

# Status of BB simulation

Yun Luo

1. New way to calculate the emittance
2. Computation facilities and Job management
3. Benchmarking the code without BBC

## 1. New ways to calculate the emittances

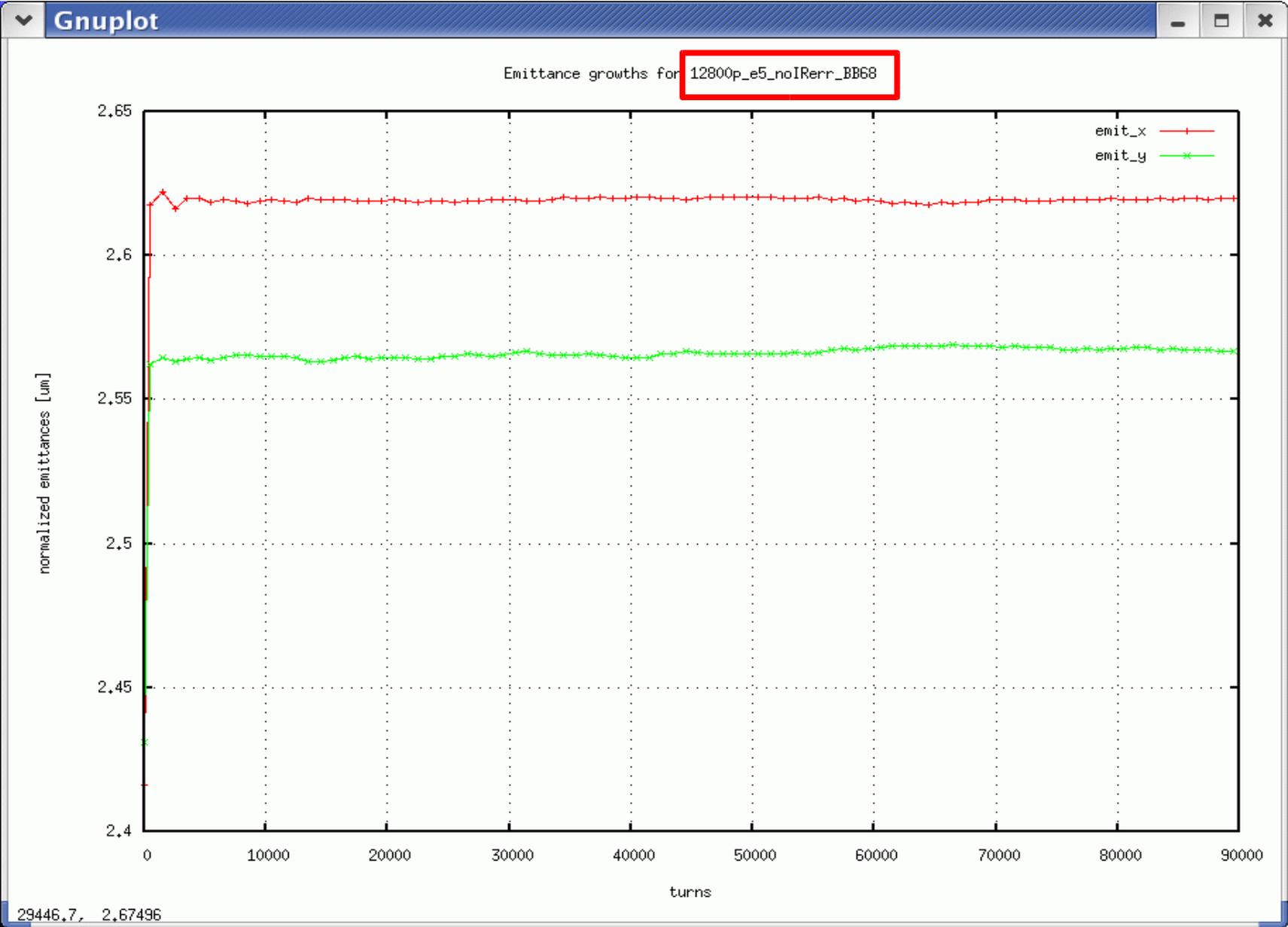
- Calculating emittances with the coordinates of 12800 particles in 100 turns.

