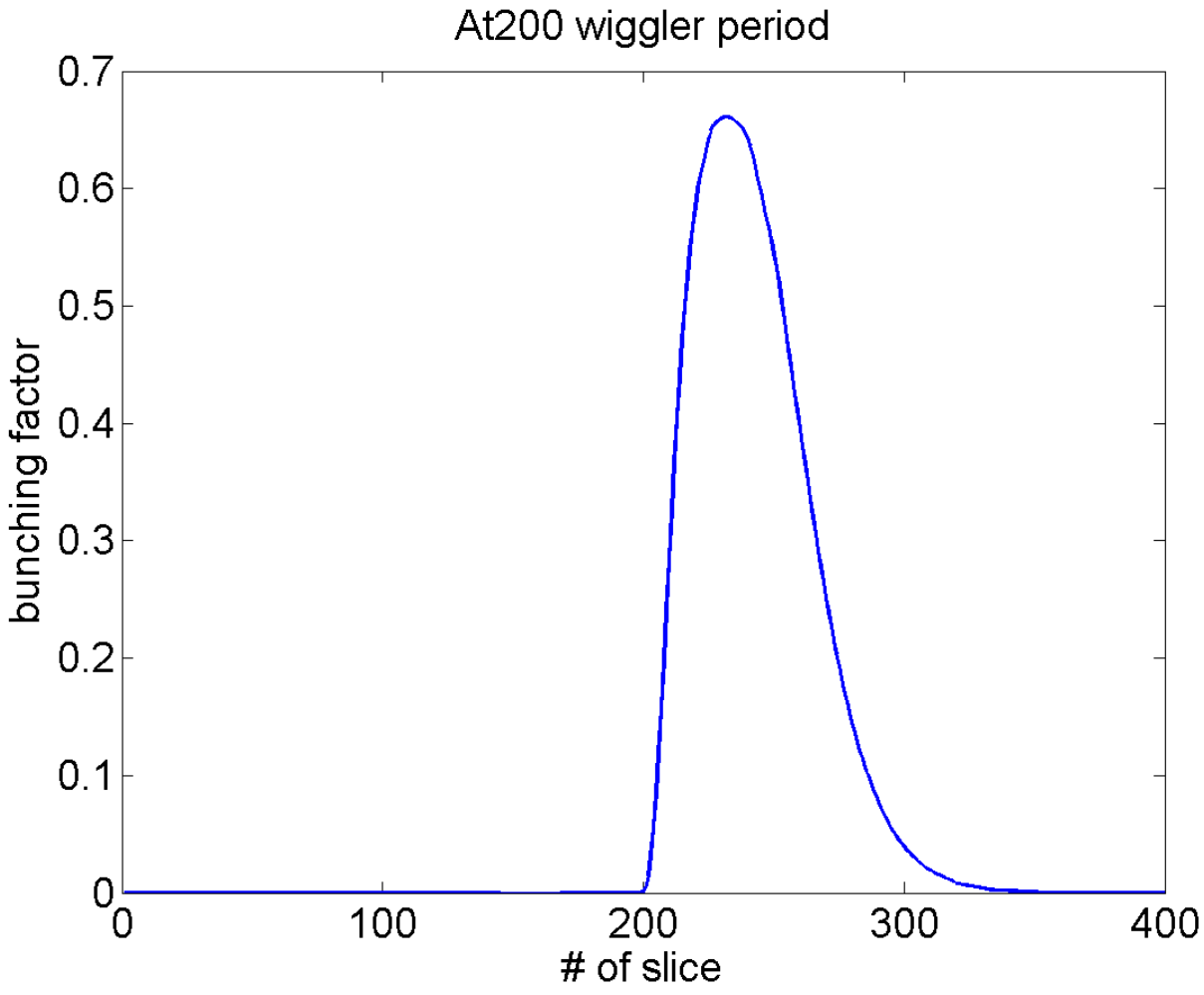
Bunching factor evolution



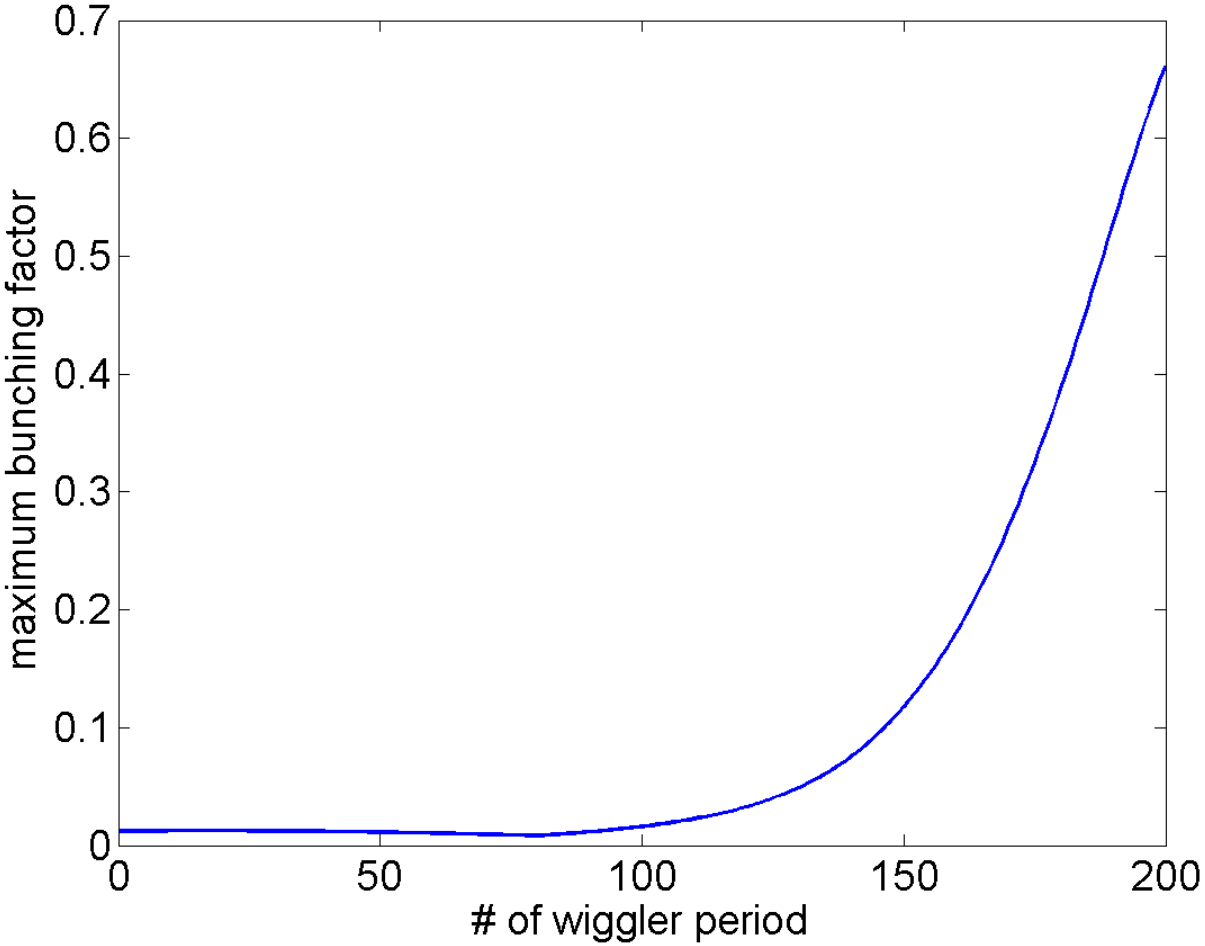
Bunching factor evolution



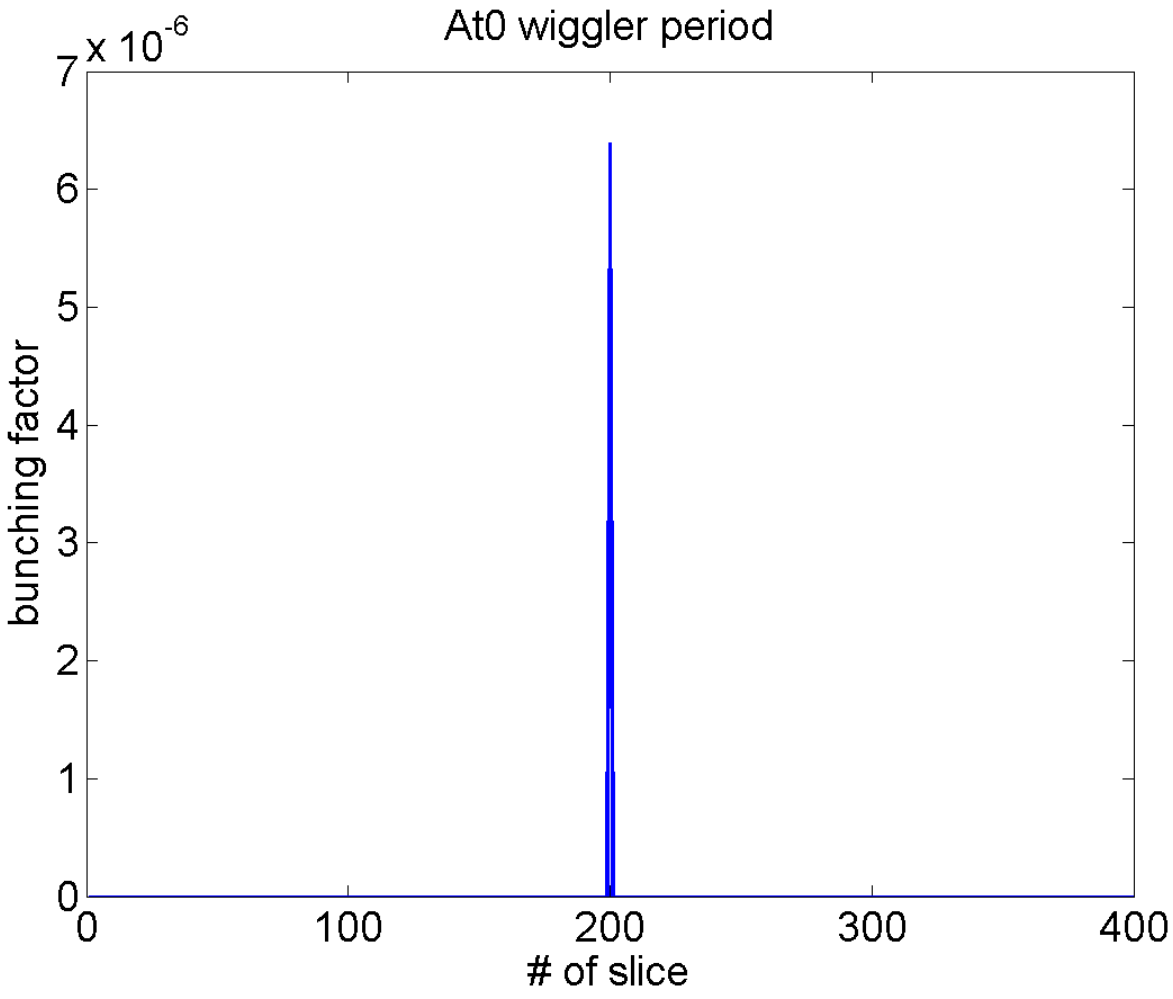
Bunching factor evolution



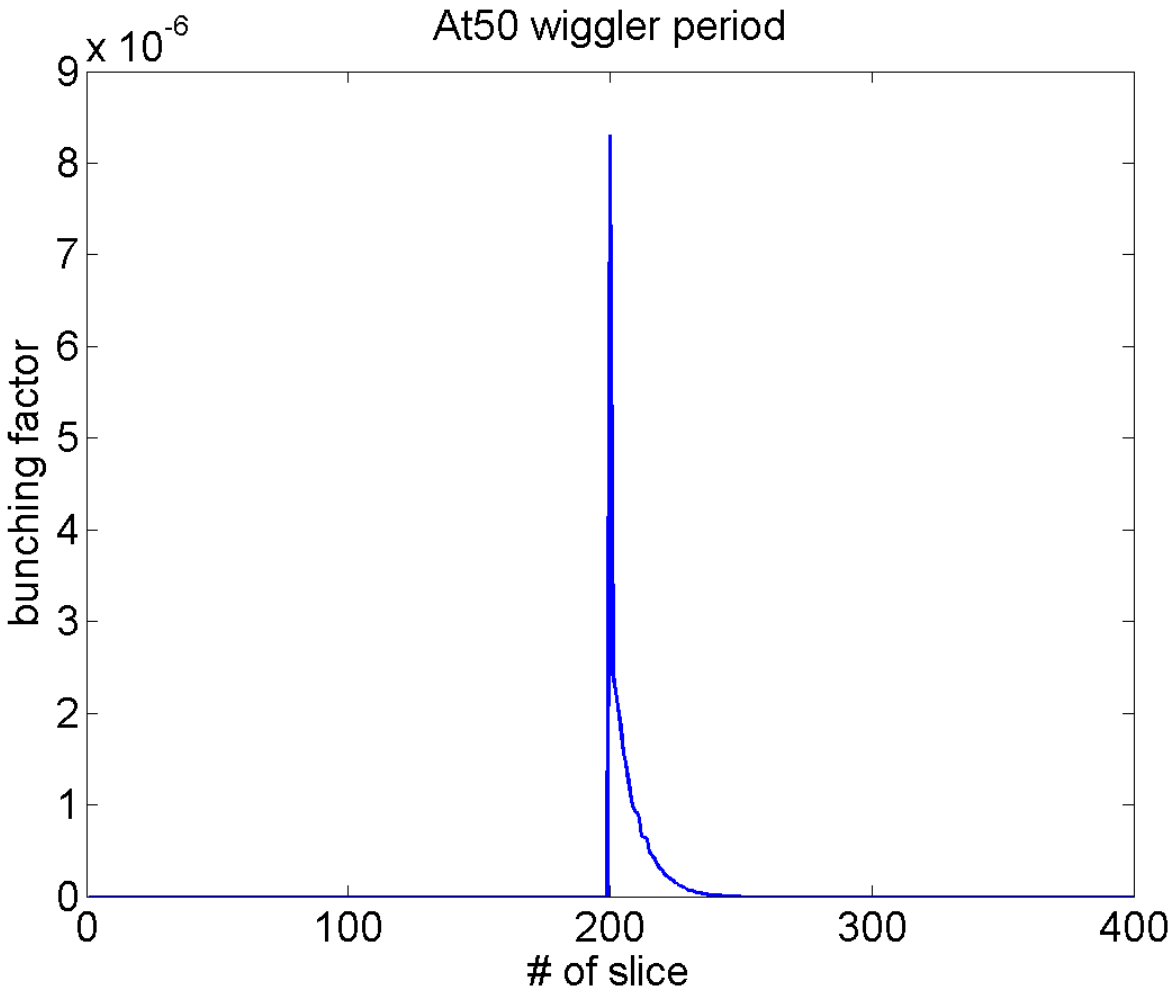
Bunching factor change along time



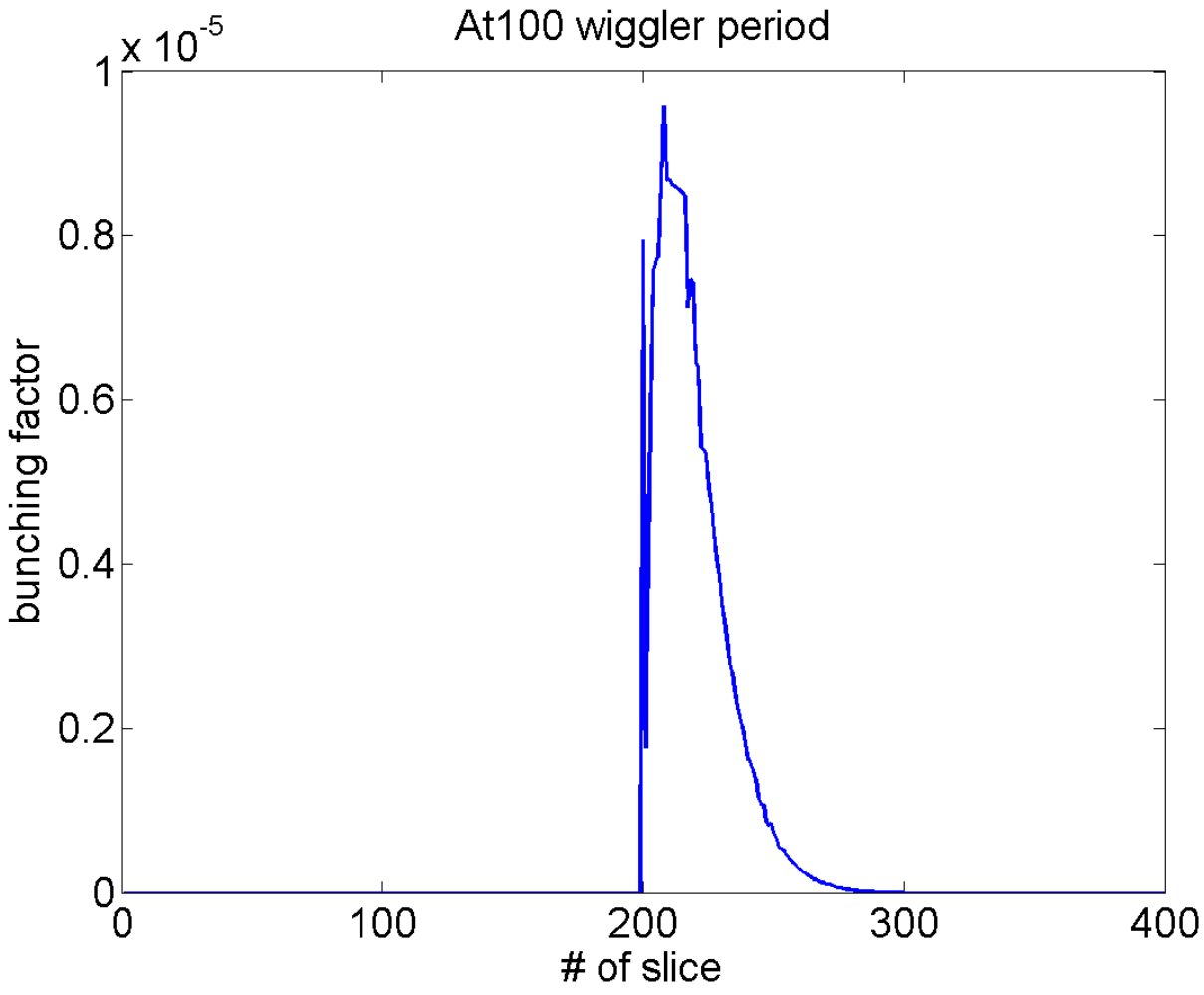
Bunching factor difference evolution



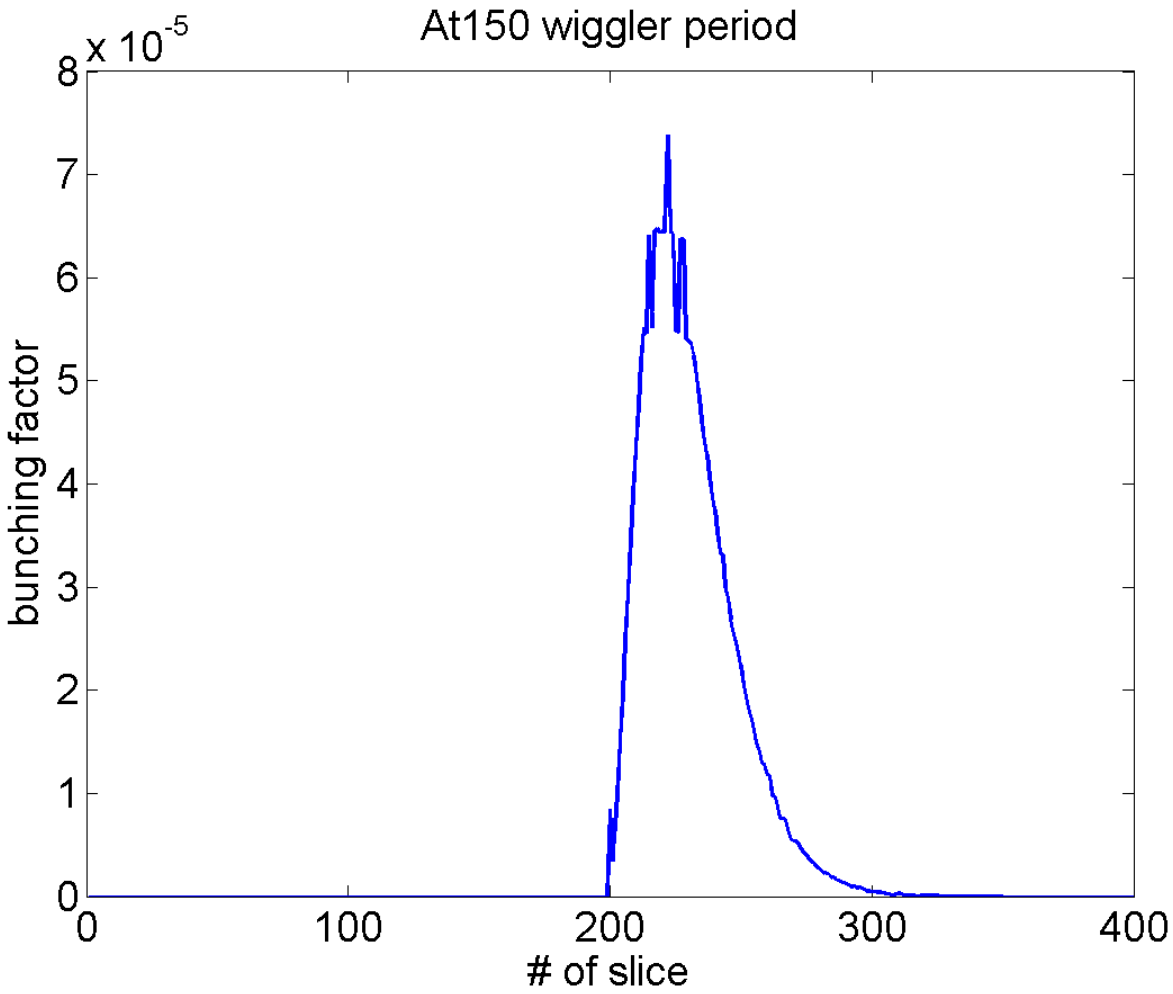
Bunching factor difference evolution



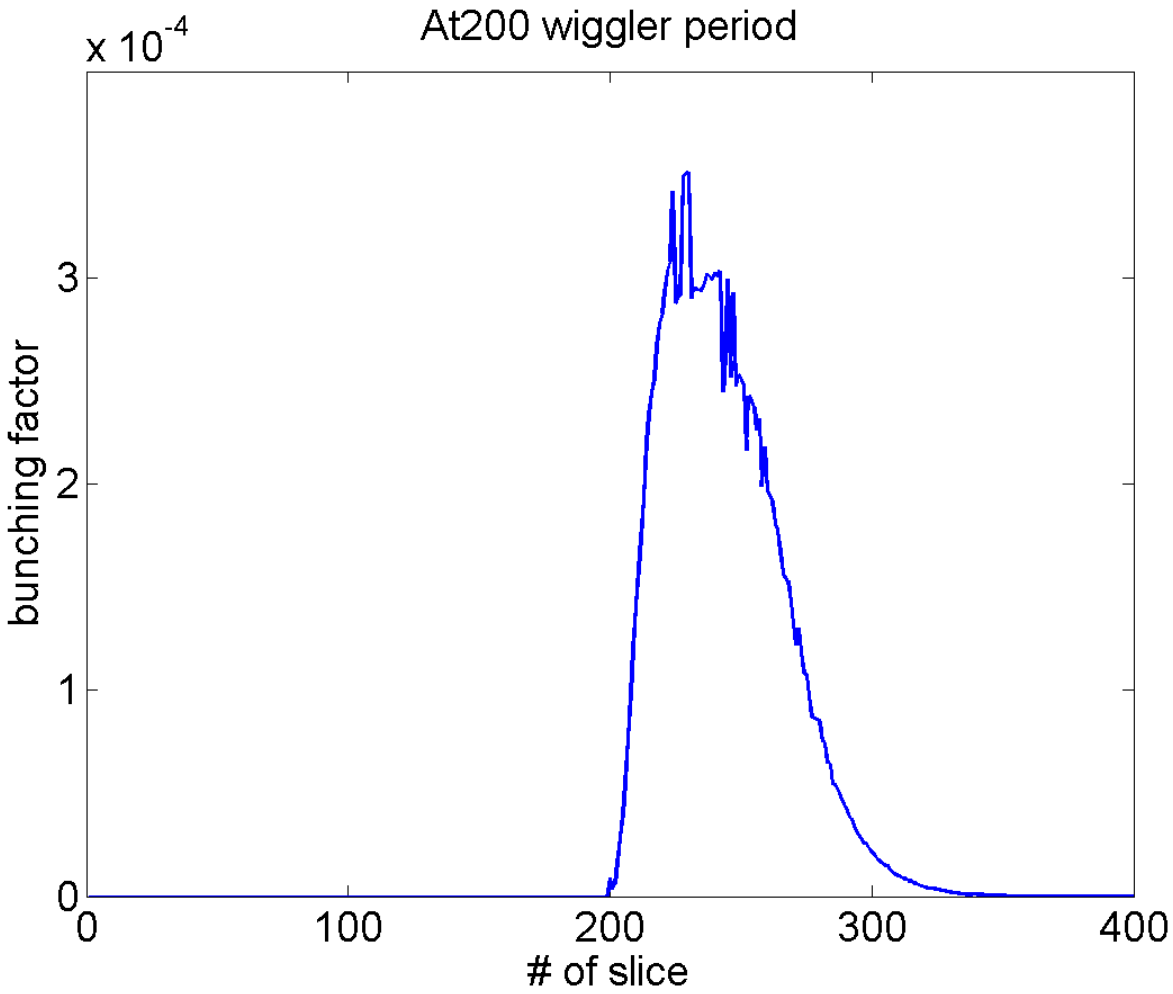
