ORBIT Simulation *vs.* Beam Measurement

W. Chou and R. Tomlin
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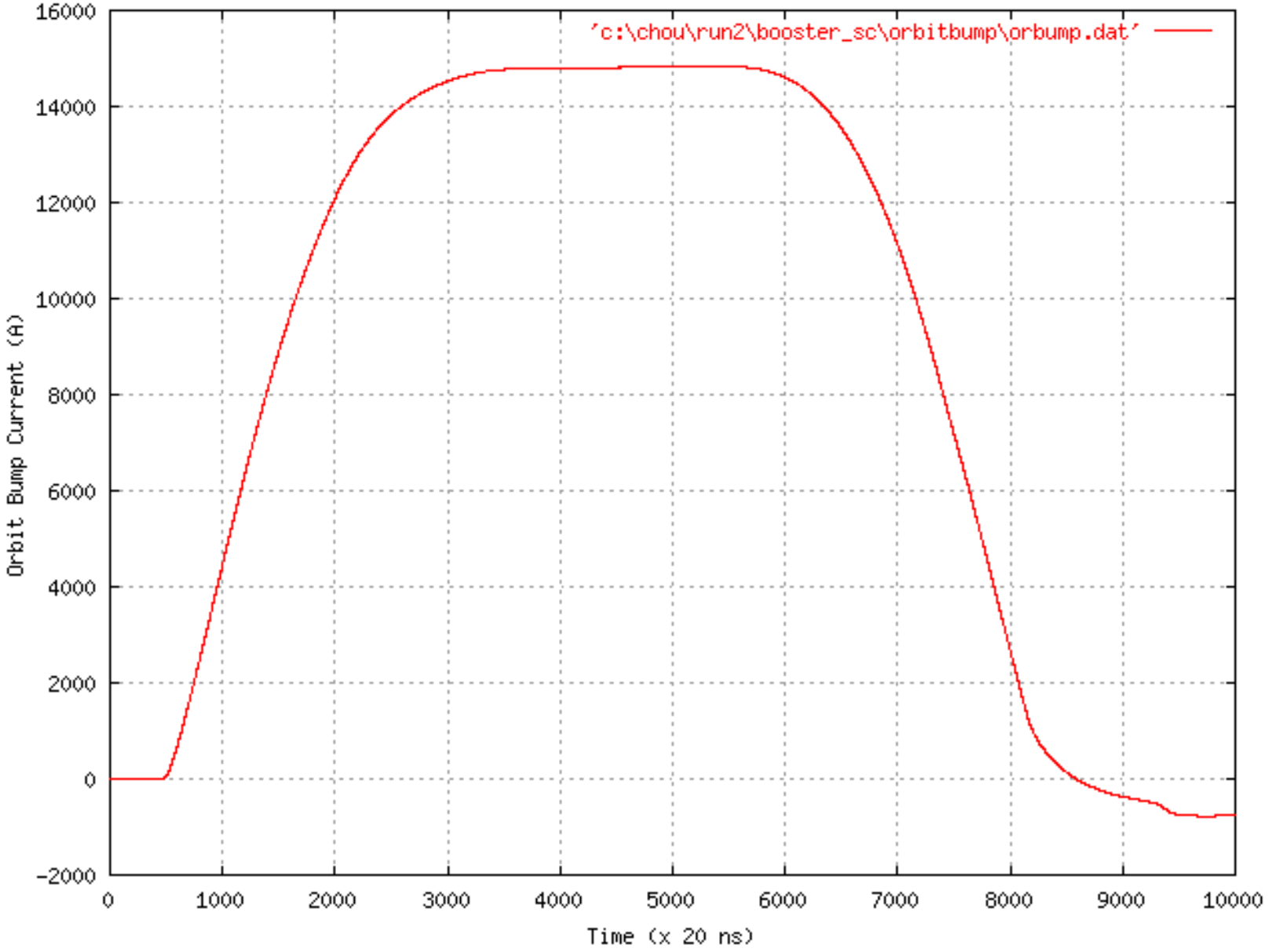
http://www-bd.fnal.gov/pdriver/booster/