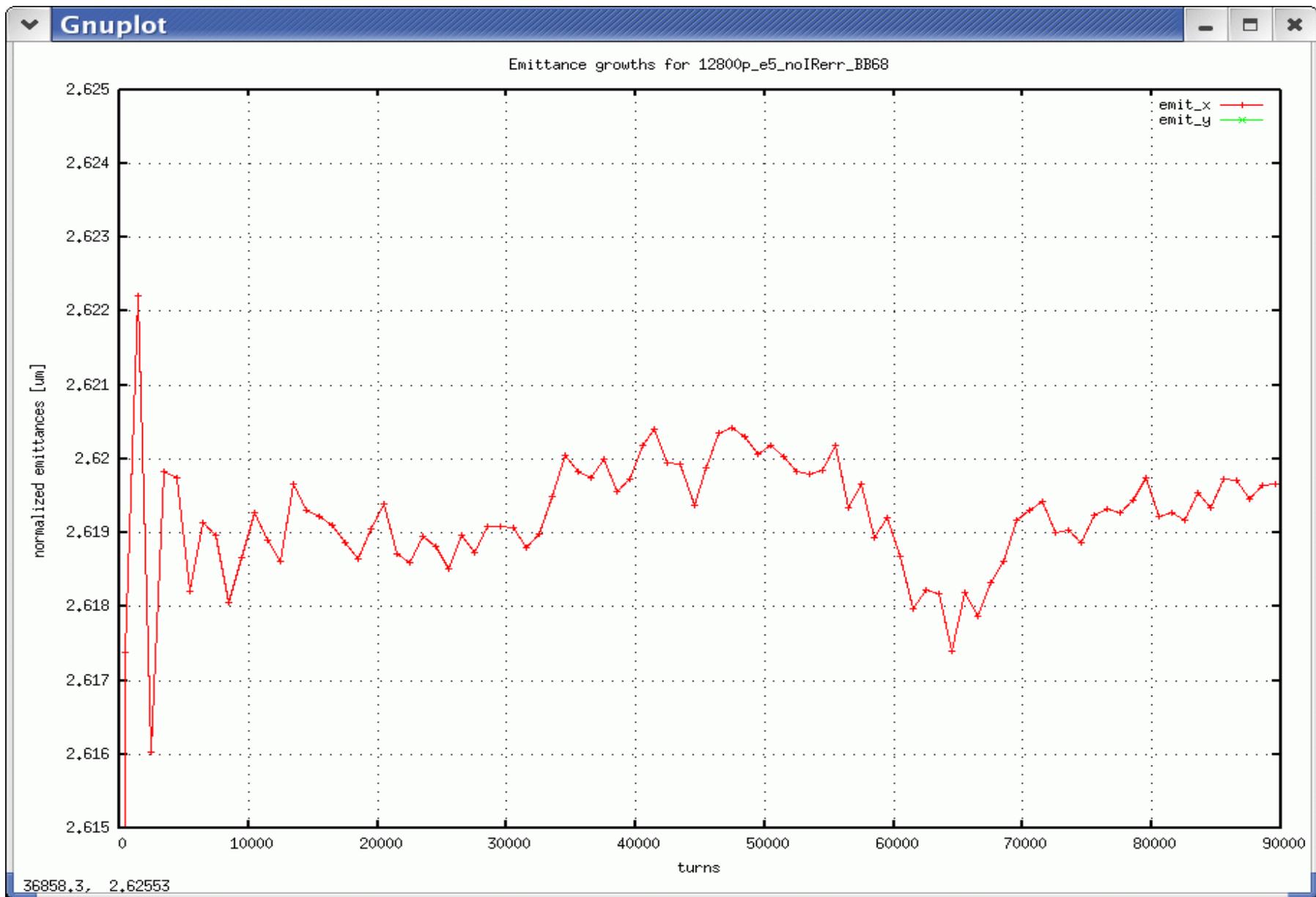
There are totally  $12800 \times 100$  sets of coordinates.

