Activity Status:

Simulation of Transient Effects of Beam-Feedback Interaction with Application to the Extraction of the CNGS Beam from the SPS

E. Vogel

activity in collaboration with

W. Höfle

16th January 2004

LCE Section Meeting

Description of problem

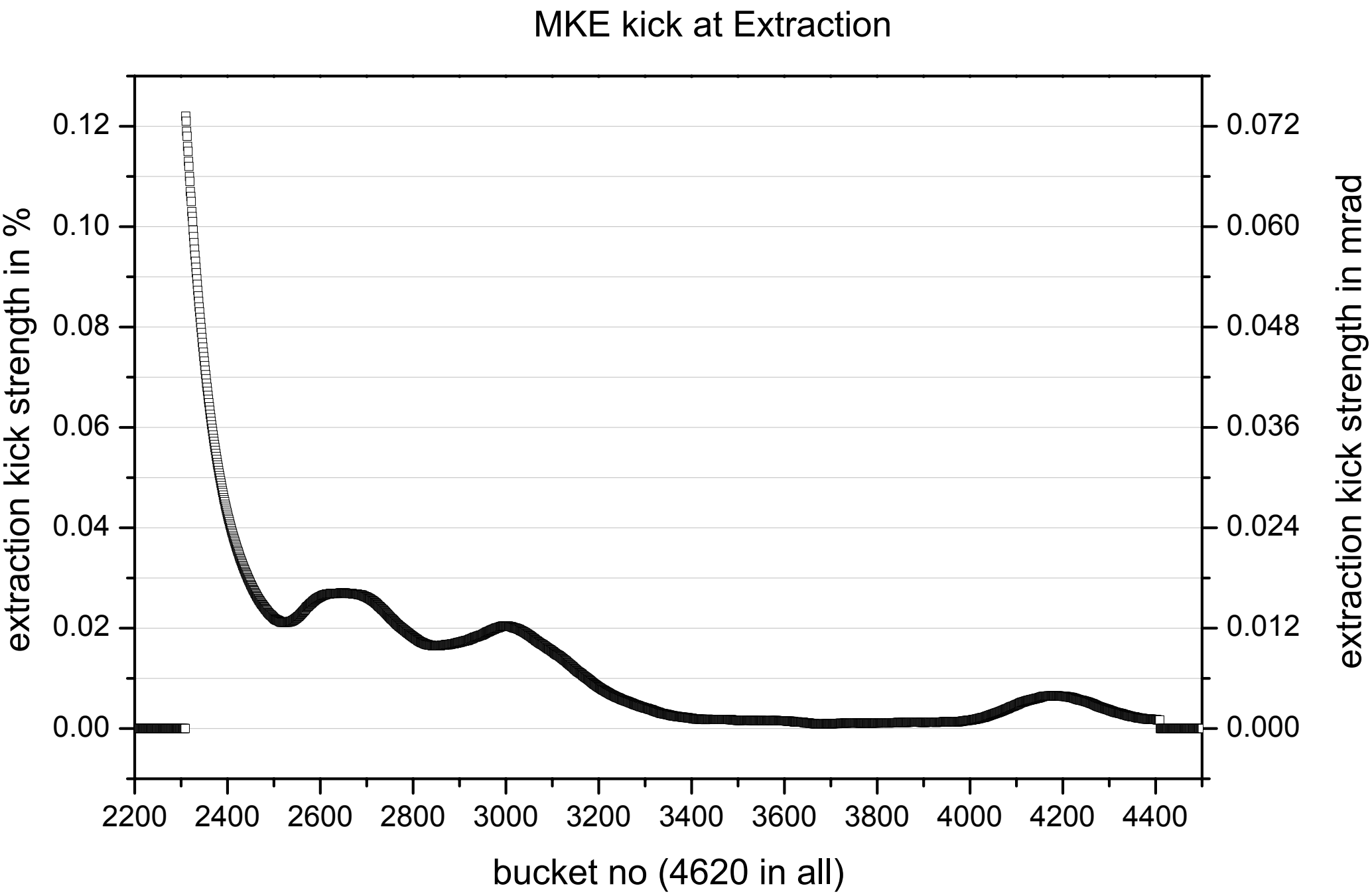
CNGS beam will be ejected from the SPS in two batches causing residual oscillations by kicker ripples on the second batch. This second batch continues to circulate for 2167 turns after the first batch has been extracted and oscillations are planned to be damped by the feedback system.