ORBIT Simulation Parameters

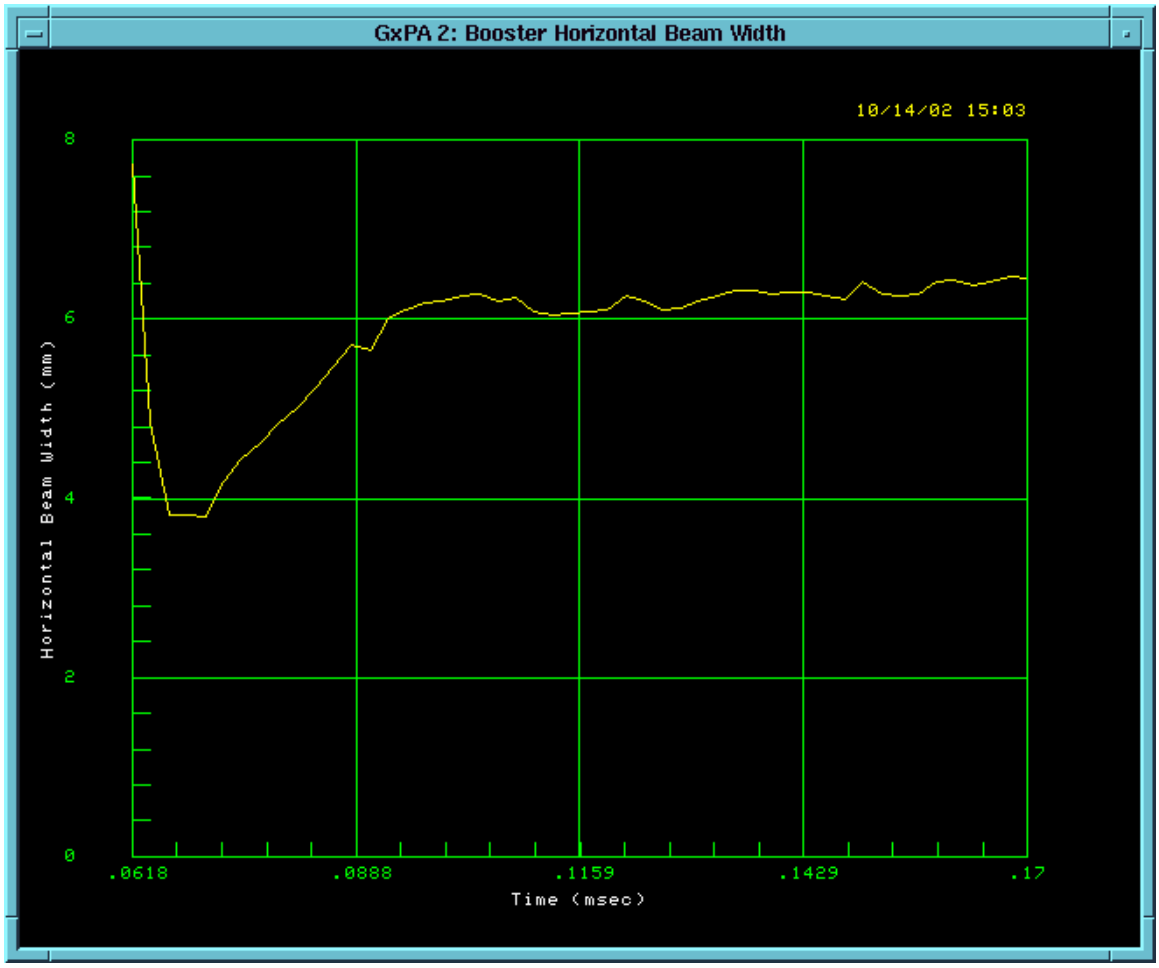
- Booster lattice version 1.1
- First order transfer matrices
- Non-accelerating RF
- Transverse phase space: bi-Gaussian distribution in both *x* and *y* planes
- Longitudinal phase space: Gaussian in *dE*, uniform in *dt*.
- 11-turn injection
- 110,000 particles (10,000 particles per injection turn)
- 32 bins in *dE-dt*, 64 bins in *x-x'*, 64 bins in *y-y'*
- Both longitudinal and transverse space charge turned on
- 200-turn tracking
- Code run on 10 parallel nodes in the heimdall computer cluster (WH13NE)