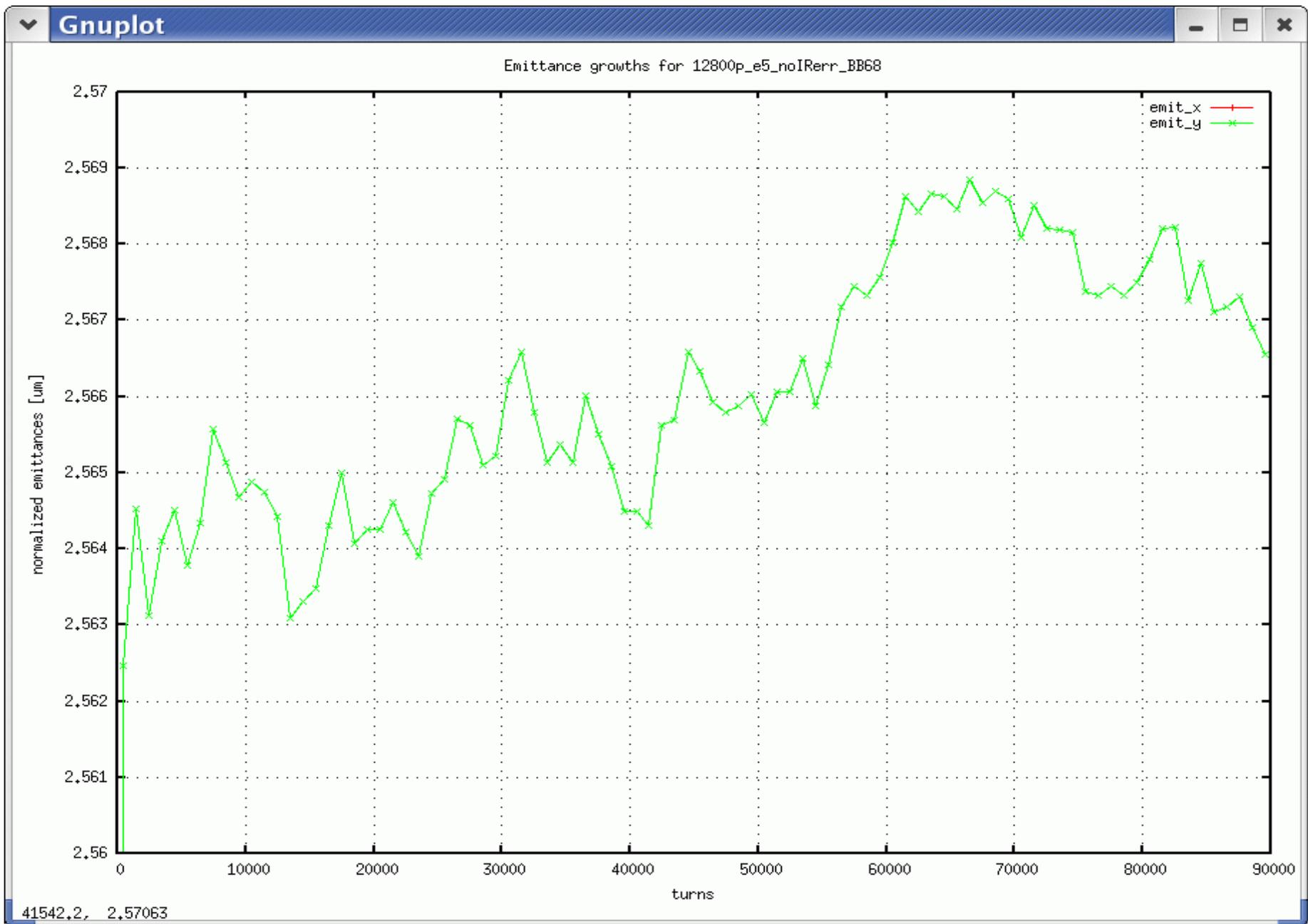
- Do  $10^5$  turn tracking, save every 10 turns.  
Do  $10^7$  turn tracking, save every  $10^3$  turns.
- Emittance calculating very time consuming.