Bunching factor difference evolution



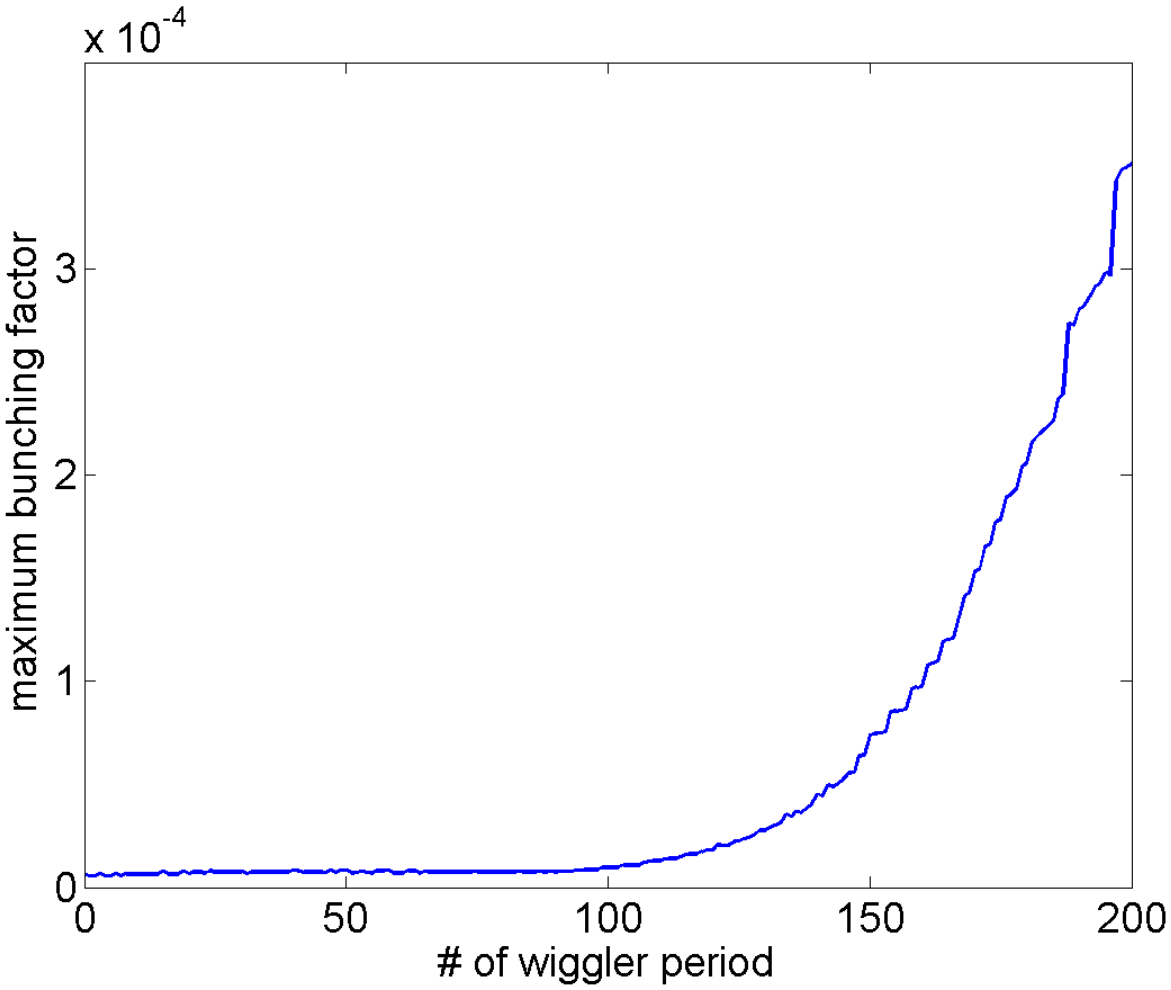
Bunching factor difference evolution



Bunching factor difference evolution

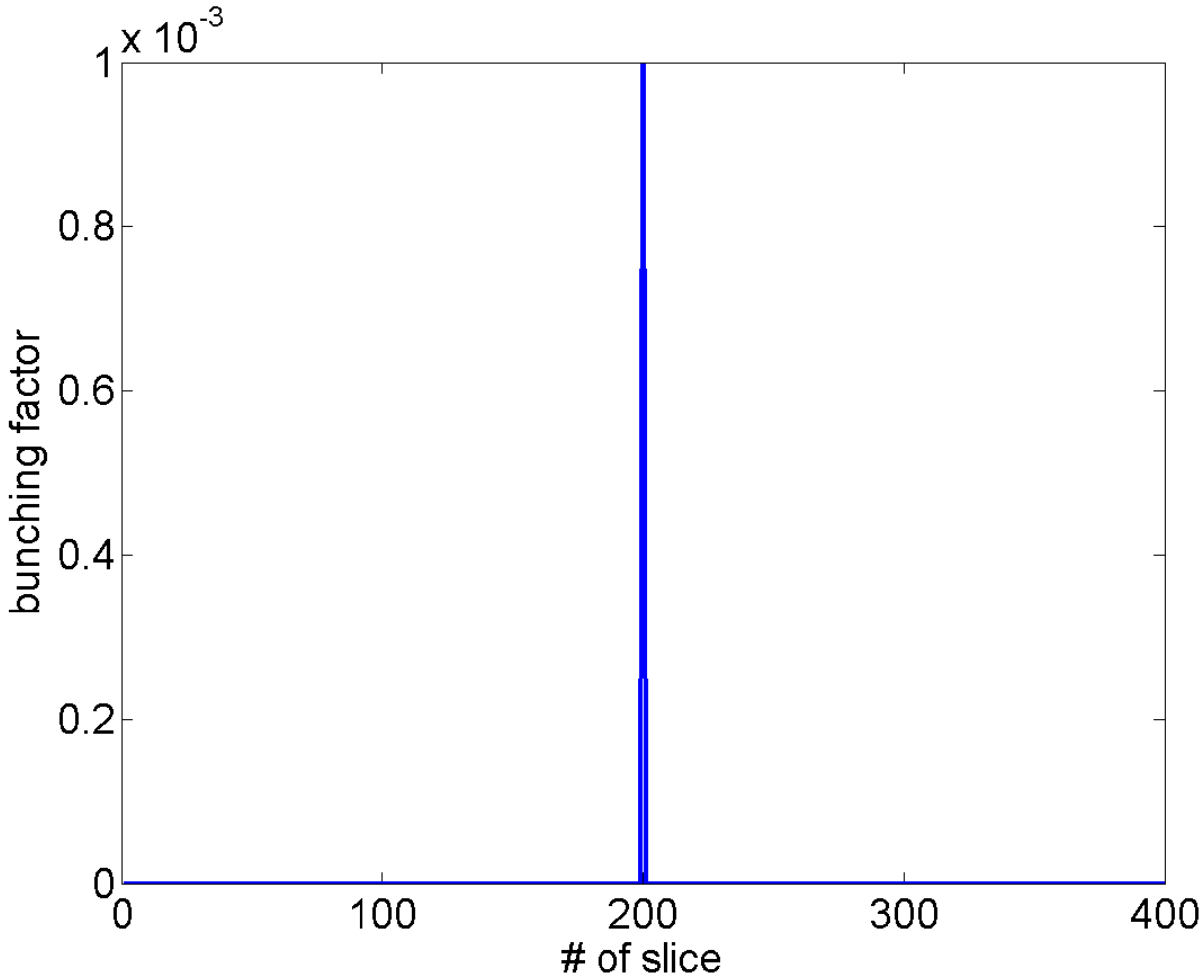


Bunching factor difference change along time

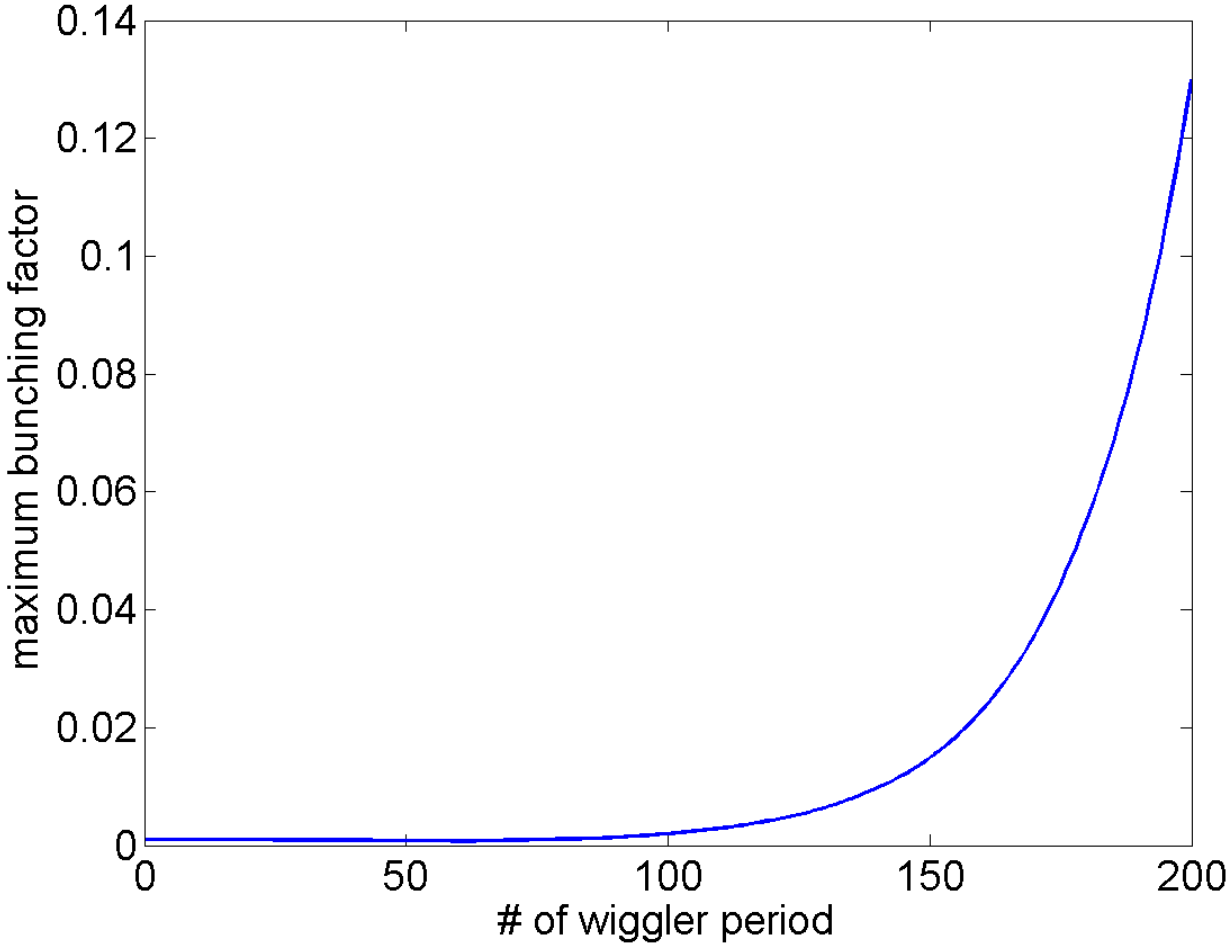


- Give initial bunching factor for 1 slice
- Run GENESIS for 200 wiggler period
- Take the output of GENESIS as the input of kicker simulation
- Run kicker simulation