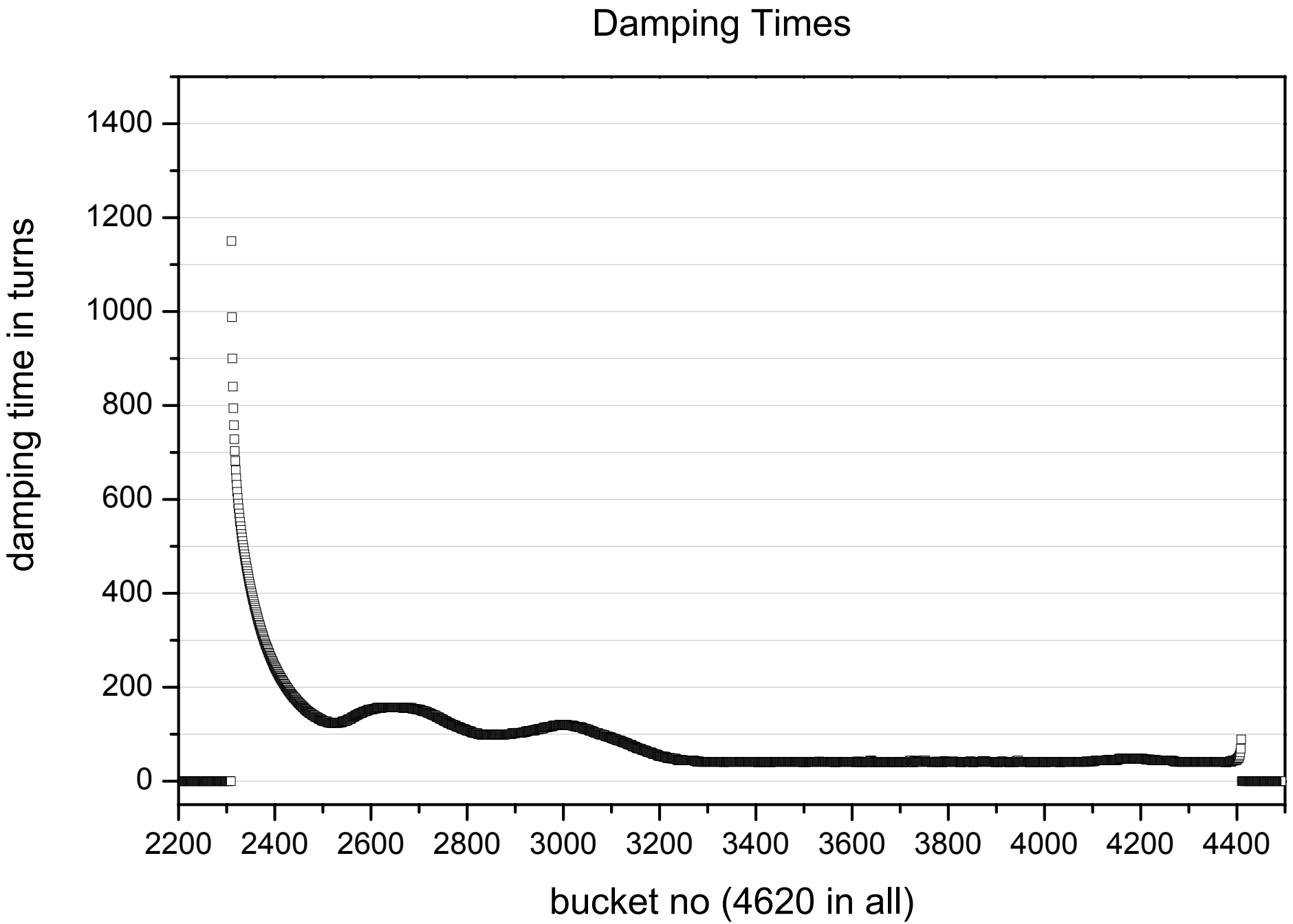
Status of simulations so far

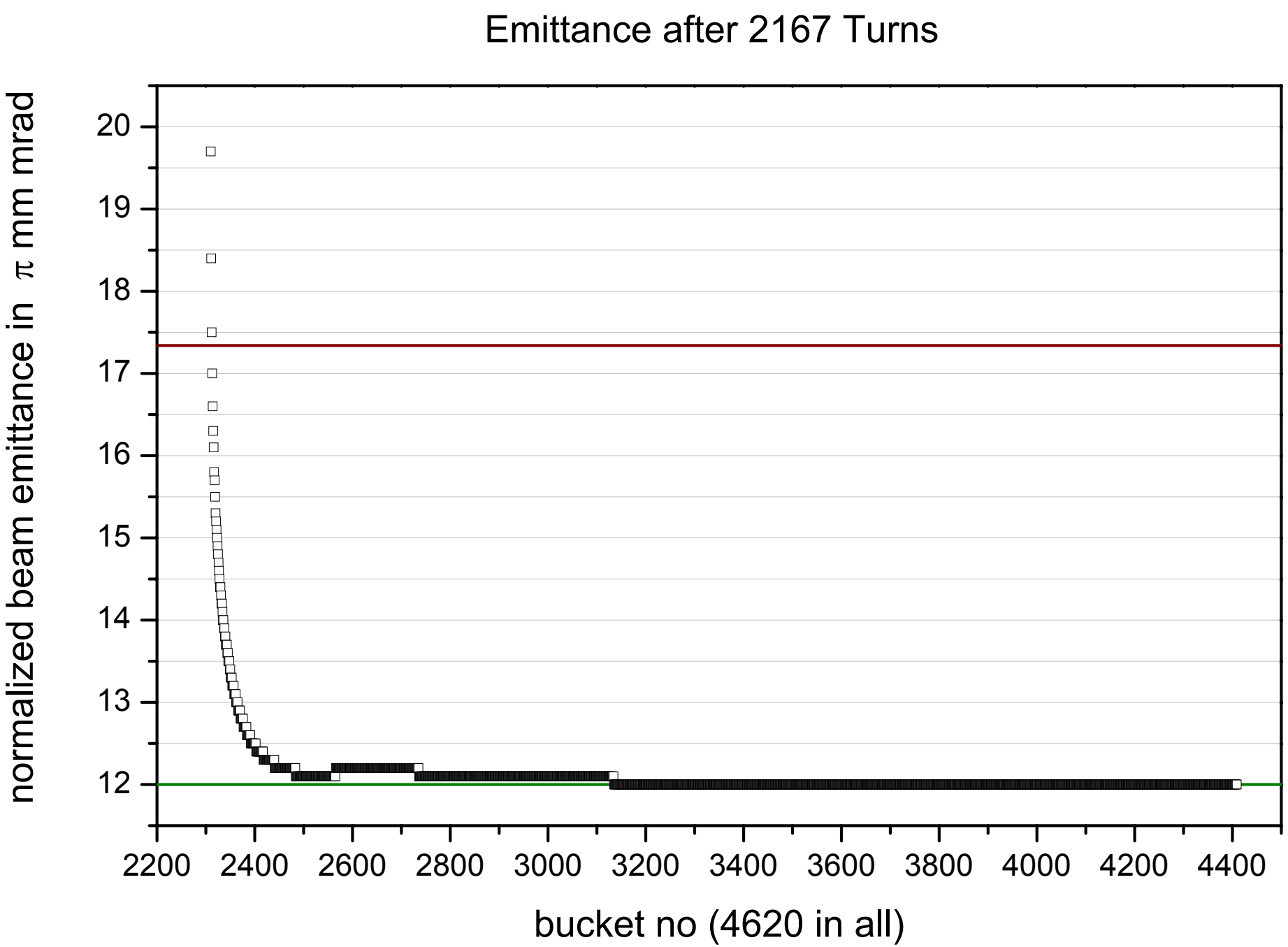
- the orders of magnitudes are OK, that mean feedback kicker strength, bandwidth limitation, action of MKE kicker, beta function at the elements, etc.
- some final values like the MKE kick strength has to be verified, as example the MKE values are based on drive signal measurements, new measurements at the kicker are planned next week!
- the code is still in a preliminary state, still sleeping (unknown) bugs has to be found
- One has to check in which way the limited aperture of the 'bumped beam' (about 7.5 sigma) plays a role in the whole business. What's about losses at the septum!