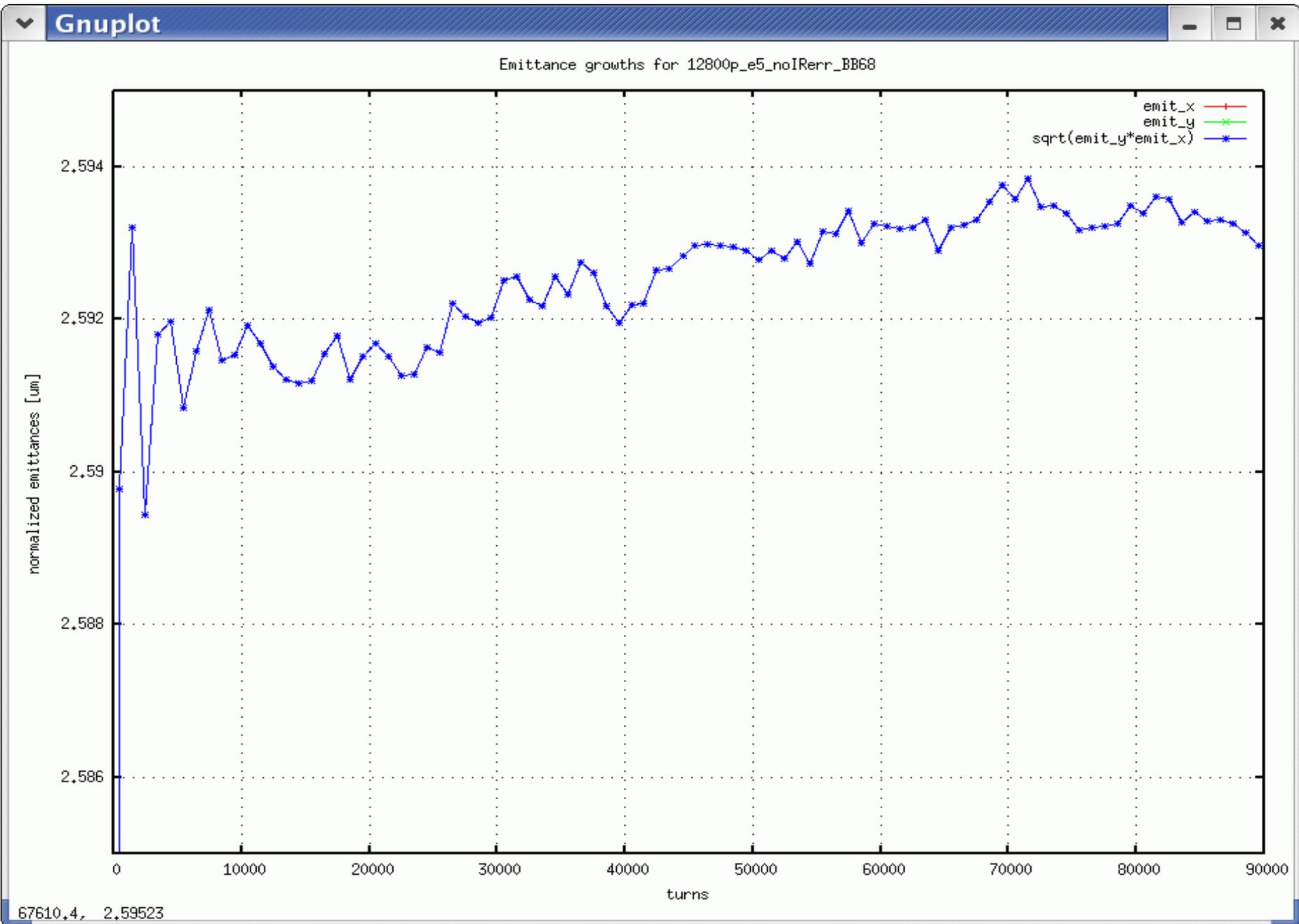
Following results may be wrong since I wrongly used cut  $\sigma_{\max} = 3.162$ . Particles with  $2J_{x,y} > 25$   $\mu\text{m}$  are excluded. ( should be  $62.5 = 25 \times 2.5$   $\mu\text{m}$  )