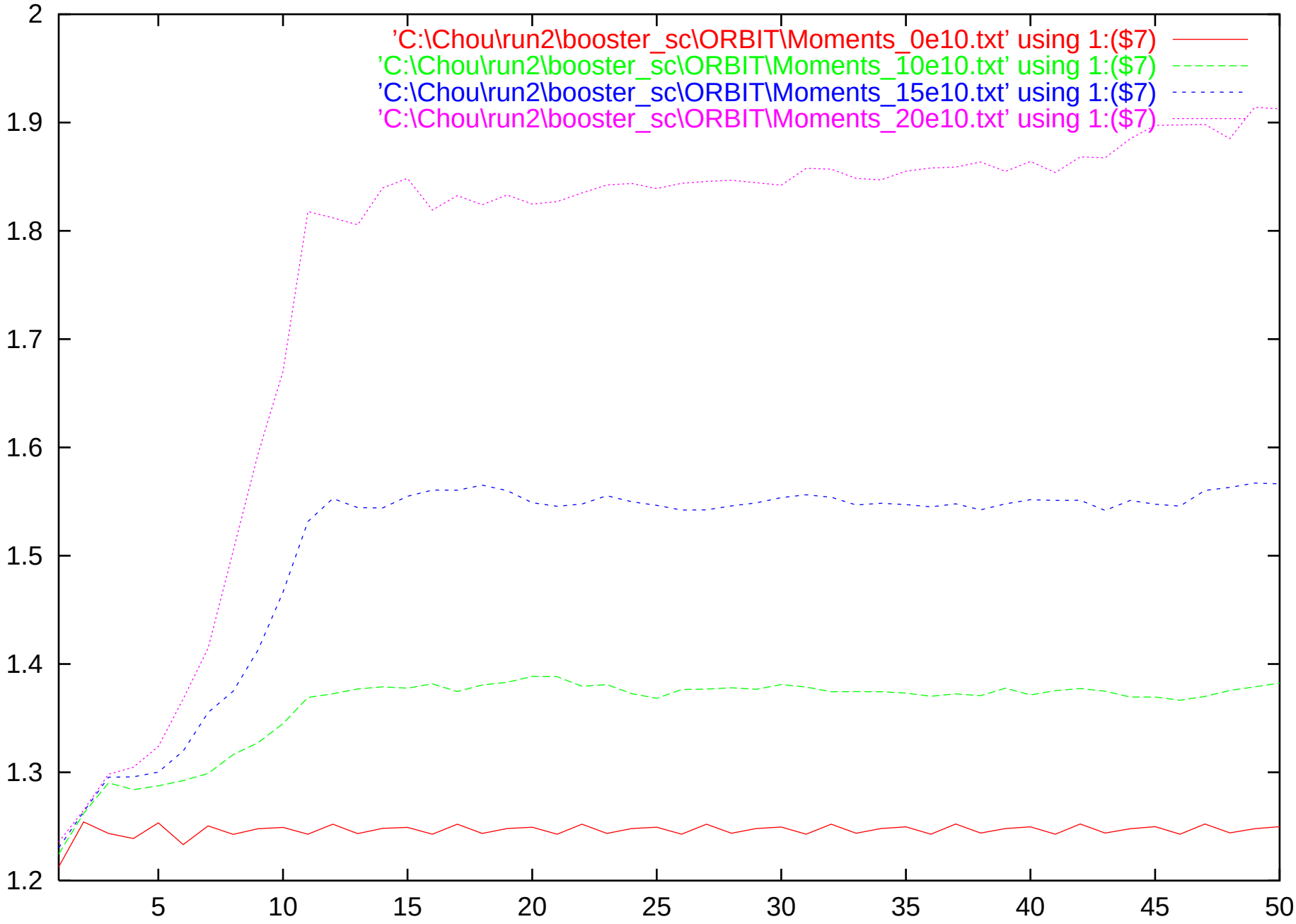
Output of ORBIT

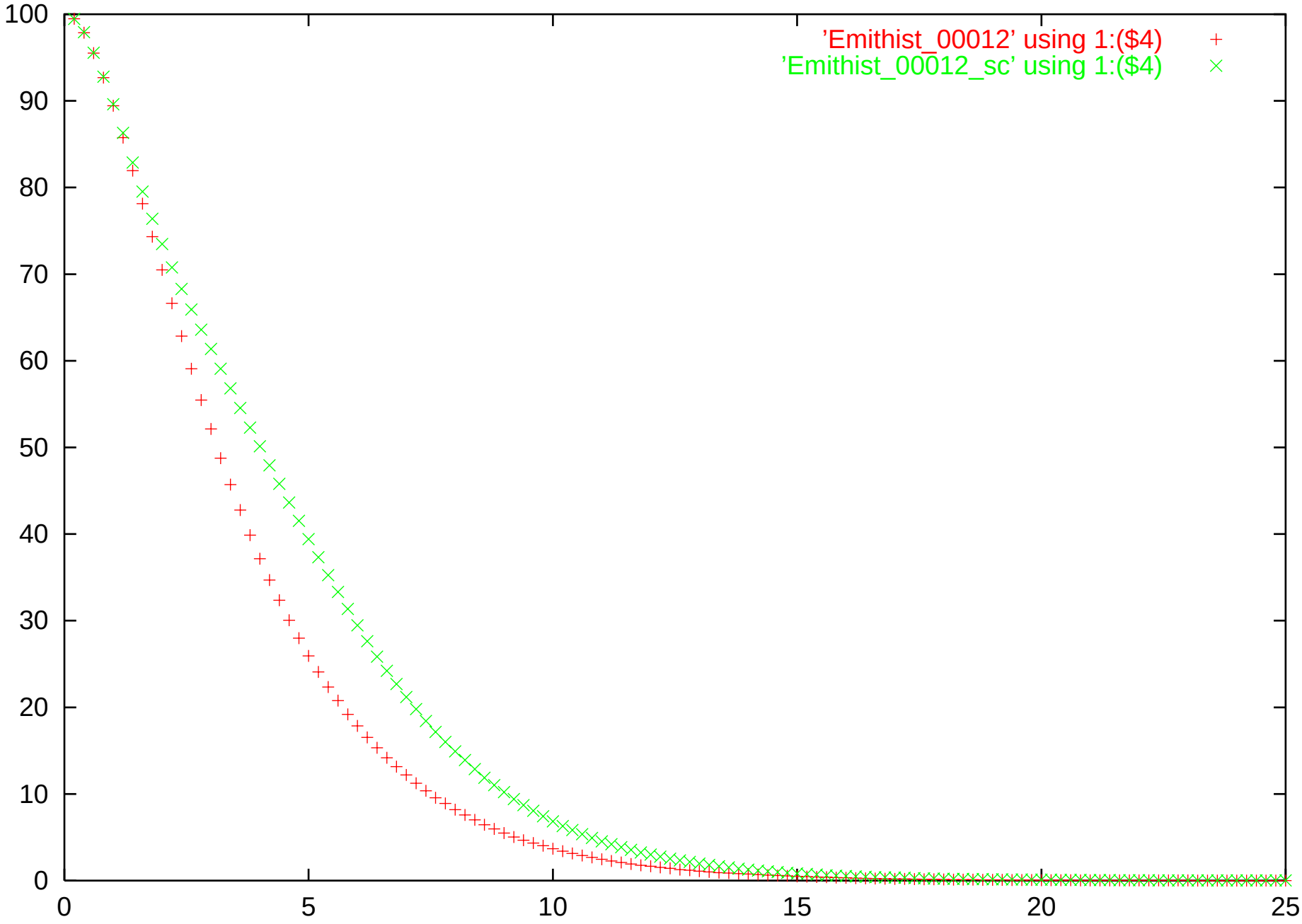
- Tune footprint
- Beam profile (*x-x', y-y', dE-dt*)
- Emittance histogram
- Turn-by-turn emittance blowup
- Turn-by-turn orbit jittering
- Turn-by-turn *x-y* coupling