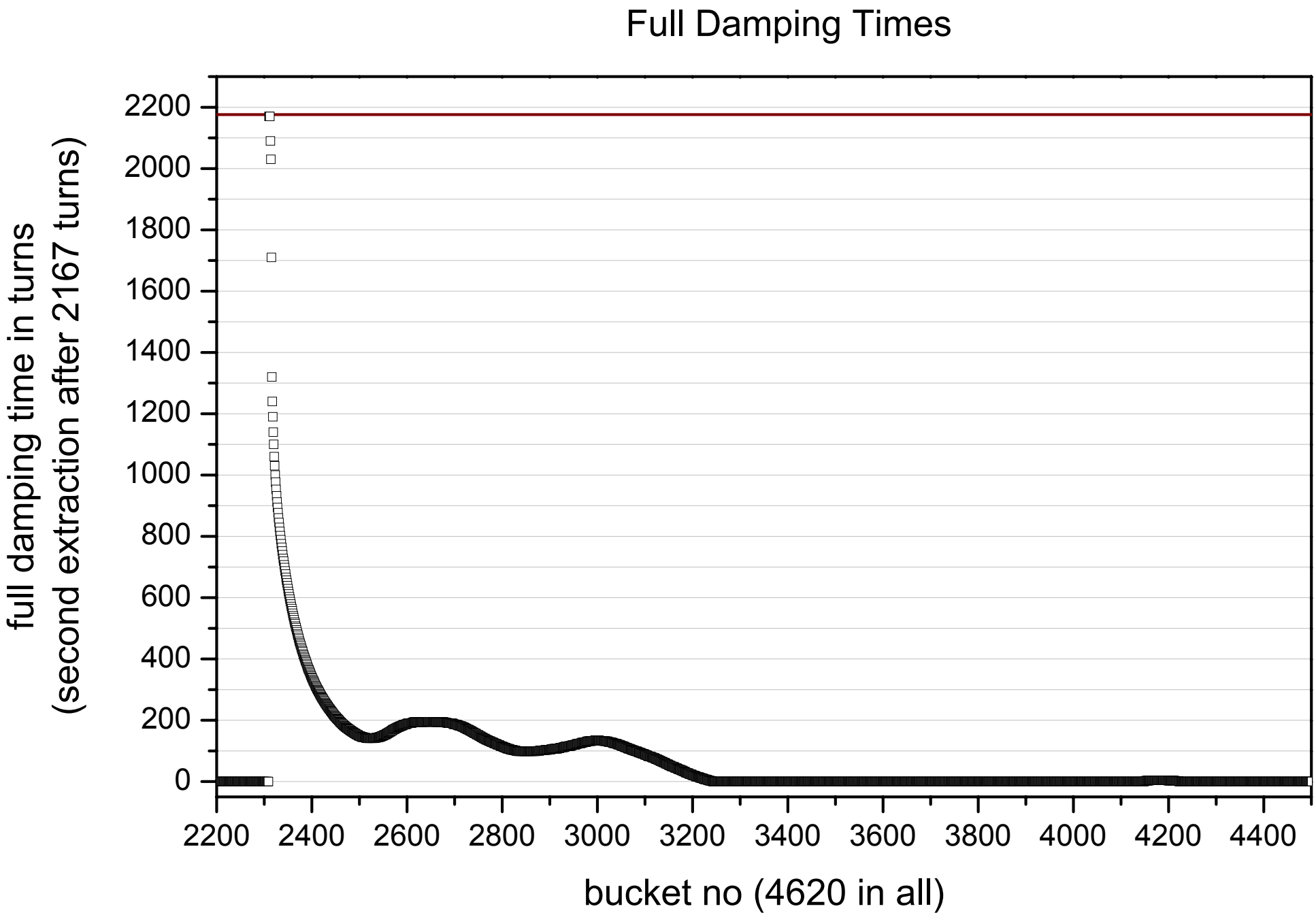
Attention!

The following results are very preliminary and contain no safety margins! One must not conclude anything out of them!


MKE kick at Extraction
extraction kick strength in %
0.12
0.10
0.08
0.06
0.04
0.02
0.00
extraction kick strength in mrad
0.072
0.060
0.048
0.036
0.024
0.012
0.000
2200
2400
2600
2800
3000
3200
3400
3600
3800
4000
4200
4400
bucket no (4620 in all)


Damping Times
damping time in turns
1400
1200
1000
800
600
400
200
0
2200
2400
2600
2800
3000
3200
3400
3600
3800
4000
4200
4400
bucket no (4620 in all)


Emittance after 2167 Turns
normalized beam emittance in π mm mrad
20
19
18
17
16
15
14
13
12
2200
2400
2600
2800
3000
3200
3400
3600
3800
4000
4200
4400
bucket no (4620 in all)


Full Damping Times
full damping time in turns
(second extraction after 2167 turns)
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
2200
2400
2600
2800
3000
3200
3400
3600
3800
4000
4200
4400
bucket no (4620 in all)