# Short-term calculation

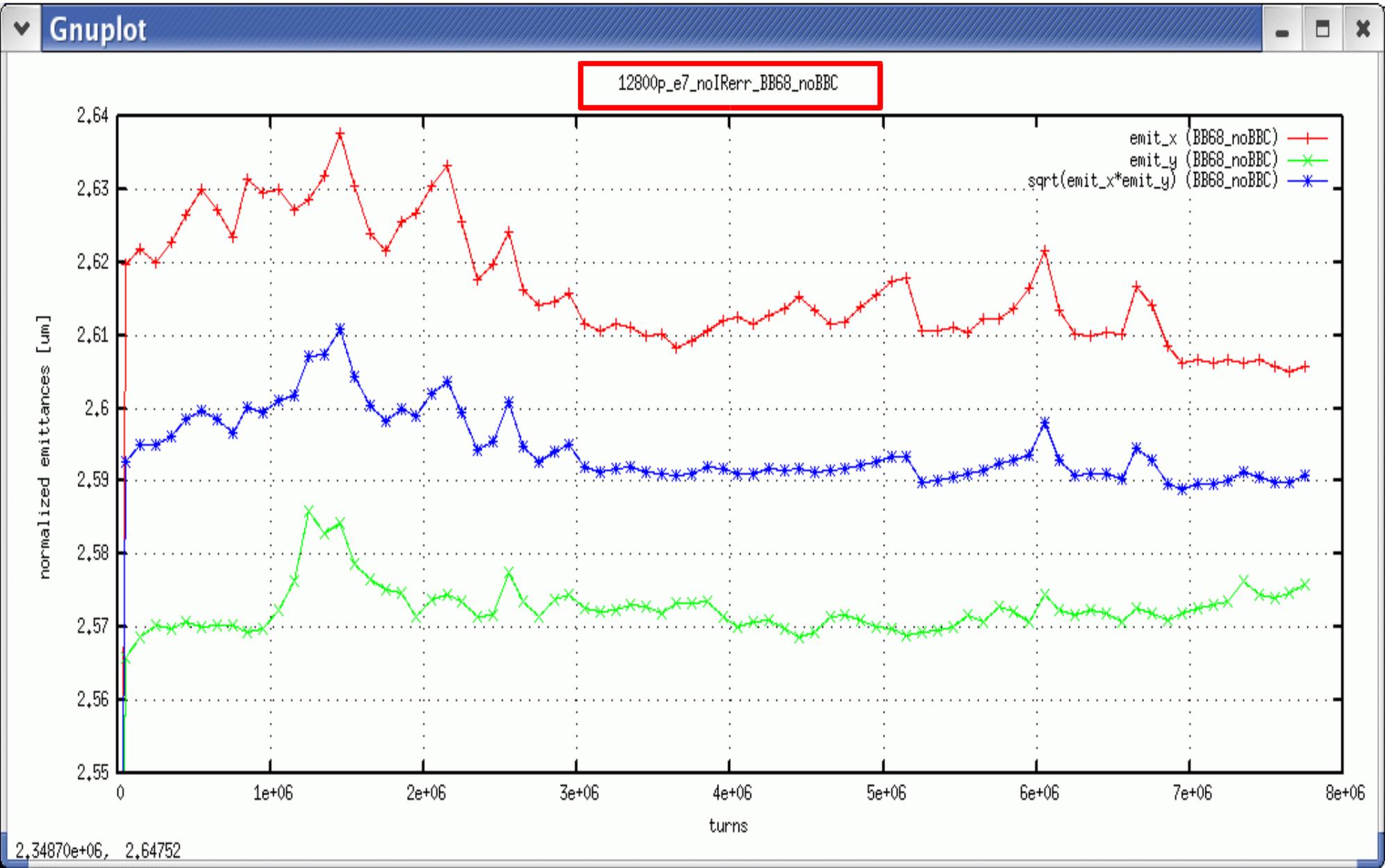


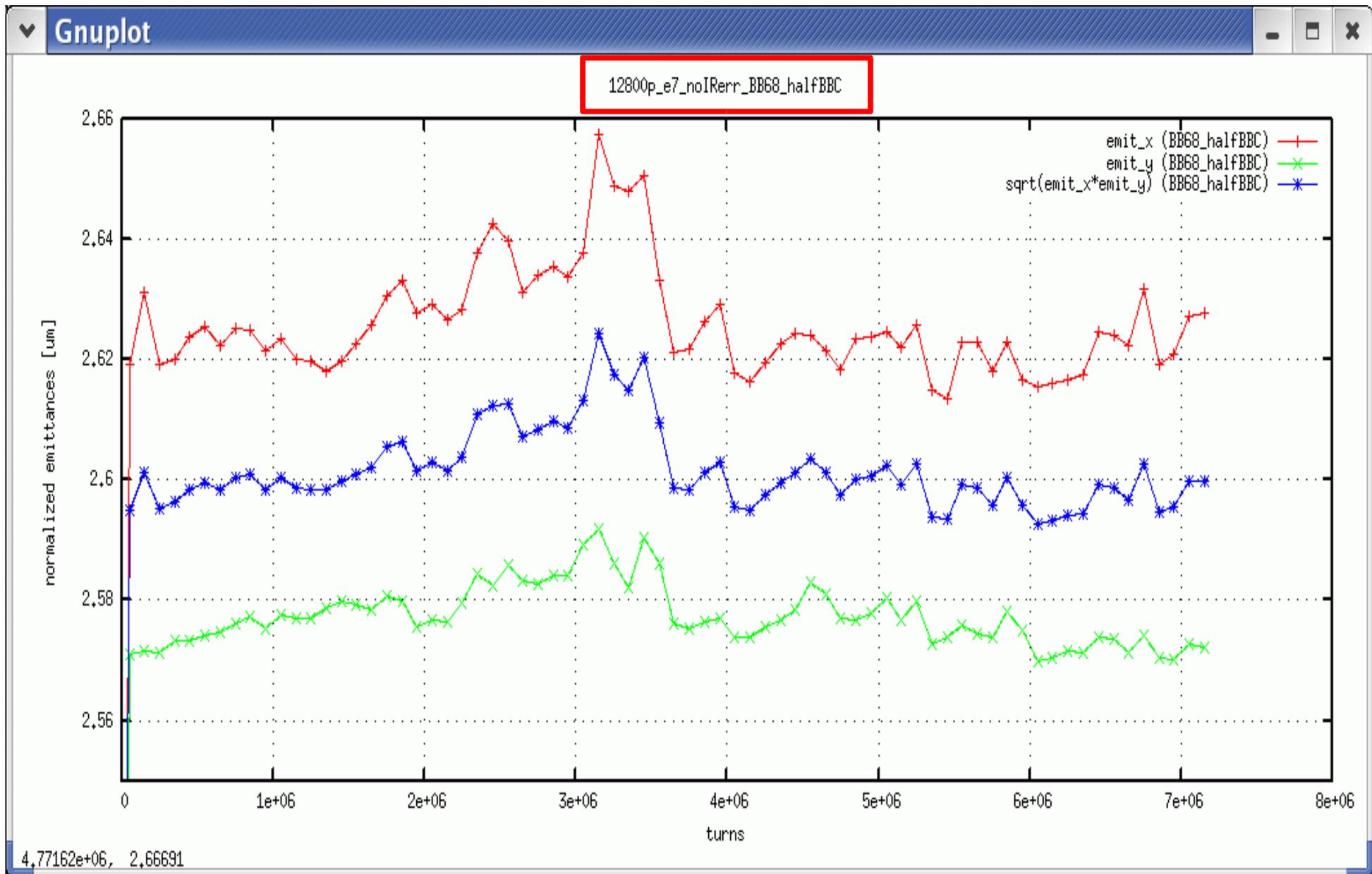


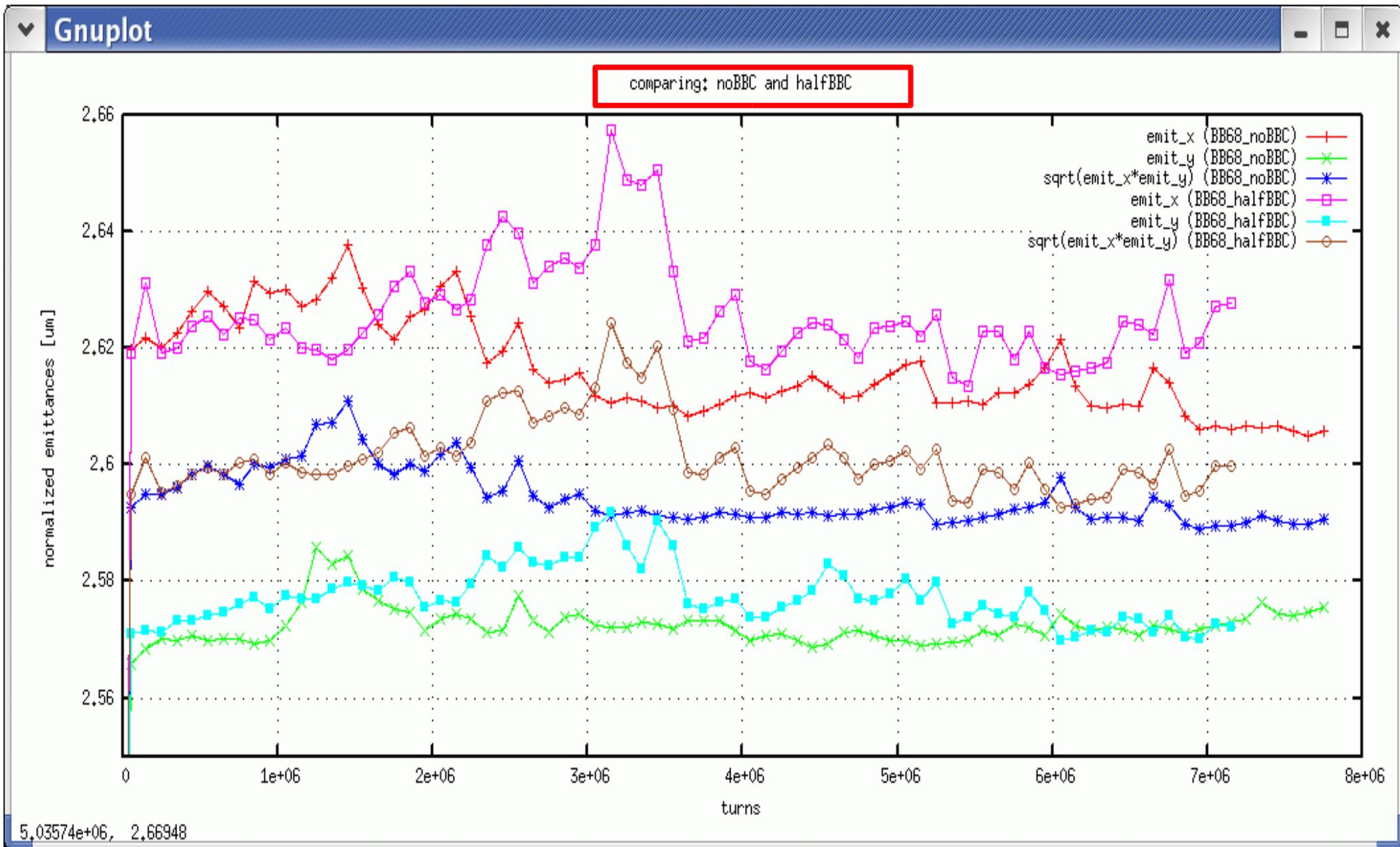




# Long-term calculation







Note: starting emittances for noBBC and halfBBC not same!

## 2. Computation facilities and Job management

☐ **Subject:** System usage : cluster.bnl.gov  
**From:** [John Reddy <jreddy@bnl.gov>](mailto:johnreddy@bnl.gov)  
**Date:** 10/16/2007 11:20 AM  
**To:** [Luo Yun <yluo@bnl.gov>](mailto:yluo@bnl.gov)

Yun Luo,

We have noticed a tremendous surge in the number and frequency of jobs you are submitting to cluster.bnl.gov. You currently have 215 jobs submitted requesting 80 hours of processing each. This is the equivalent of requesting 716 days worth of processing time. While we appreciate your need to do work, your usage constitutes a near abusive hoarding of processing time. Your usage is preventing other people from being able to engage in science.