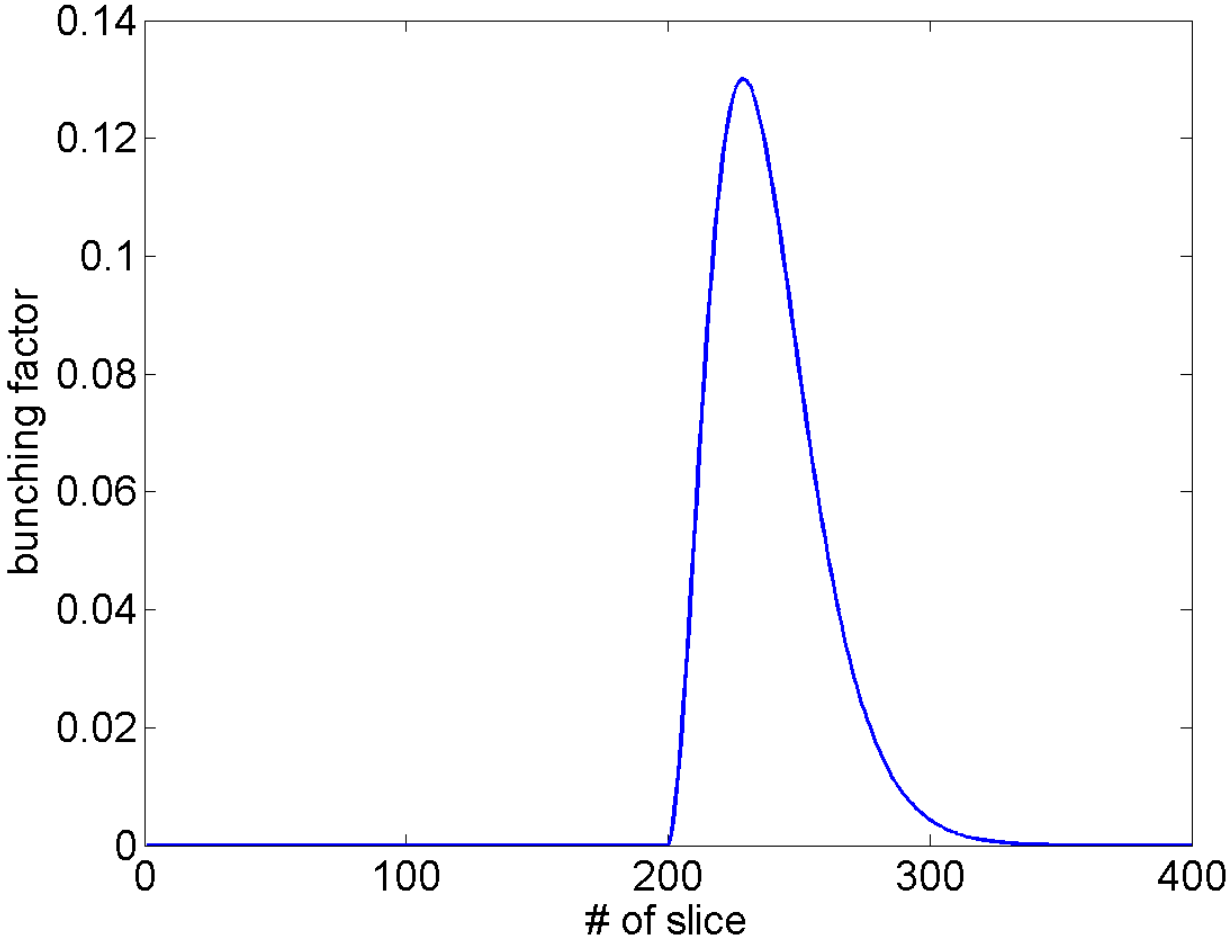
Initial bunching factor in GENESIS



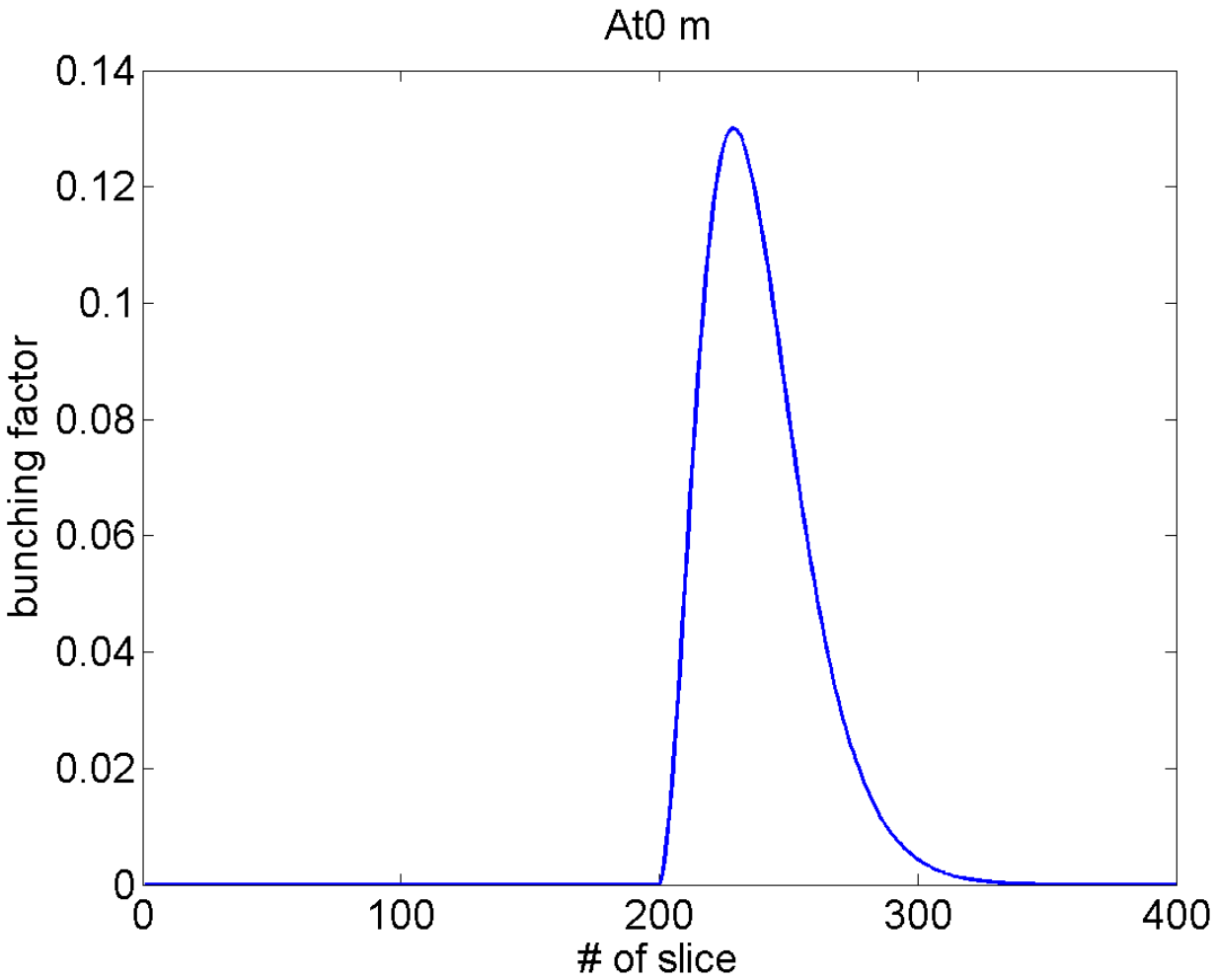
Bunching factor changes in GENESIS



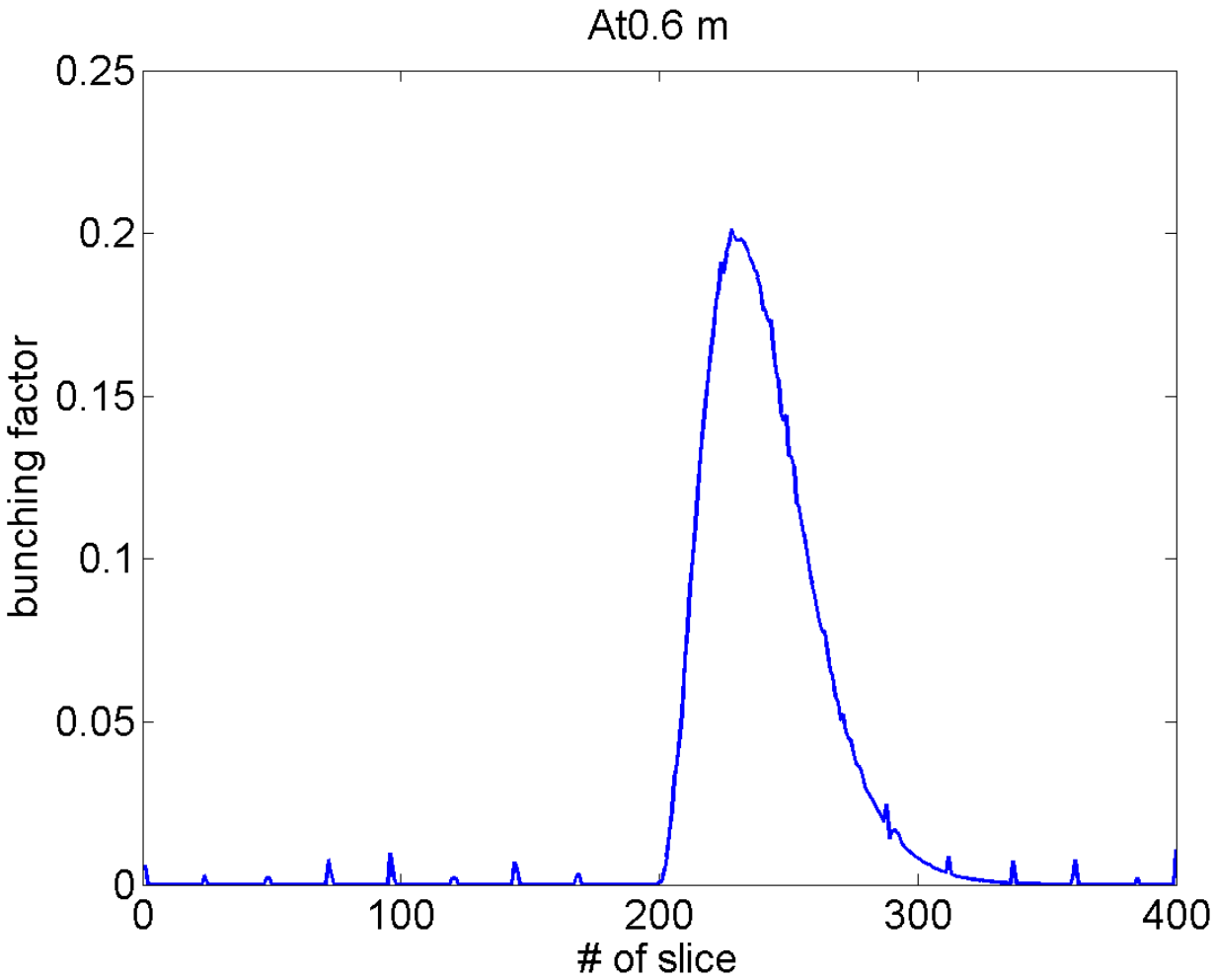
Final bunching factor in GENESIS



Bunching factor in kicker



Bunching factor in kicker



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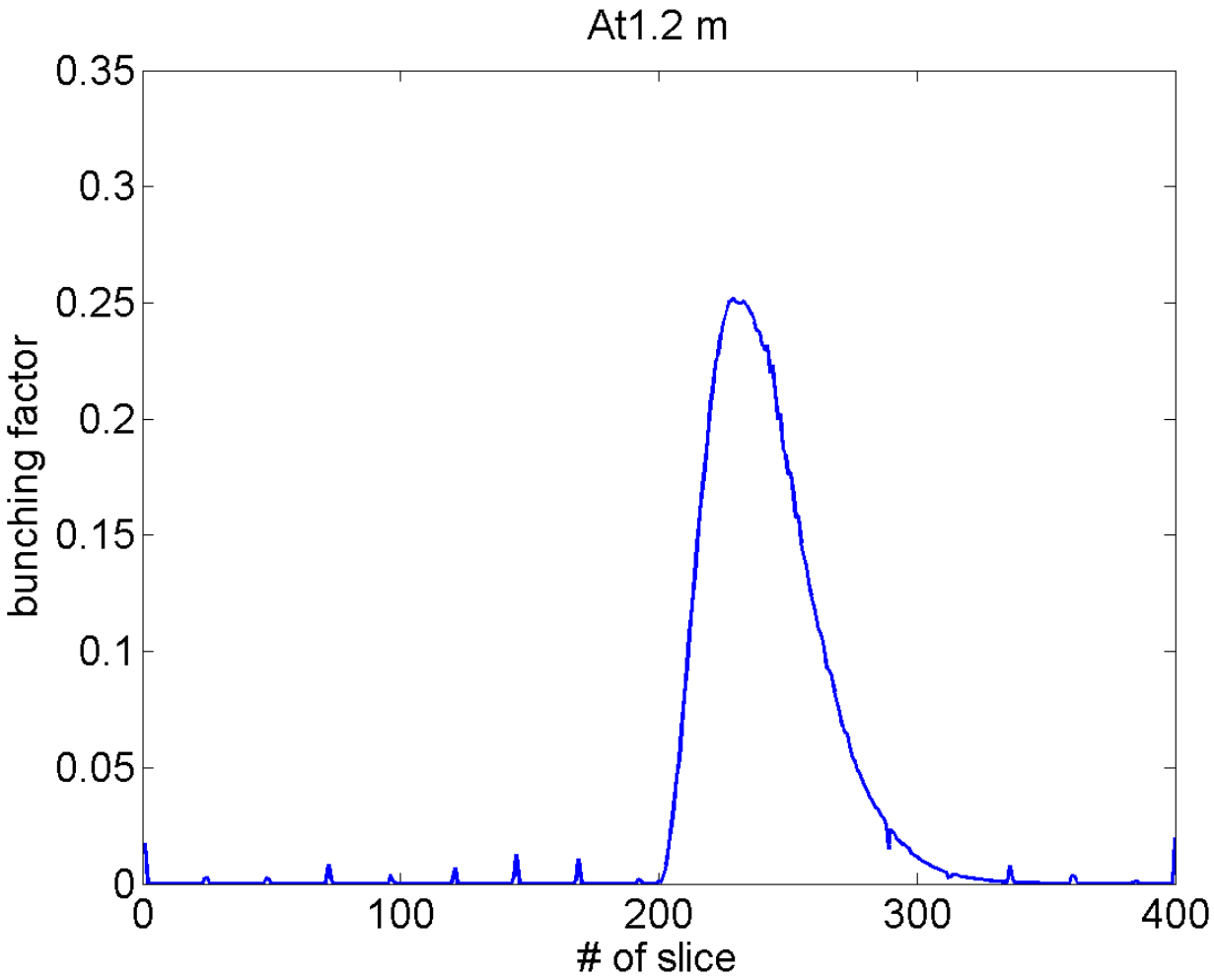

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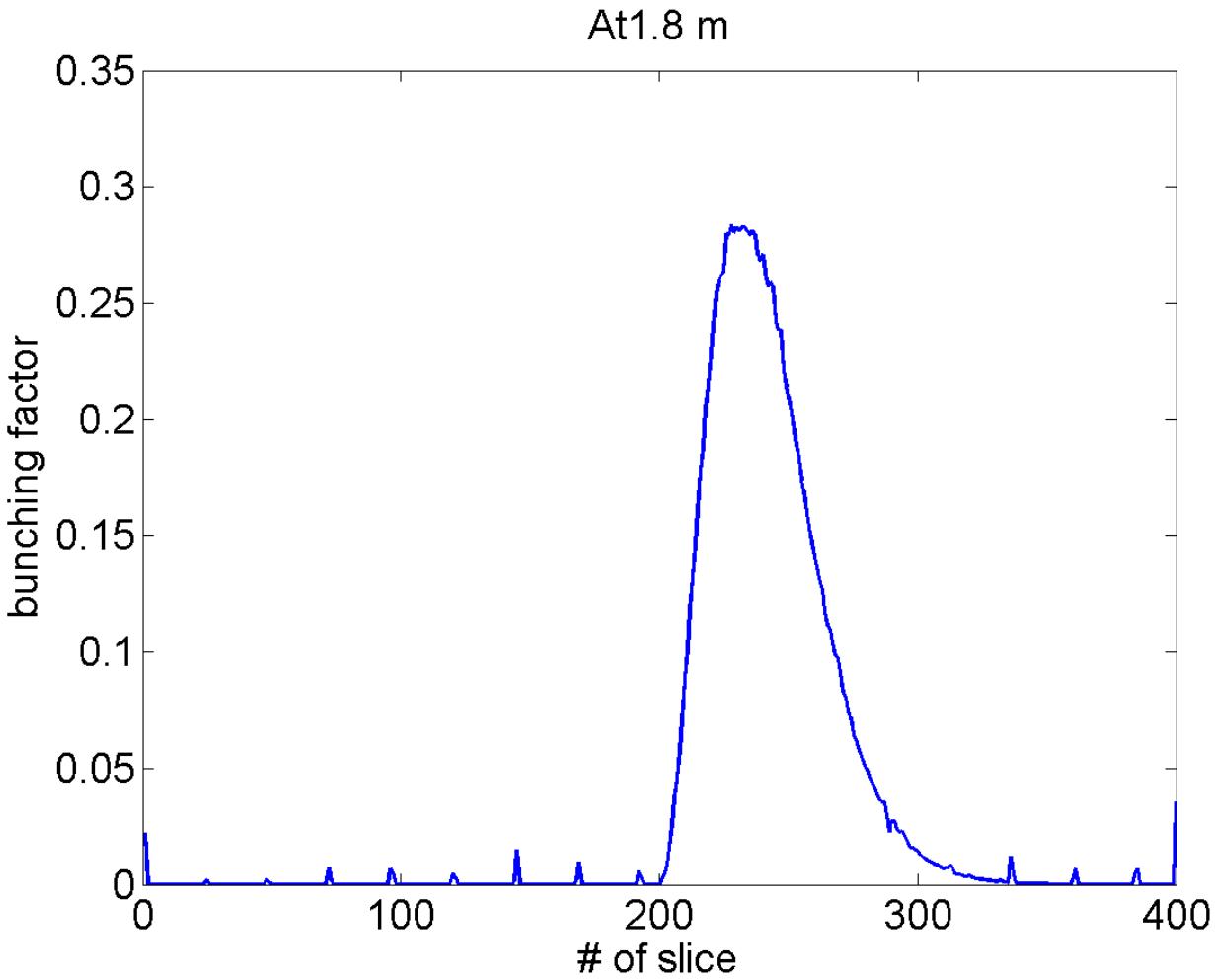

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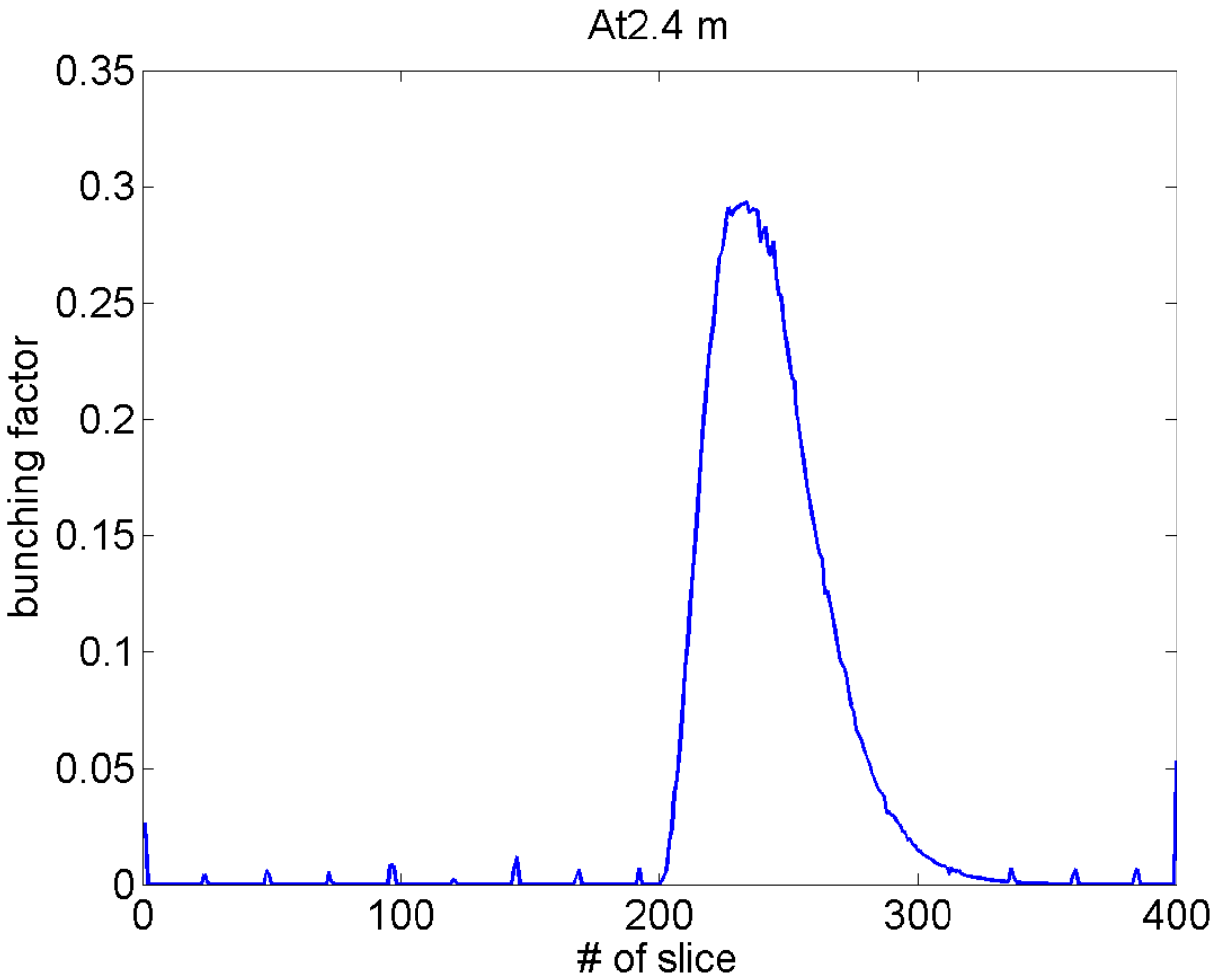