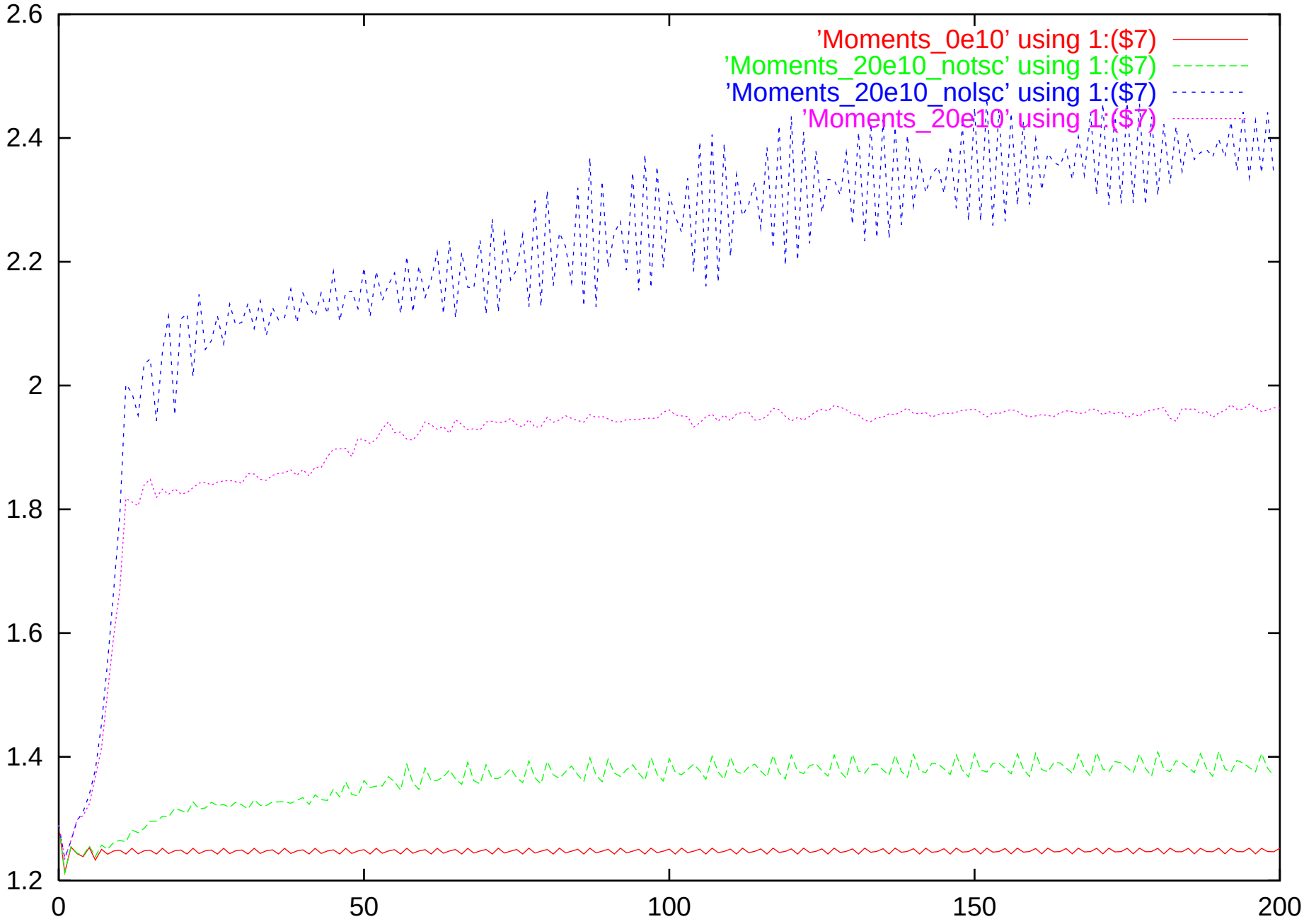

'c:\chou\run2\booster_sc\orbitbump\orbump.dat'
Orbit Bump Current (A)
Time (x 20 ns)
16000
14000
12000
10000
8000
6000
4000
2000
0
-2000
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000

Author: Ray Tomlin
Date: October 14, 2002
Title: Booster beam width prior to the transition. IPM data. (The first turn injection is on the bottom of the horizontal data curve. There are 10 turns of injection.)




'C:\Chou\run2\booster_sc\ORBIT\Moments_0e10.txt' using 1:($7)
'C:\Chou\run2\booster_sc\ORBIT\Moments_10e10.txt' using 1:($7)
'C:\Chou\run2\booster_sc\ORBIT\Moments_15e10.txt' using 1:($7)
'C:\Chou\run2\booster_sc\ORBIT\Moments_20e10.txt' using 1:($7)
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
5
10
15
20
25
30
35
40
45
50


'Emithist_00012' using 1:($4)
'Emithist_00012_sc' using 1:($4)
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25


'Moments_0e10' using 1:($7)
'Moments_20e10_notsc' using 1:($7)
'Moments_20e10_nolsc' using 1:($7)
'Moments_20e10' using 1:($7)
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
0
50
100
150
200