There is a program being configured and tested which will automatically regulate individual usage of cluster.bnl.gov. However, this program is not yet available. As such, it is necessary for users to police their own utilization.

We will let your jobs continue to run for now as we monitor the situation. Please reduce the number or parallel jobs you submit in the future. If the excessive usage continues, we will be forced to terminate jobs in order to free resources. If you have any questions or concerns, please contact me.

-John Reddy

Now I limit myself to run at most 20 jobs at same time, agreed by John.

# CERN Computation resources ?

☐ **Subject:** [Fwd: Re: Computing on screen saver time]  
**From:** [Wolfram Fischer <Wolfram.Fischer@bnl.gov>](mailto:Wolfram.Fischer@bnl.gov)  
**Date:** 09:04 AM  
**To:** [Yun Luo <yluo@bnl.gov>](mailto:yluo@bnl.gov)

Here are the technical details:

- The overall idea is to deal with a large amount of sequential jobs (so NOT parallel computing and without crosstalk between the jobs)
- Very little data have to be transported at beginning and the end of running the job.
- A server handles in- and out-going jobs in the order of 100'000 jobs at a time.
- Typically the jobs are run several times to avoid incorrect results.
- One task was to overcome the famous tails, i.e. the first 90% of the results come in pretty quickly while the residual runs take more time by far. This can be overcome by simply relaunching unfinished jobs with automated scripts.
- We have an CERN internal system CPSS and a world wide operating one with is BOINC, details can be found on the LHC@HOME web page.
- People may sign up and they do so enthusiastically to help to design the LHC! As a reward it seems they obtain some kind of "points" according to their contributions.
- We have prepared the highly optimized SixTrack code for this screen saver task.
- The essential modifications to the code were:
  - a) There is an elaborate script environment that allows to generate automatically large amounts of jobs to cover all relevant track parameters like seeds, amplitudes, phasespace angles and tunes scans.
  - b) Since the SixTrack job has to stop immediately on user intervention

### 3. Benchmarking the code without BBC

- ♦ The simulation code for BBC also can be used to RHIC BB simulation. It was suggested by Vladimir Shiltsev (fnal) to benchmark it with RHIC BB simulation.
- ♦ Observables for comparison between Simulation and Measurement:
  - 1) emittance growth, beam sizes,
  - 2) beam lifetime,

DA, FMA, Diffusion and Layponov component are not measurable at RHIC at this moment.