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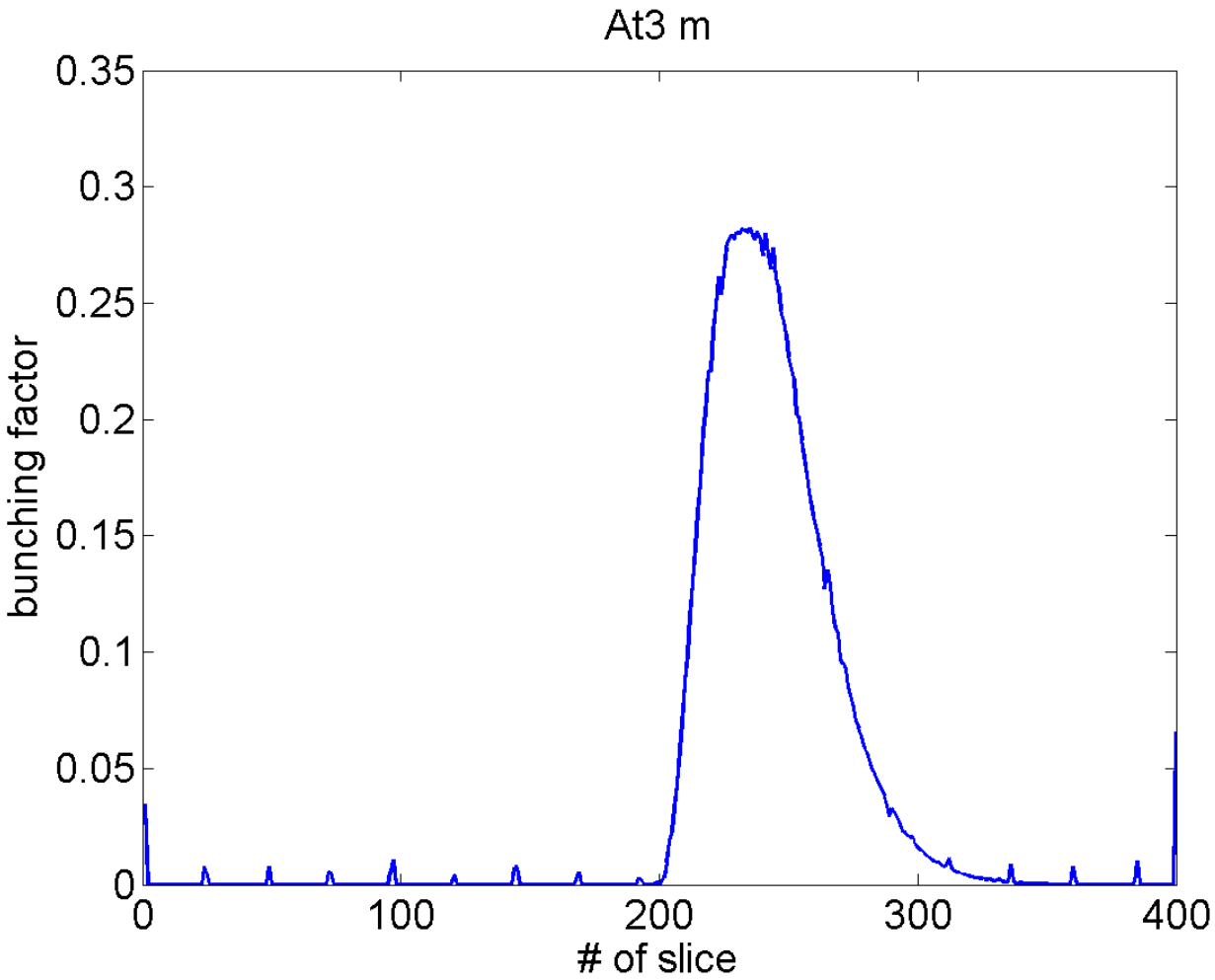
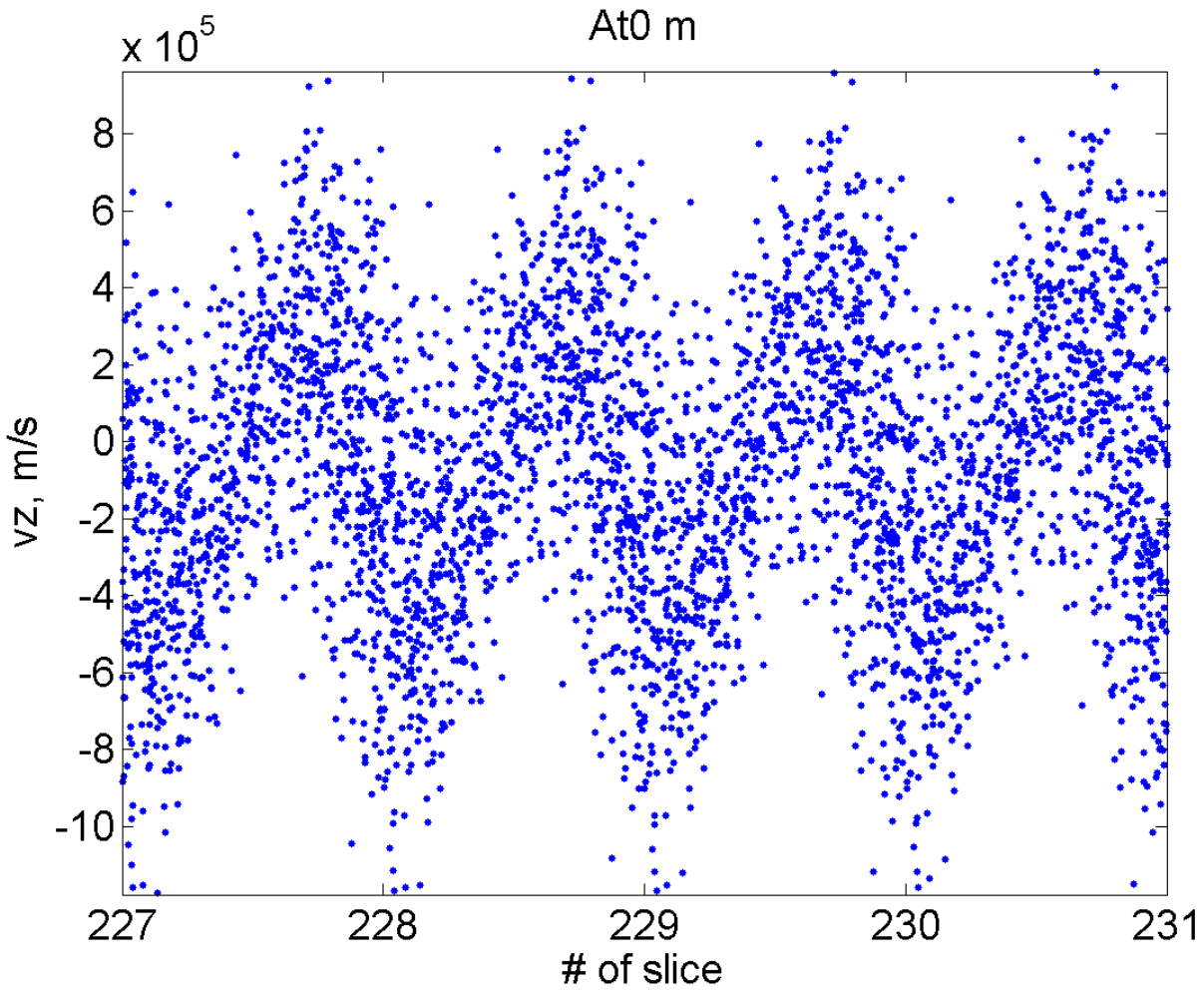
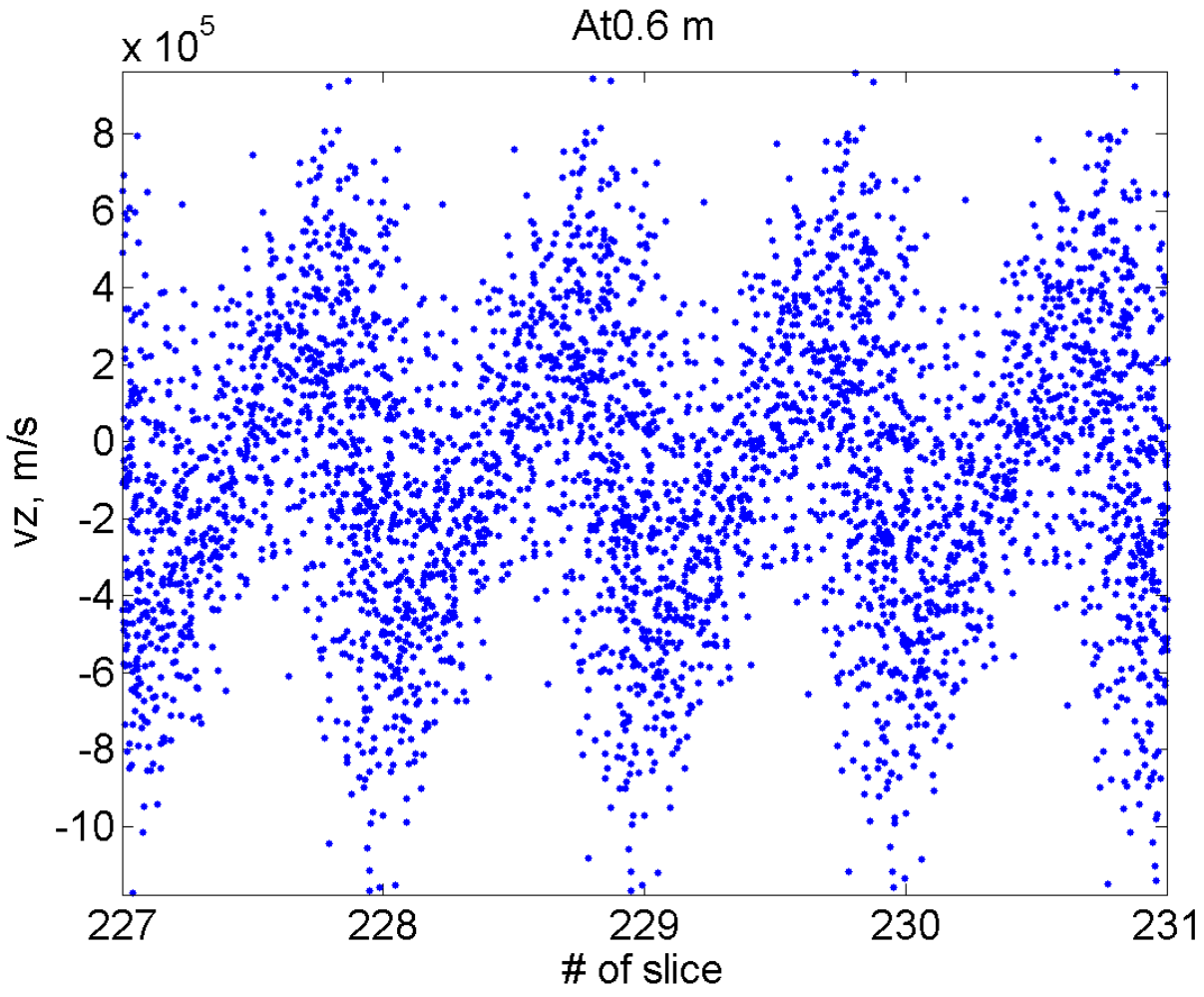


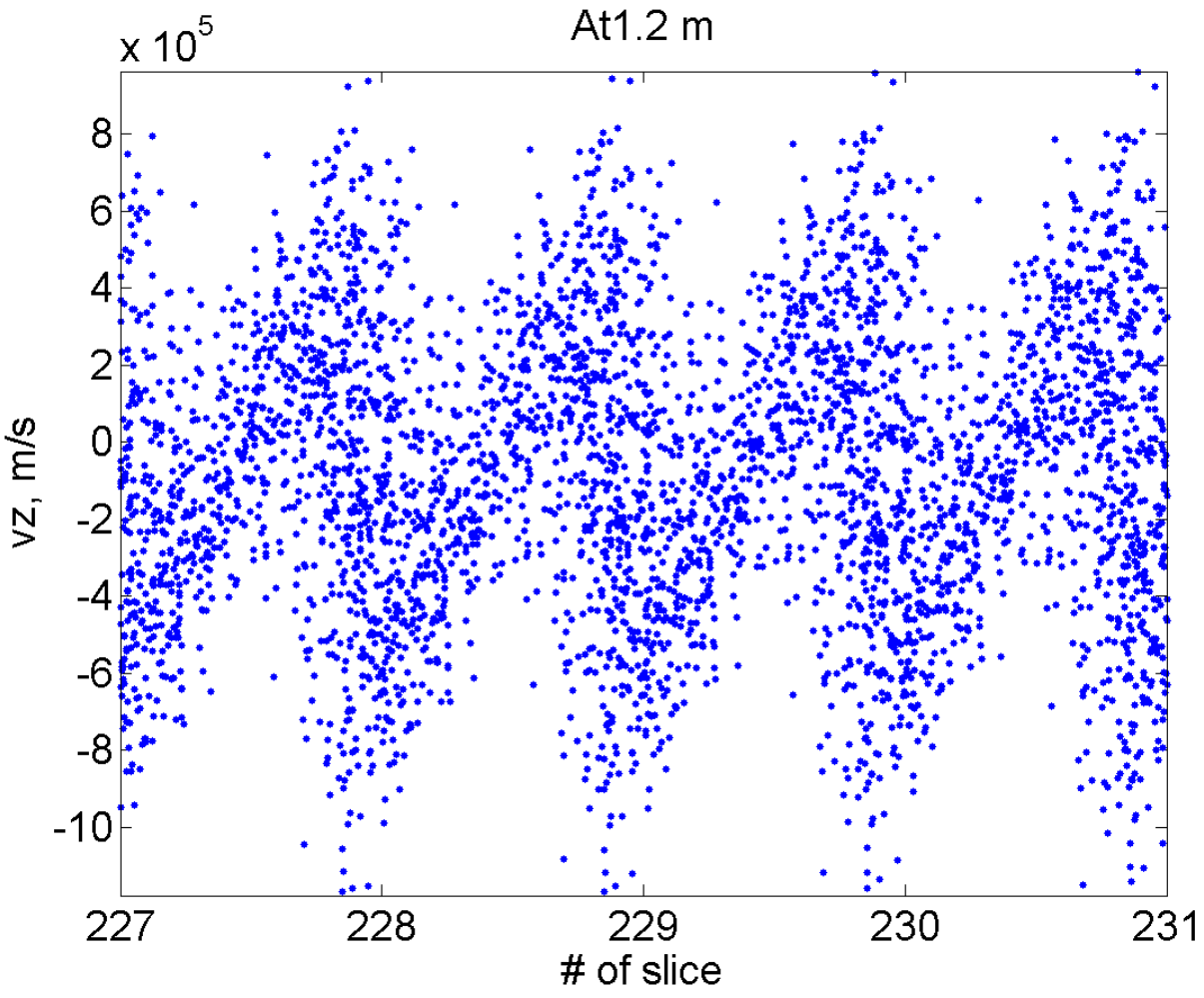
$z - v_z$ plot in kicker



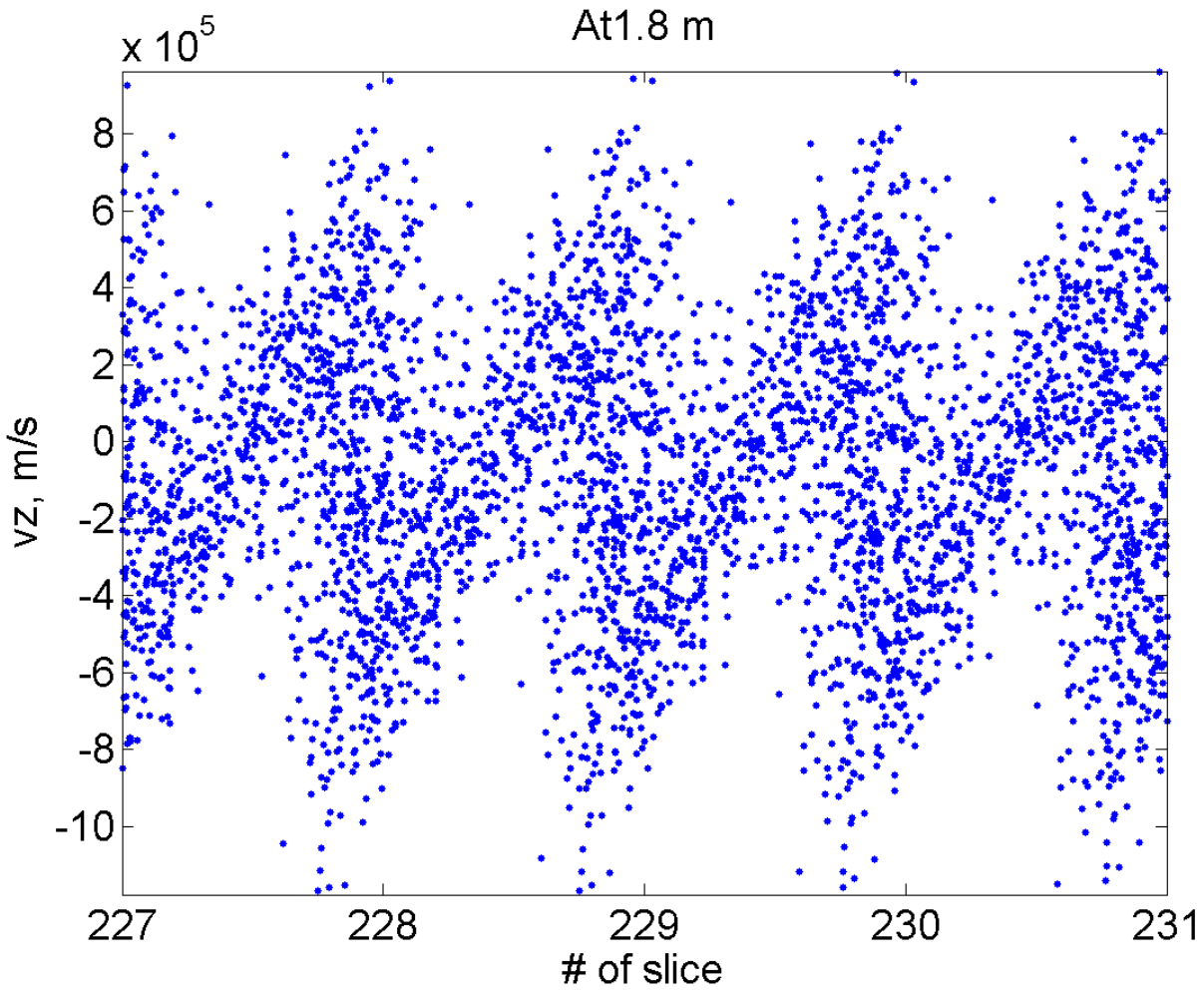
$z - v_z$ plot in kicker



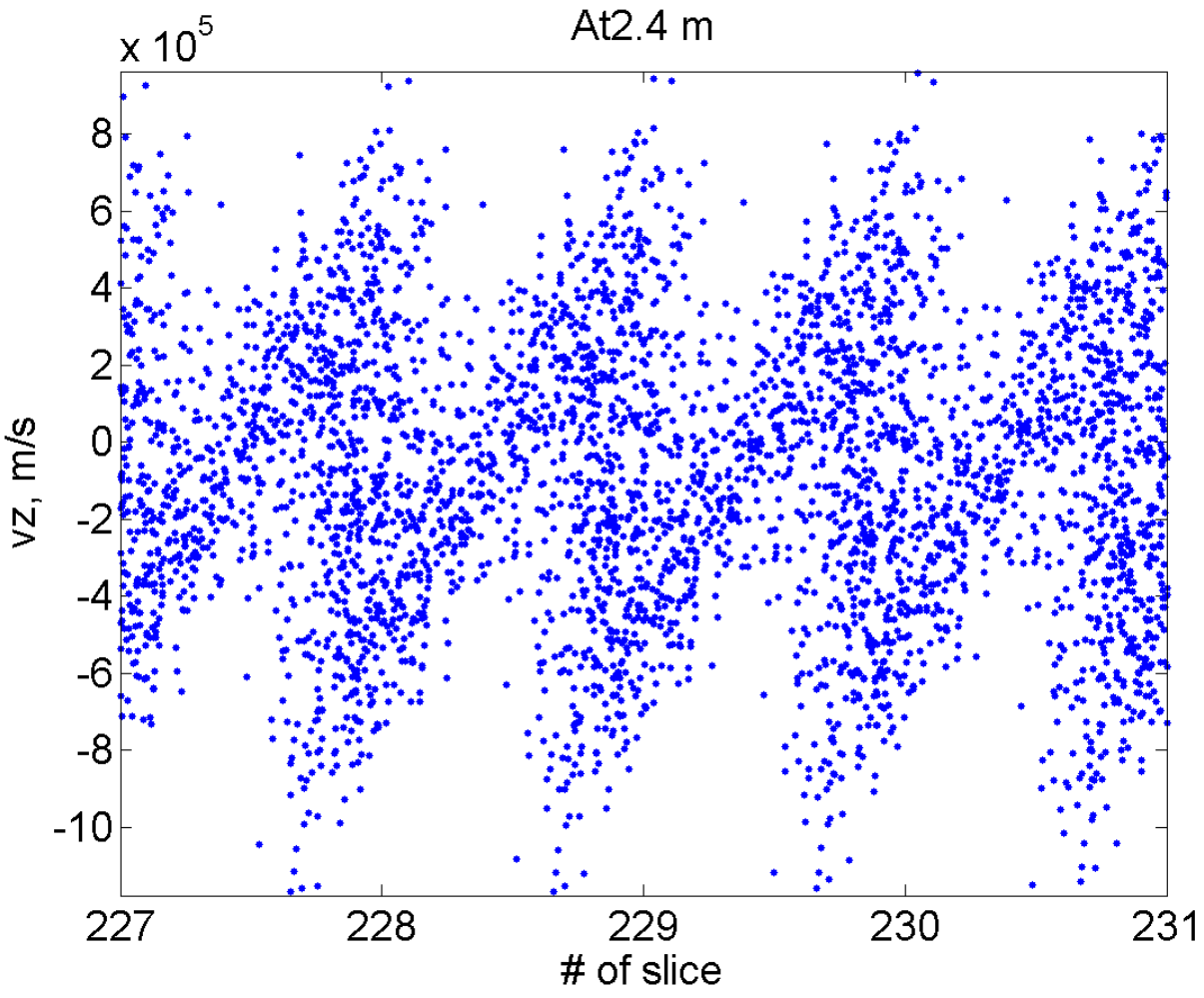
$z - v_z$ plot in kicker



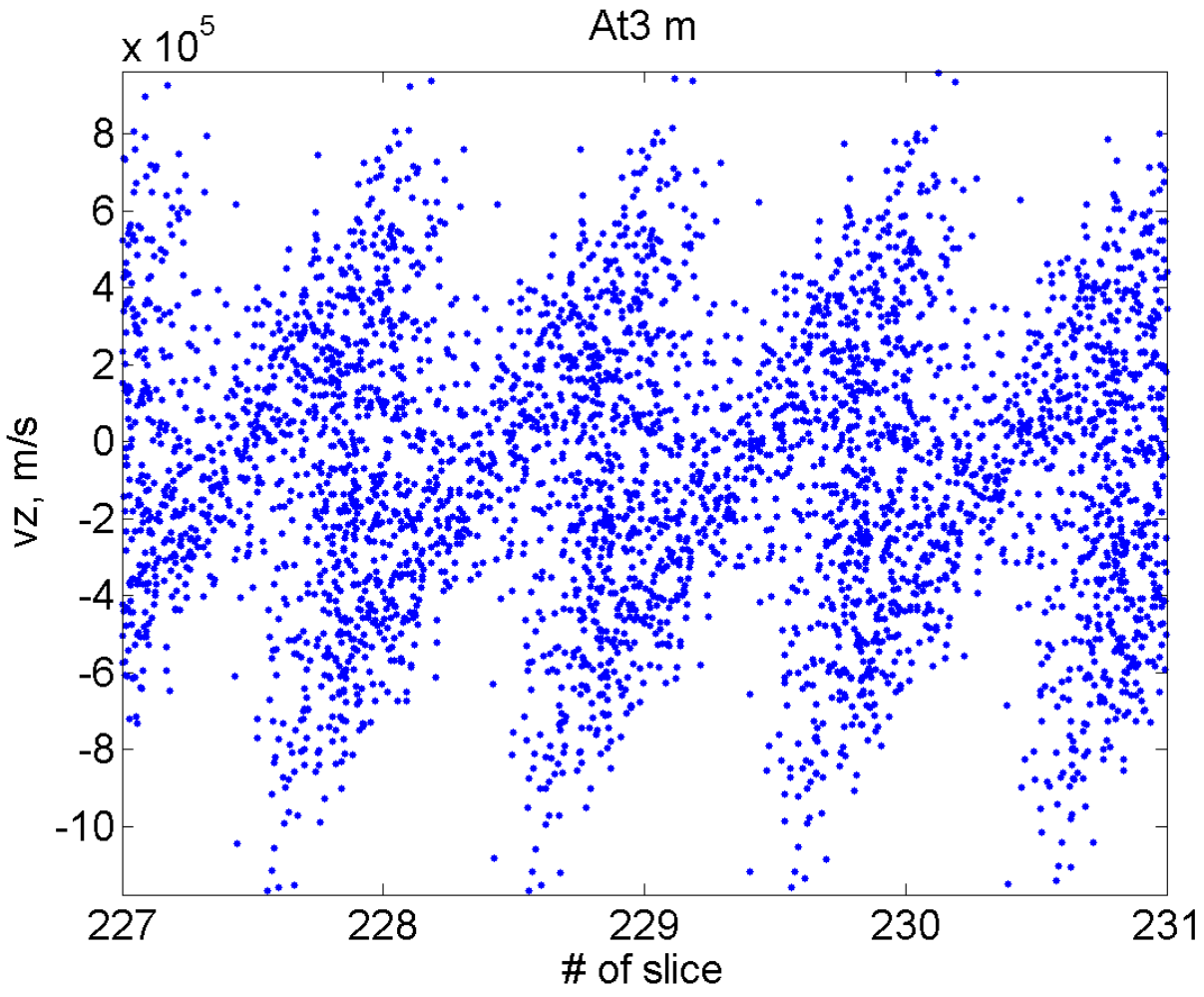
$z - v_z$ plot in kicker



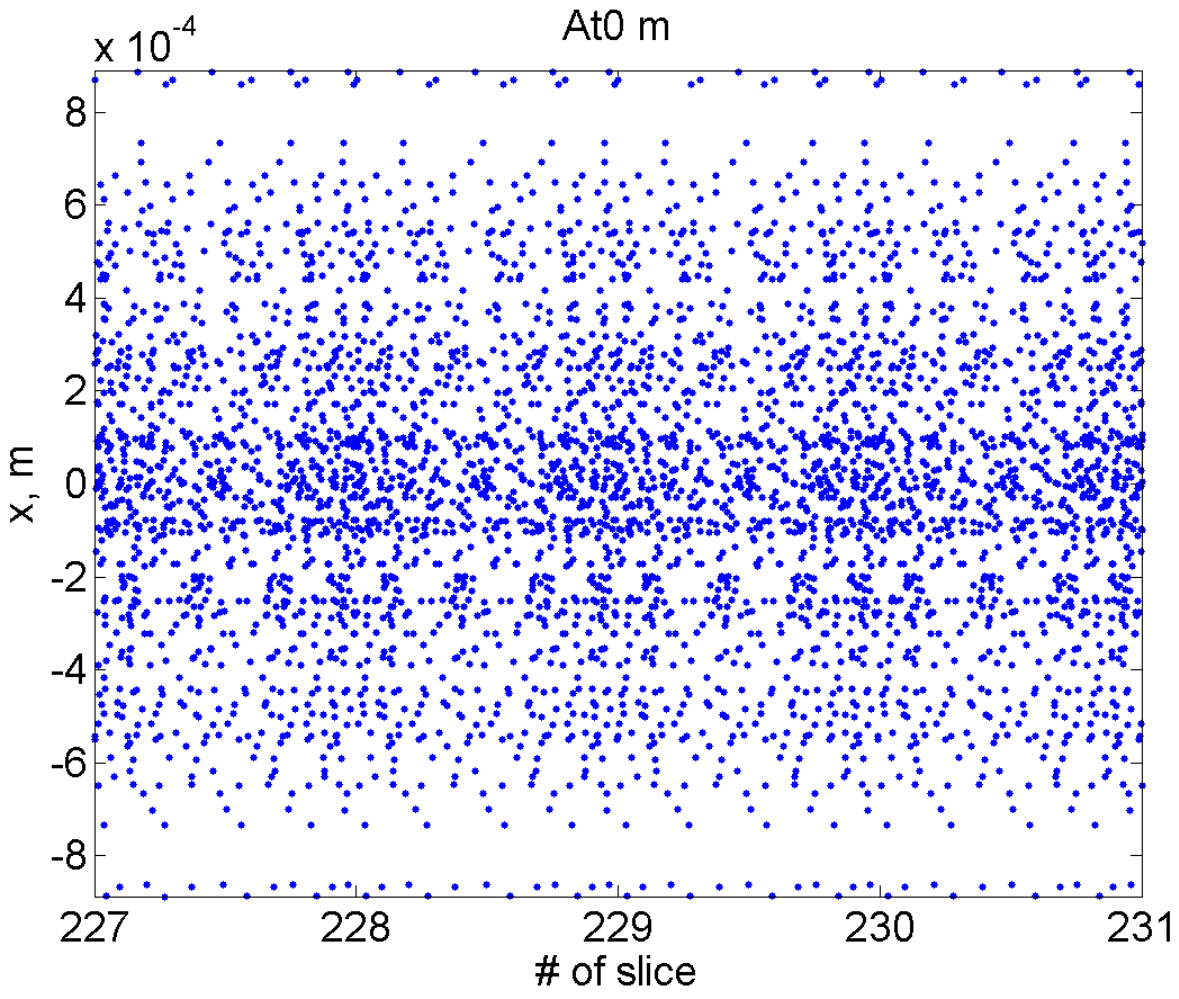
$z - v_z$ plot in kicker



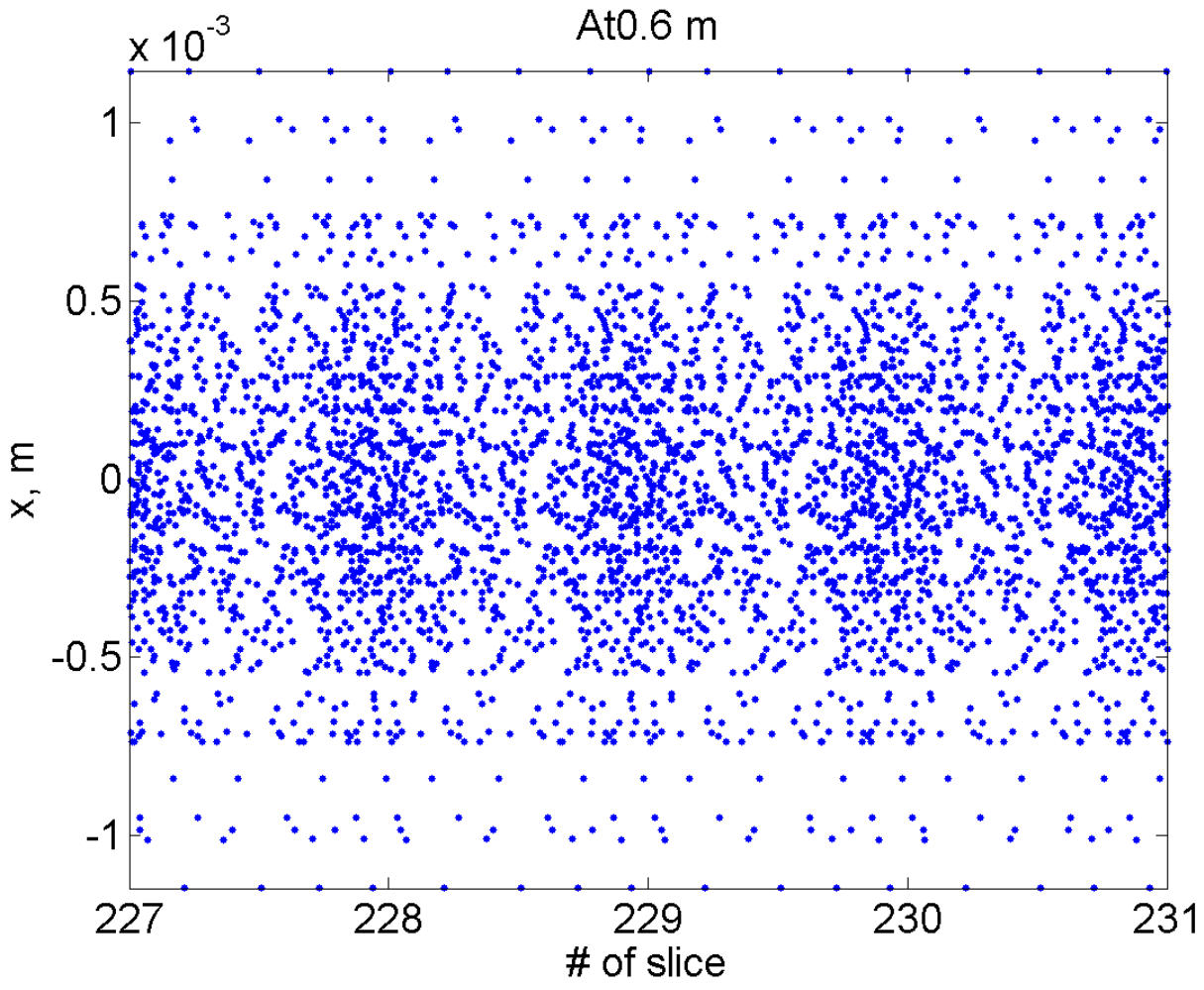
$z - v_z$ plot in kicker



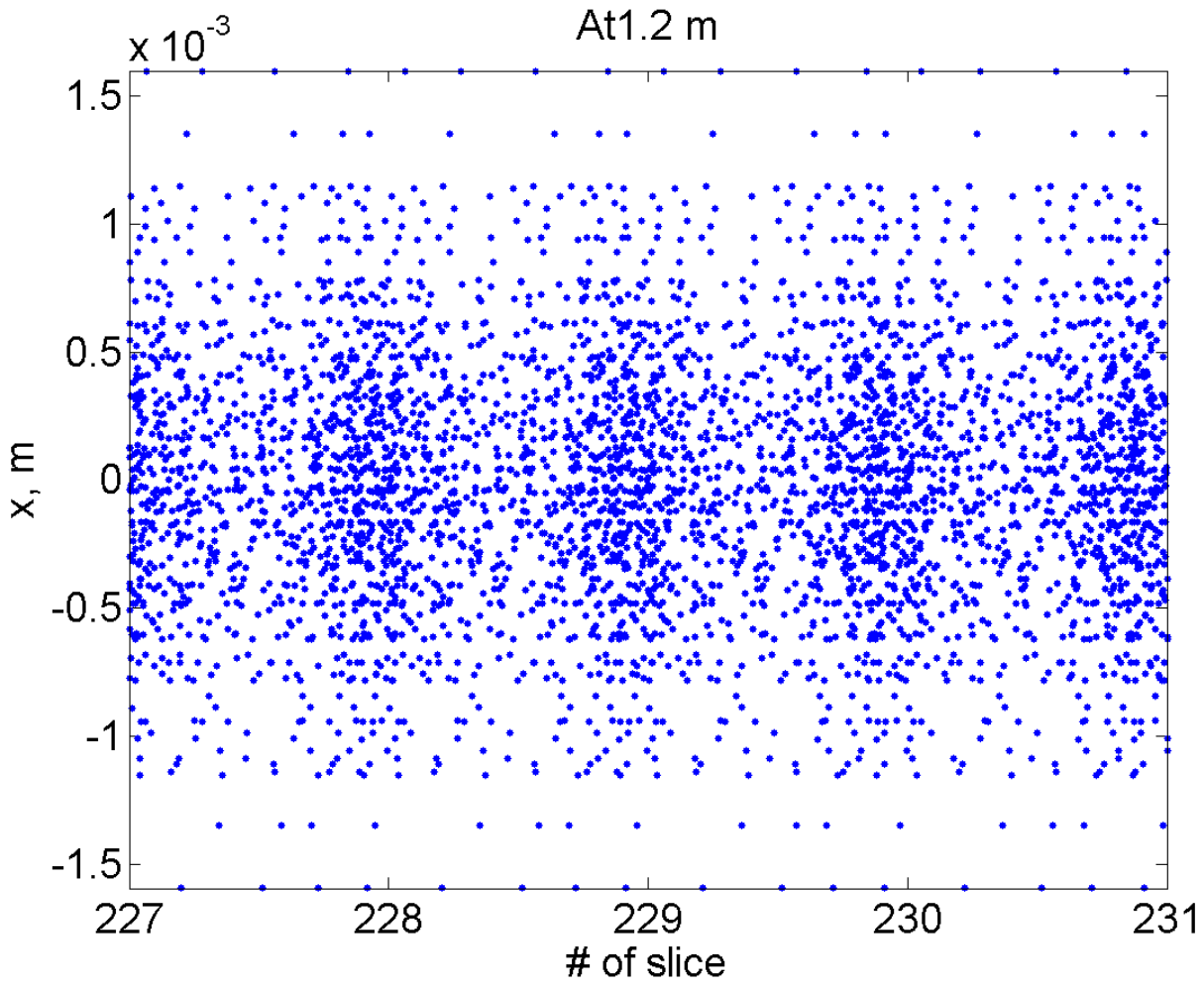
$z - x$ plot in kicker



$z - x$ plot in kicker



$z - x$ plot in kicker



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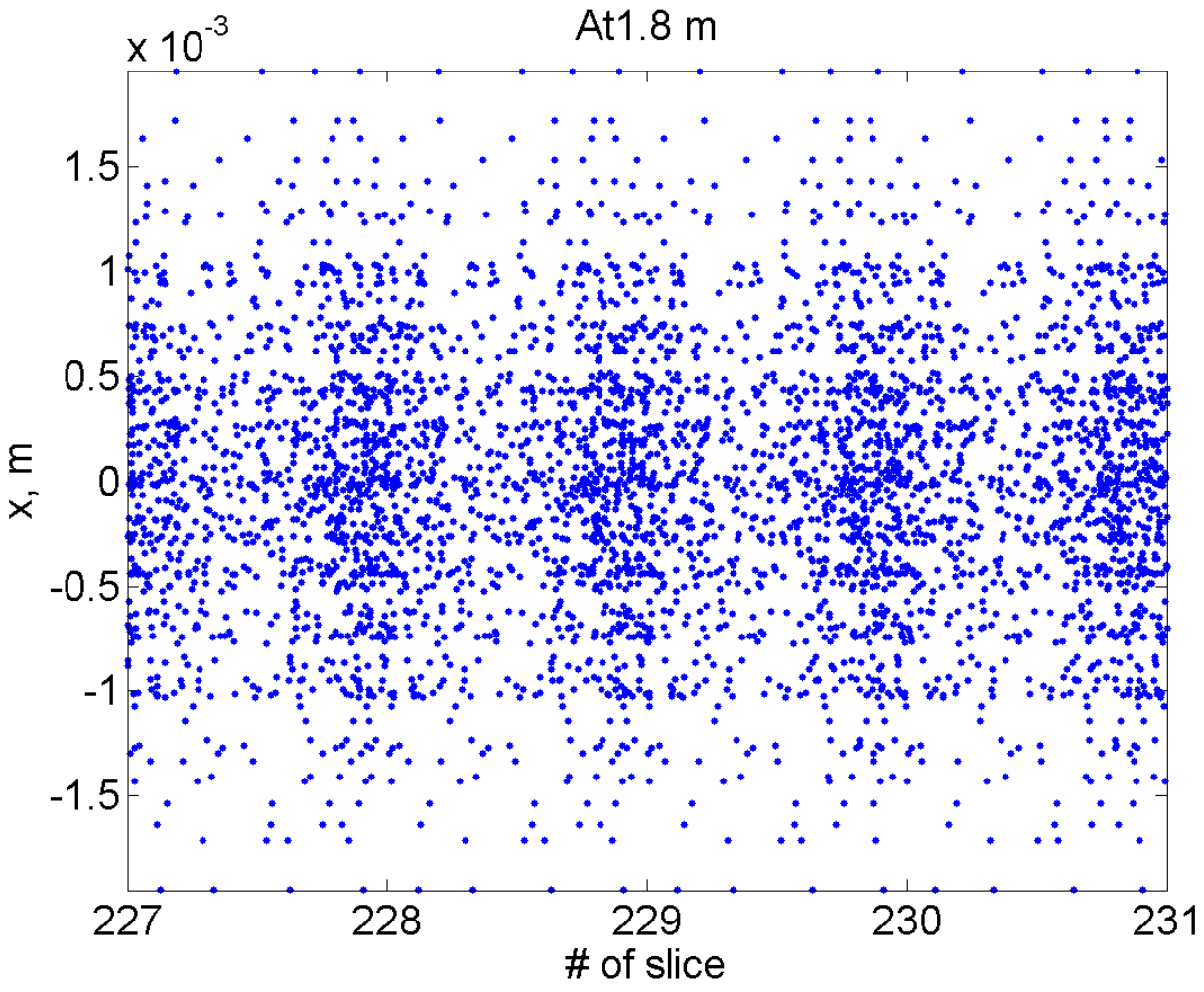

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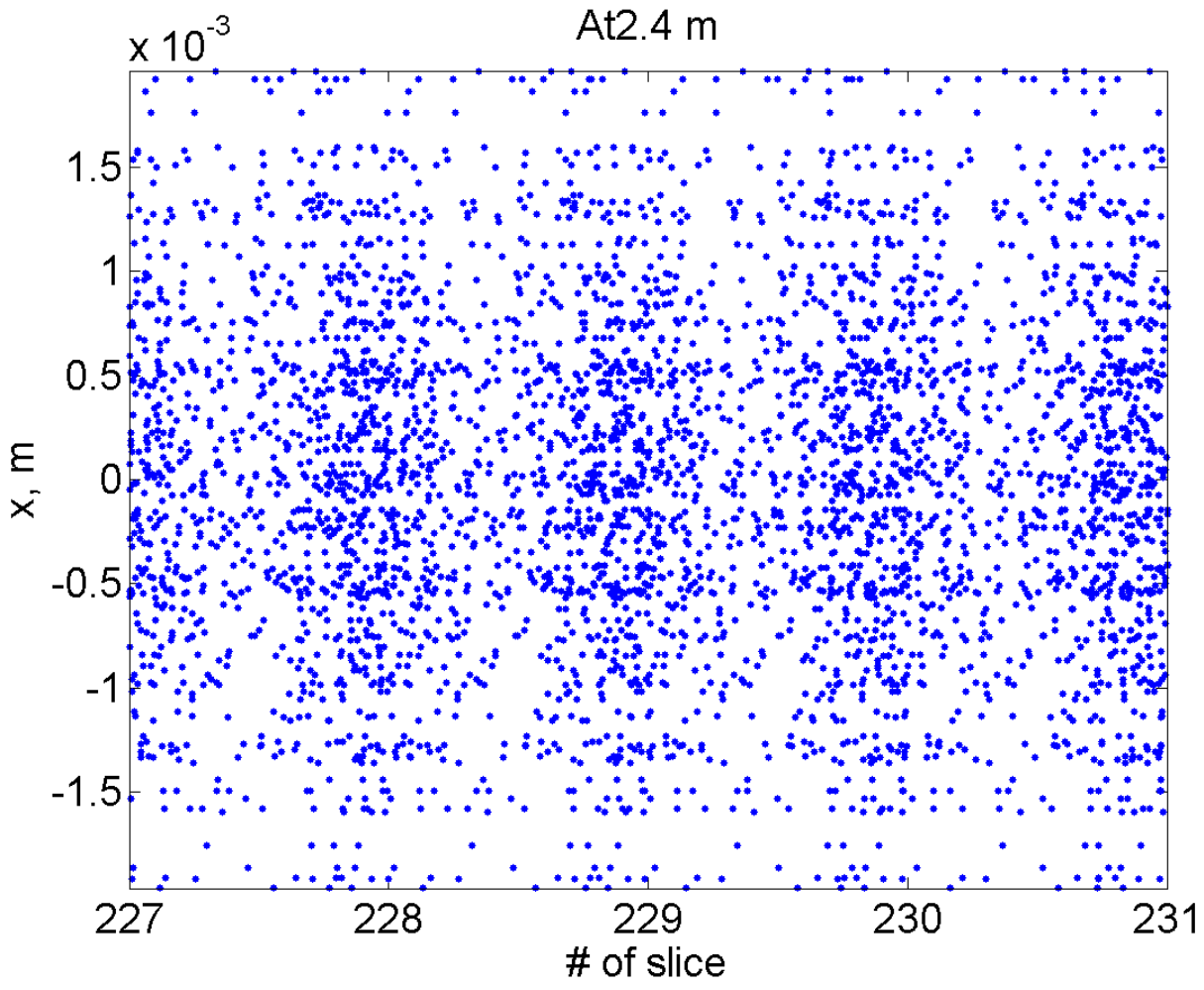
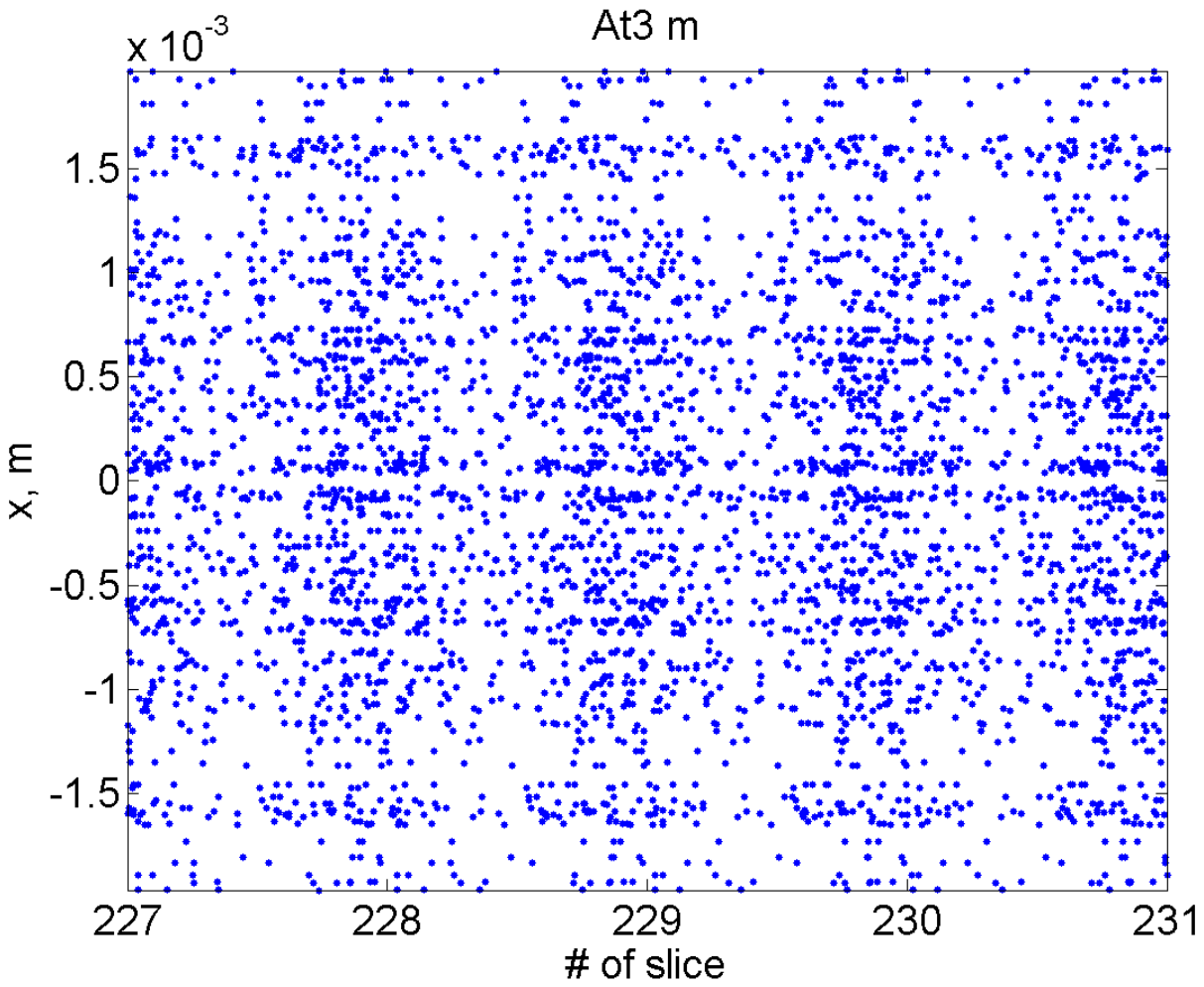
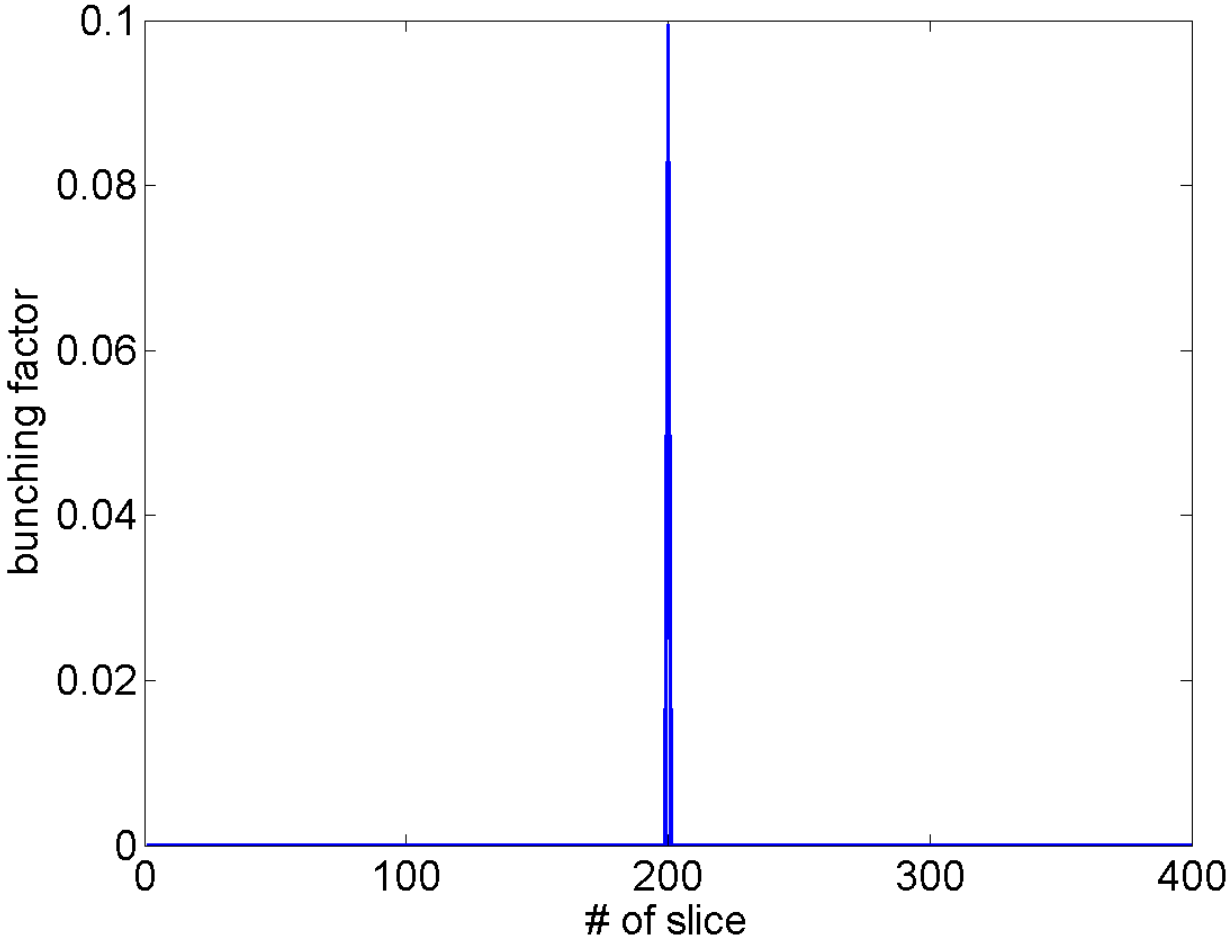


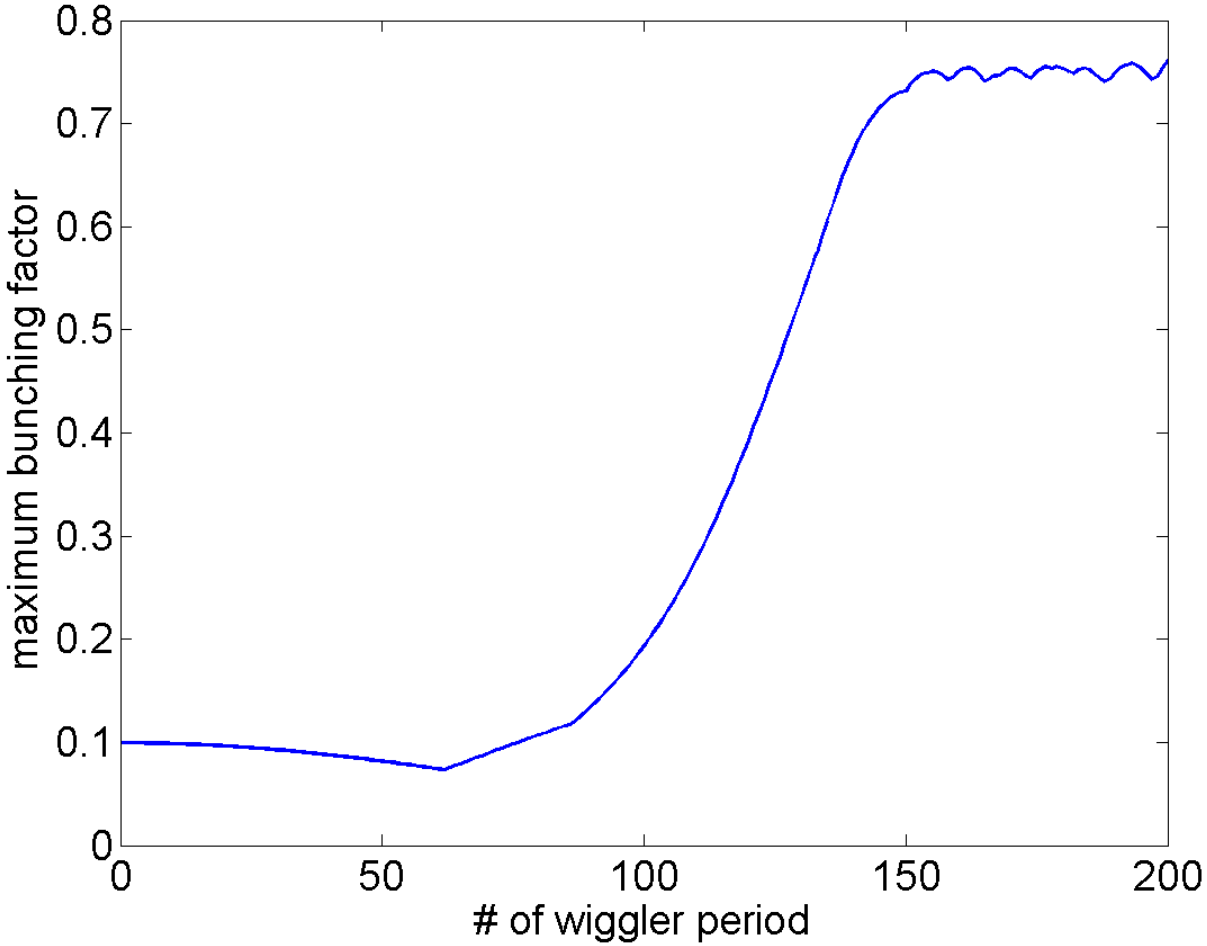
$z - x$ plot in kicker



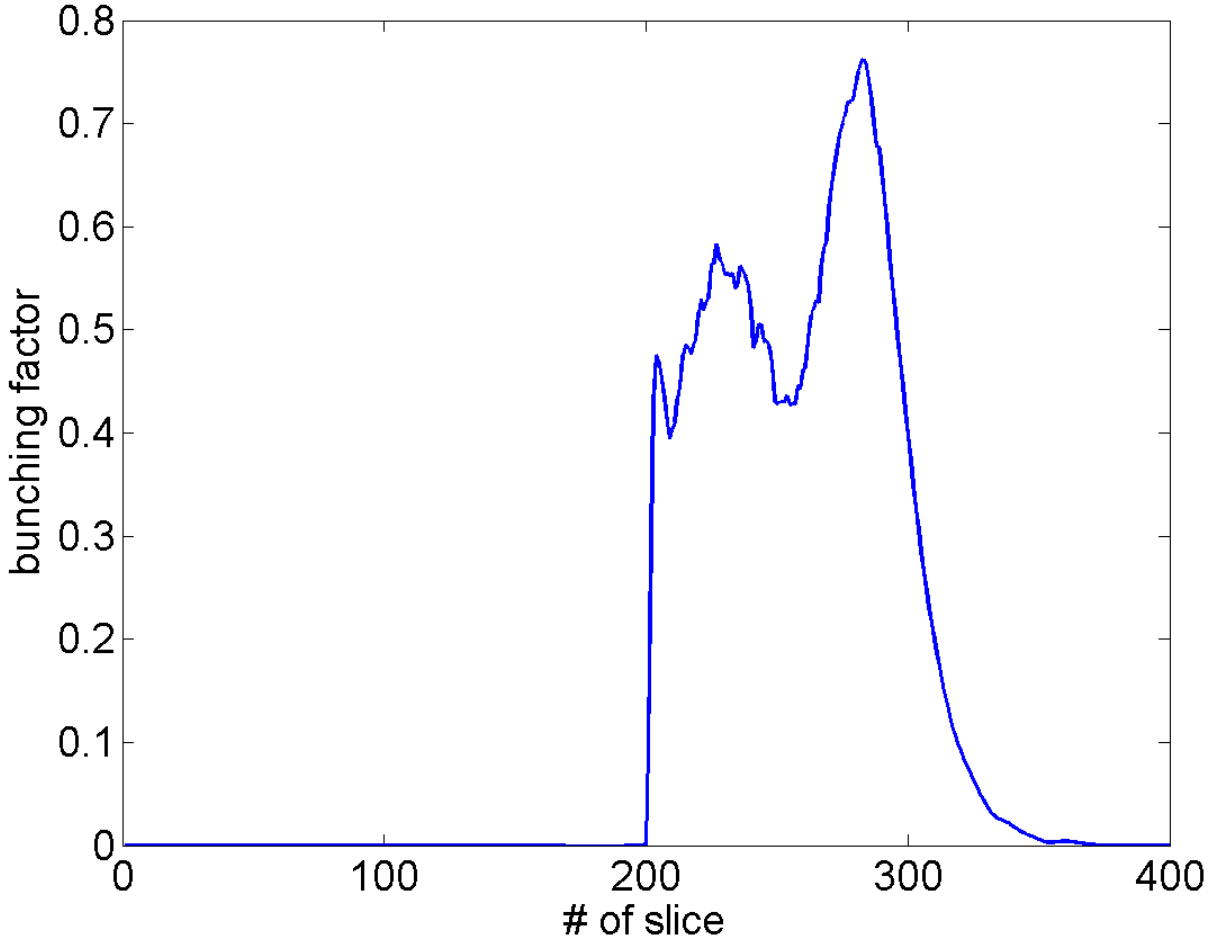
Initial bunching factor in GENESIS



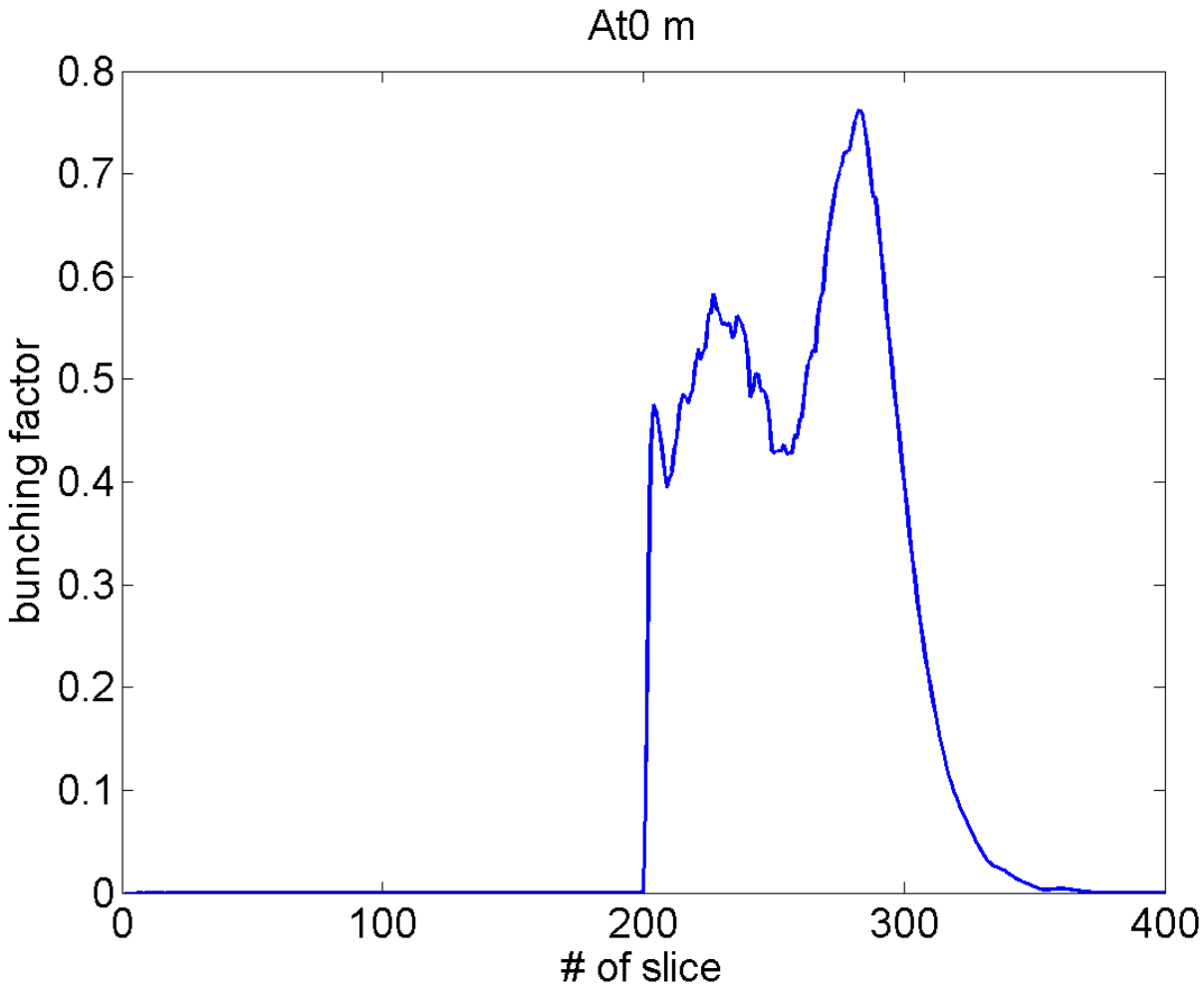
Bunching factor changes in GENESIS



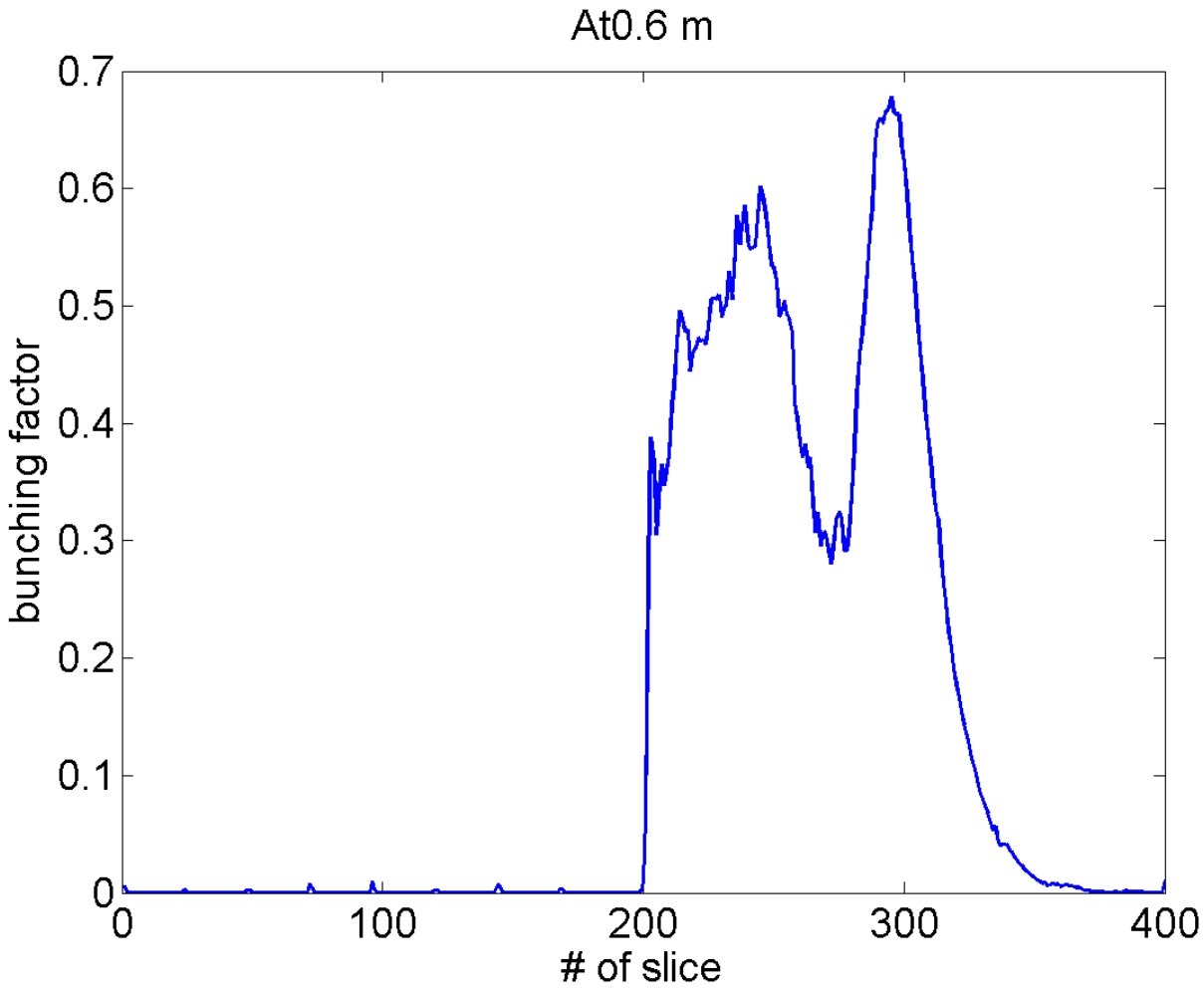
Final bunching factor in GENESIS



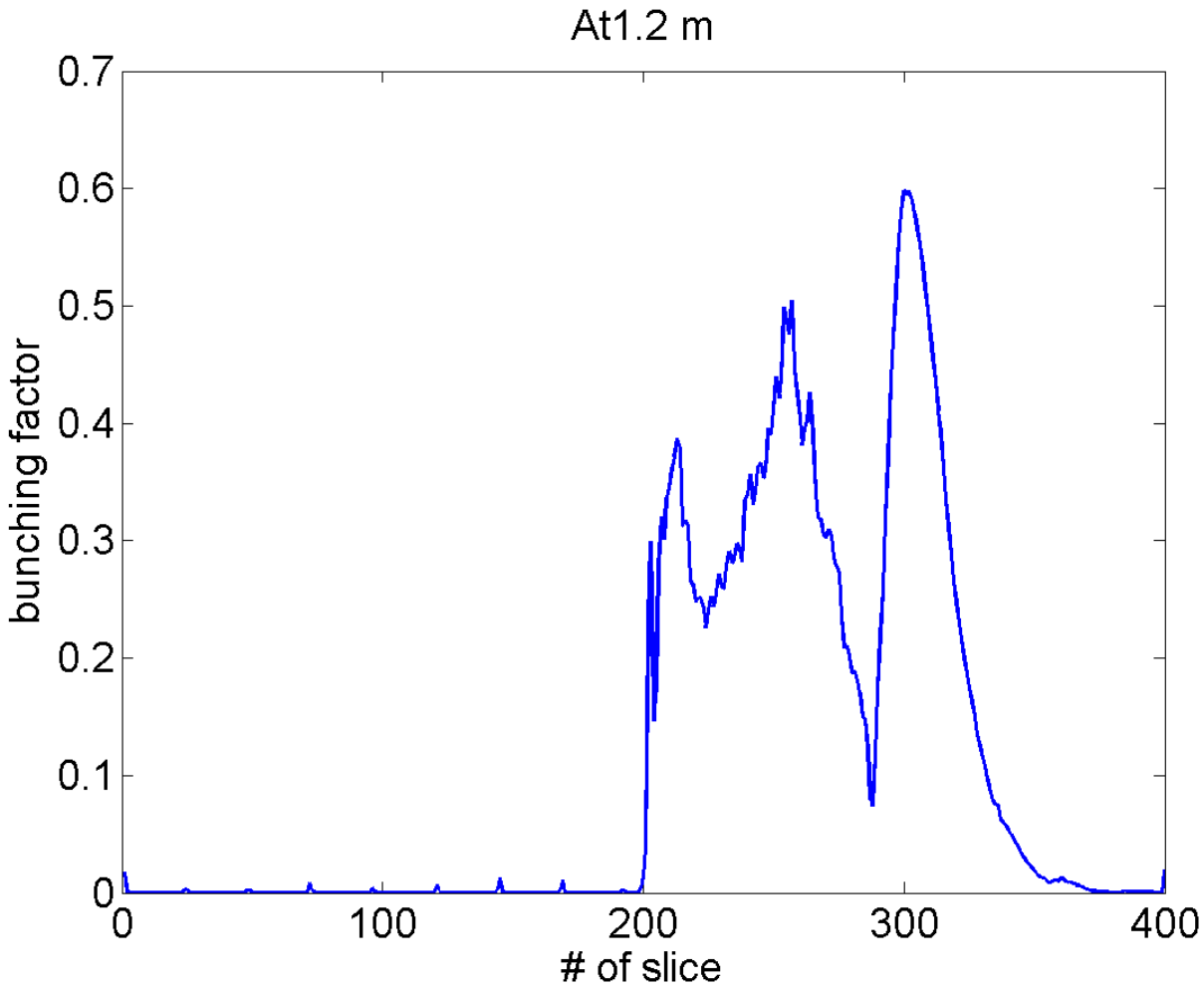
Bunching factor in kicker



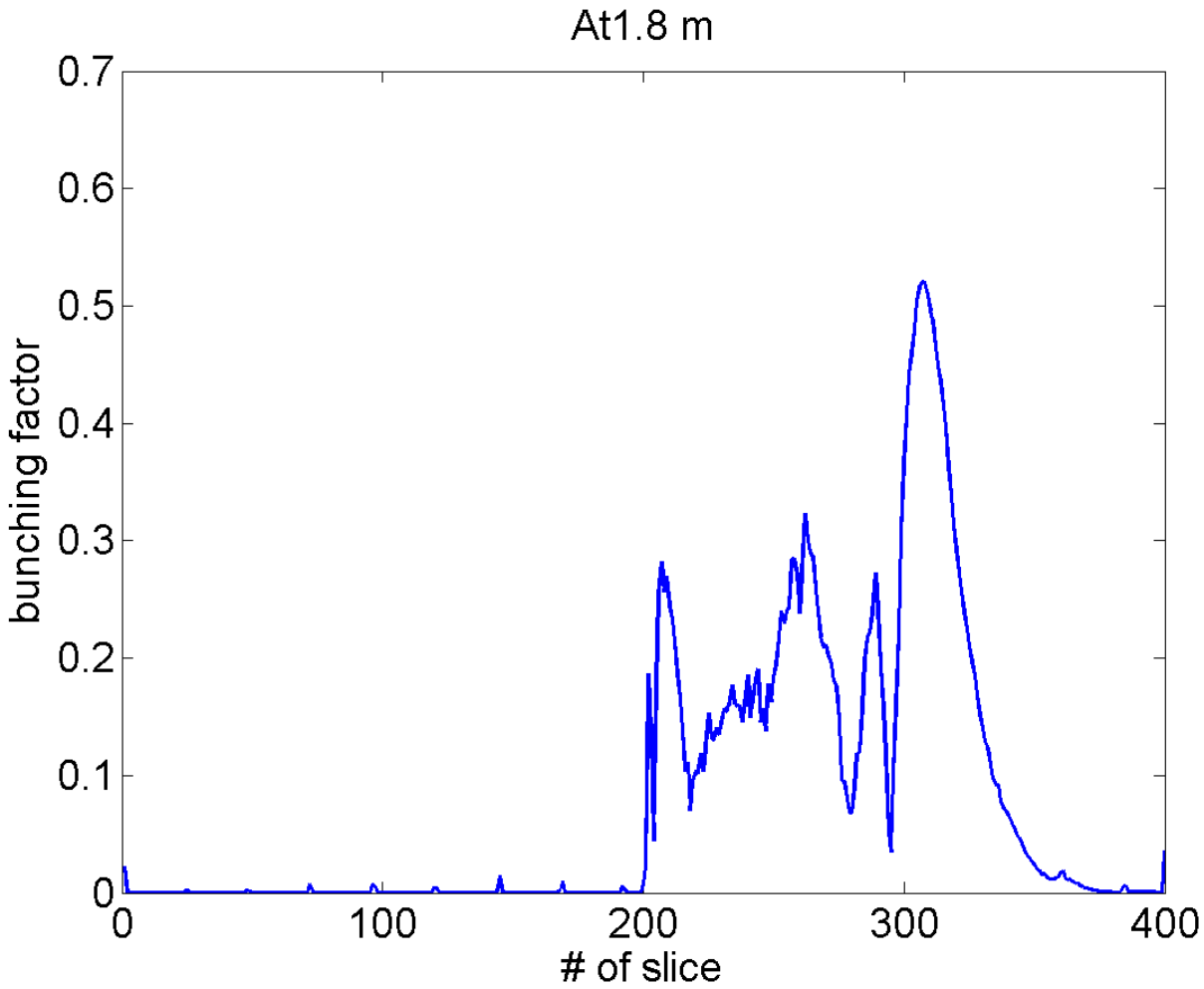
Bunching factor in kicker



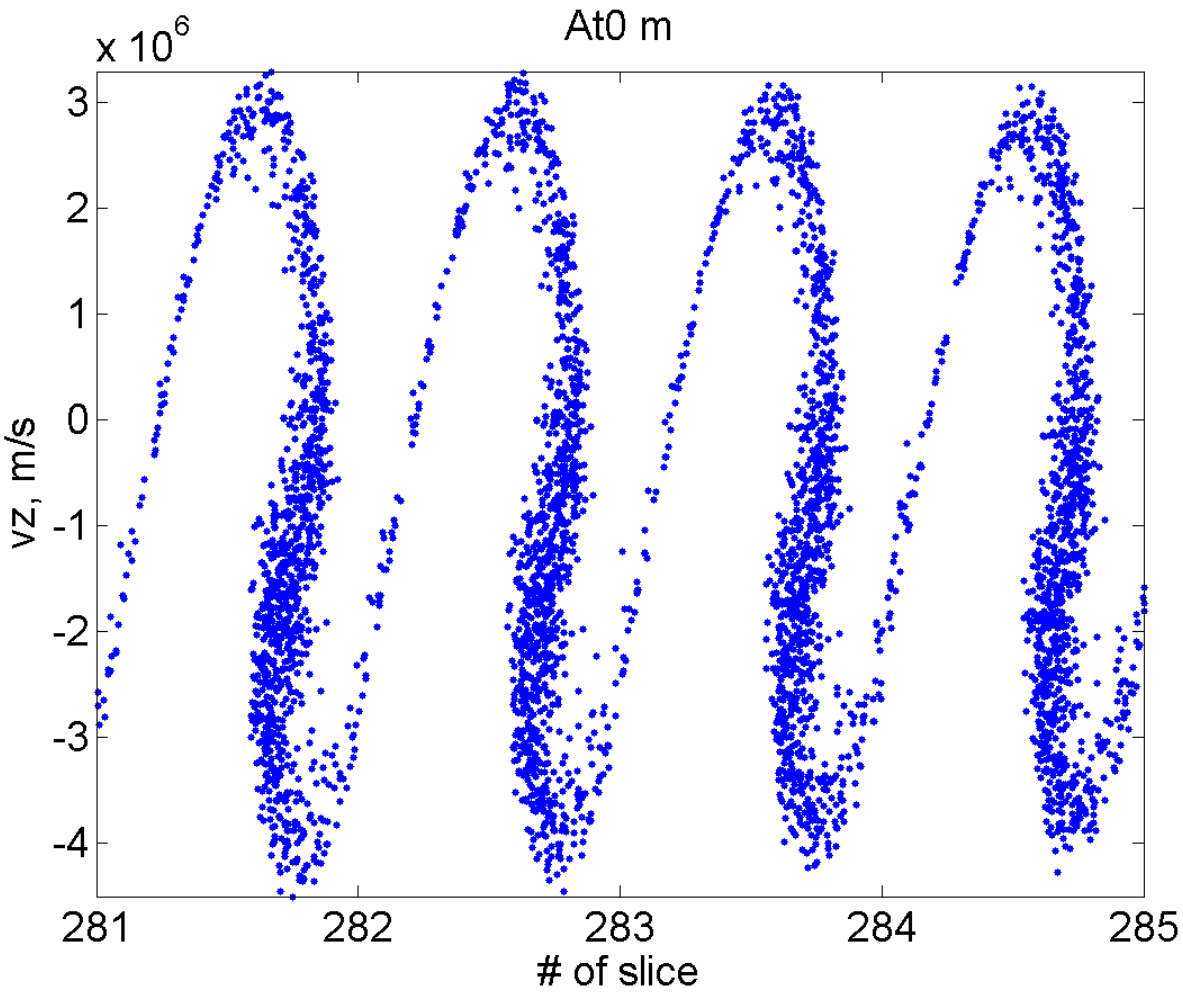
Bunching factor in kicker



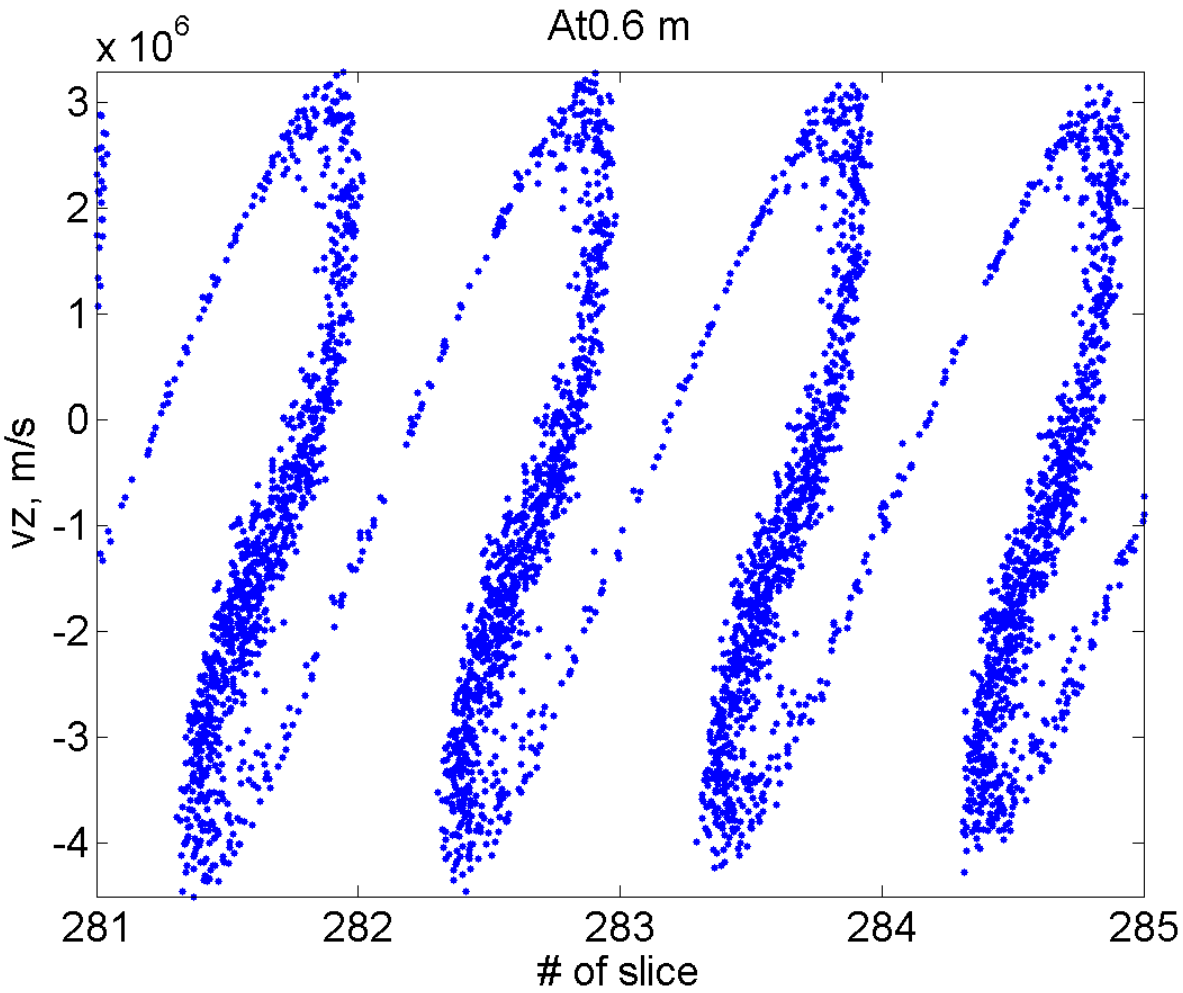
Bunching factor in kicker



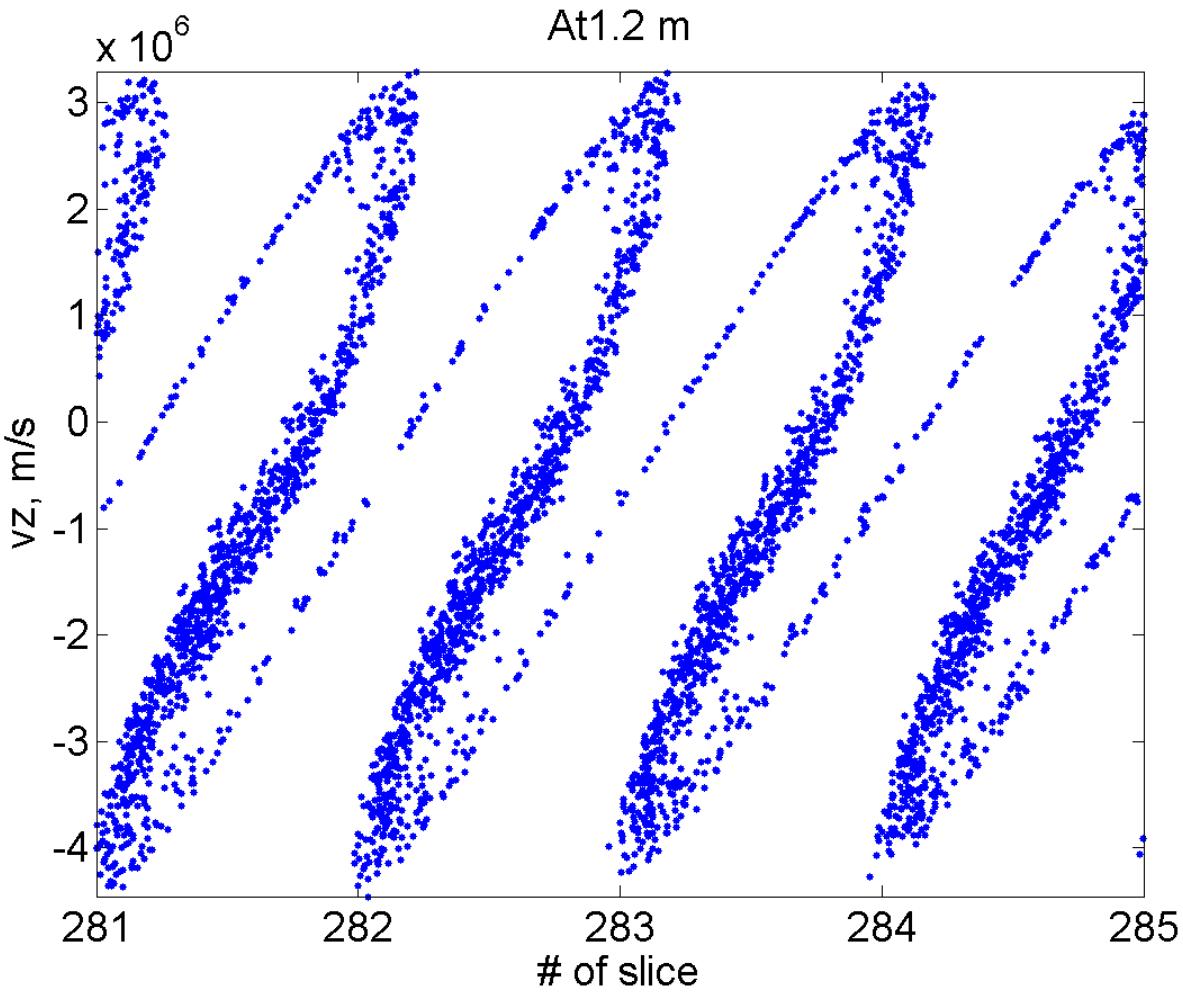
$z - v_z$ plot in kicker



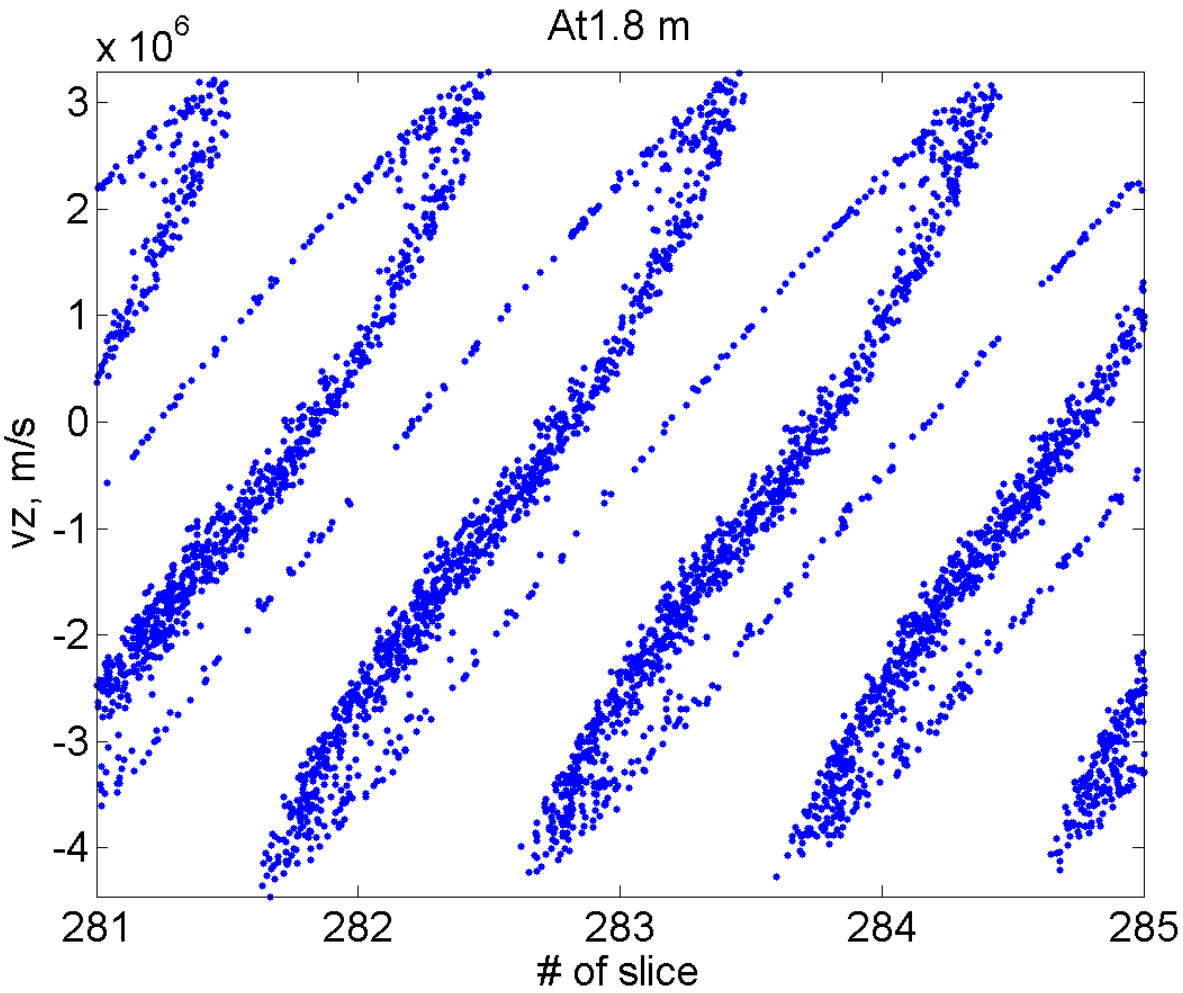
$z - v_z$ plot in kicker



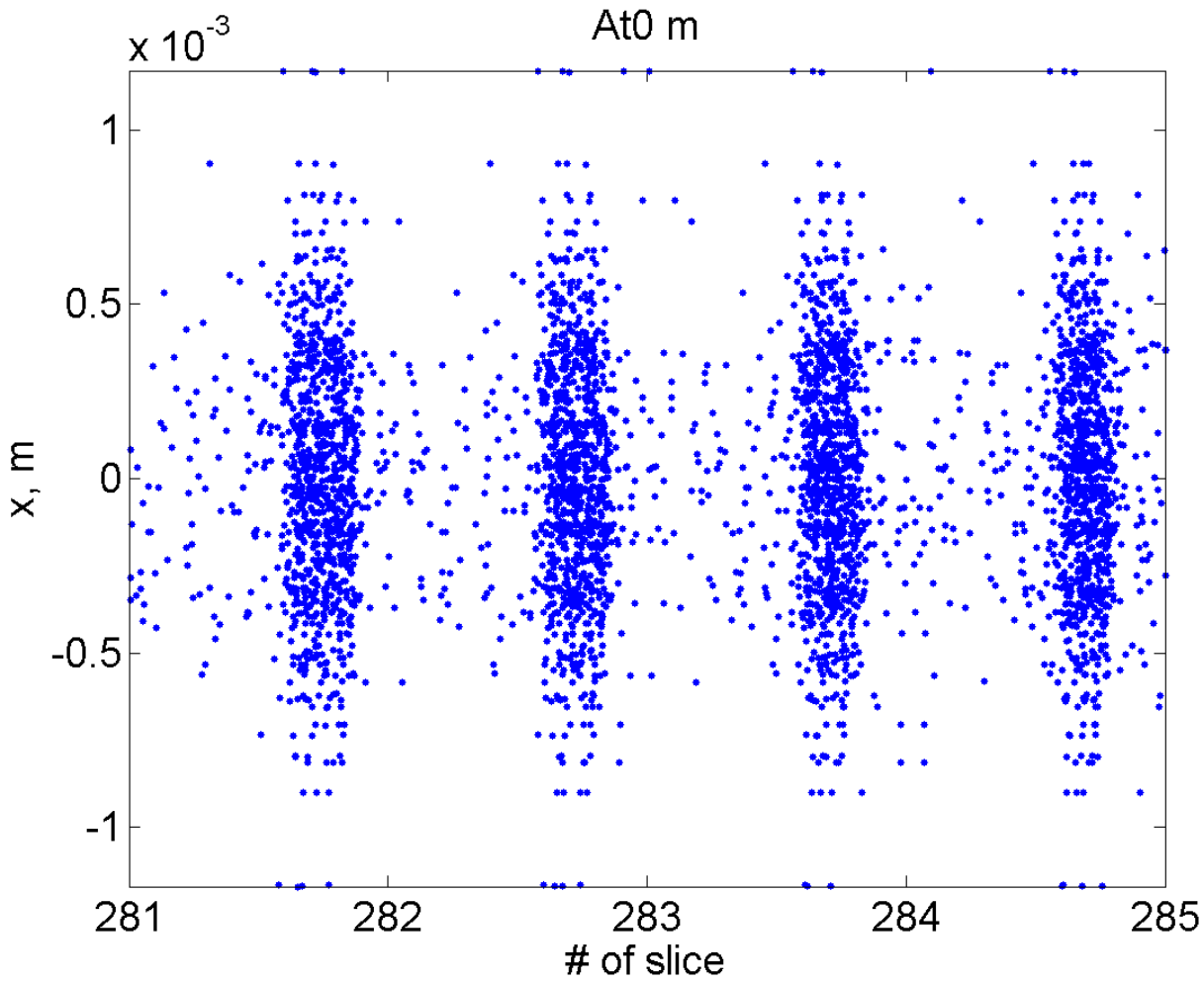
$z - v_z$ plot in kicker



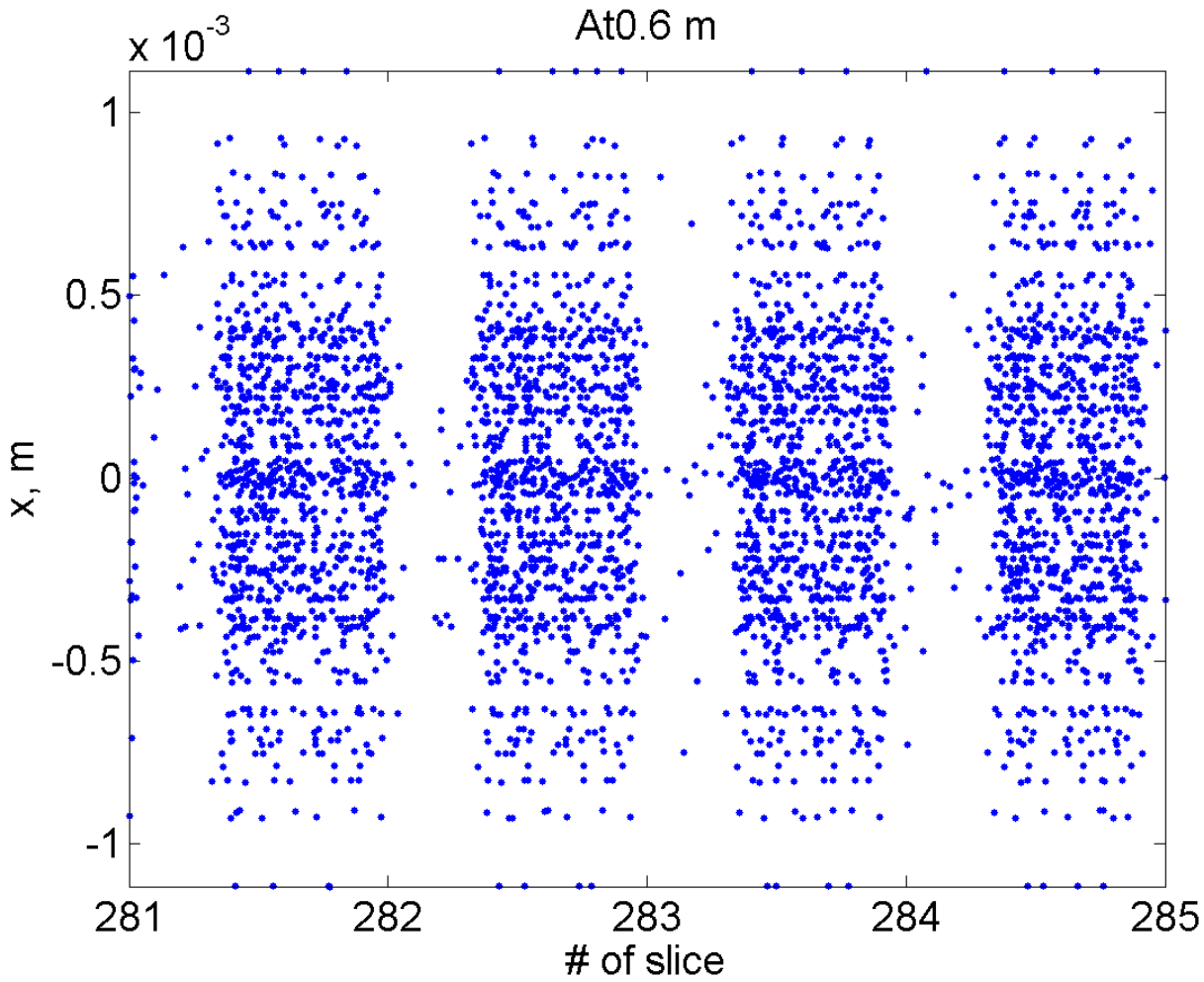
$z - v_z$ plot in kicker



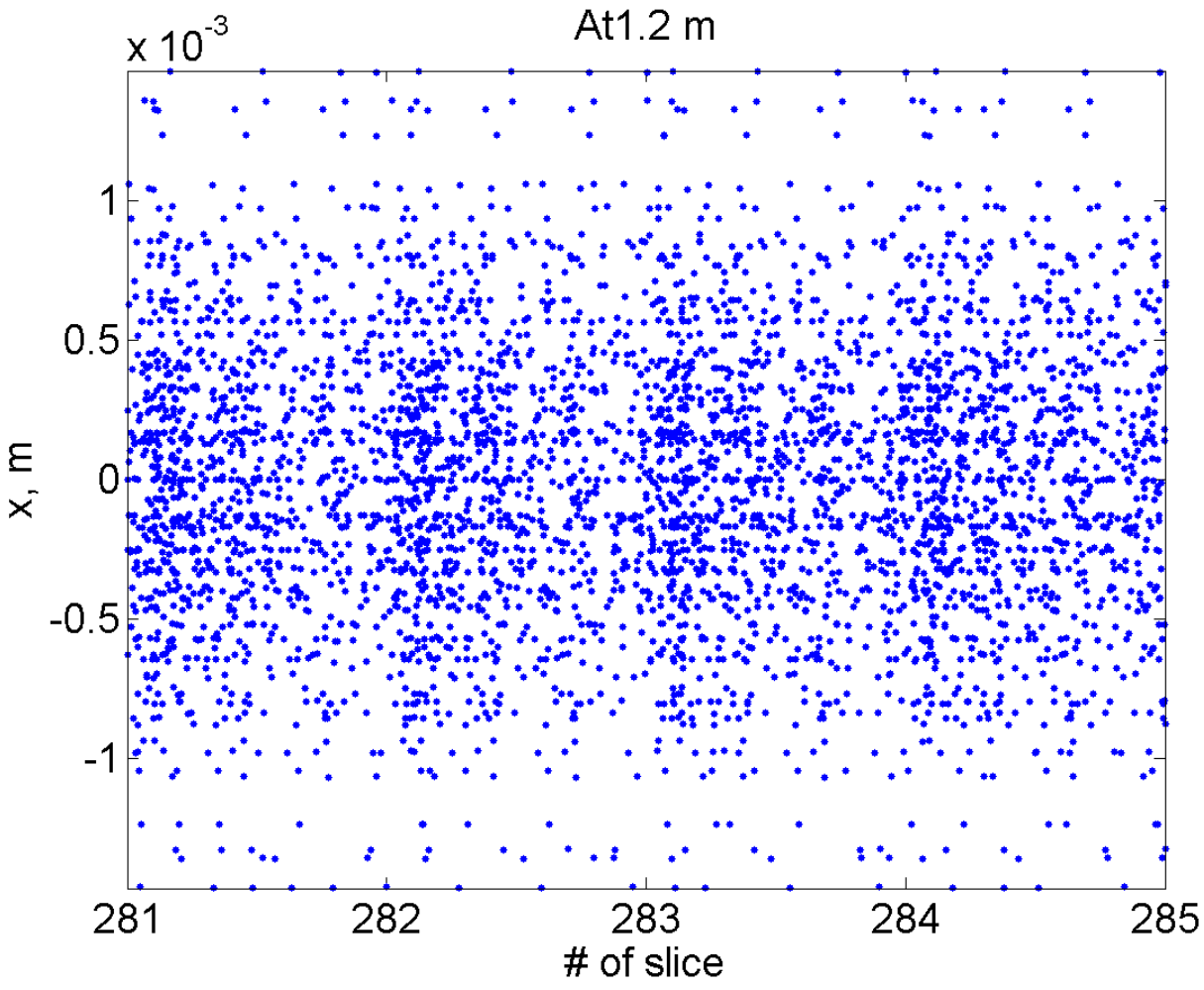
$z - x$ plot in kicker



$z - x$ plot in kicker



$z - x$ plot in kicker



$z - x$ plot in kicker