

# 1. Tracking results with phase advances changes

adjusting the phase advances between IP8 and IP10 by adding artificial phase advances before and after IP10.

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1) with BB:
* NAME                S          BETX          AX          BETY          AY          MUX          MU
"CLOCK6"              0          0.5187613667  -0.03188310215  0.5196453489  -0.01173642922  0          0
"CLOCK8"              639.445028  0.5187613667  0.03188310215  0.5196453488  0.01173642924  5.304811589  4.294930232
"CLOCK10"             1277.948394  10.71138784   0.04687100377   9.785402809   0.01613284454   9.517622644  9.779139376

The phase advances before IP8 and IP10:
    horizontal: 4.212811055
    vertical   : 5.484209144

The matrix to be inserted:

before IP10:
horizontal dphi_x = 0.57437789 pi =103.3880202 degree
vertical   dphi_y = 0.031581712 pi = 5.68470816 degree

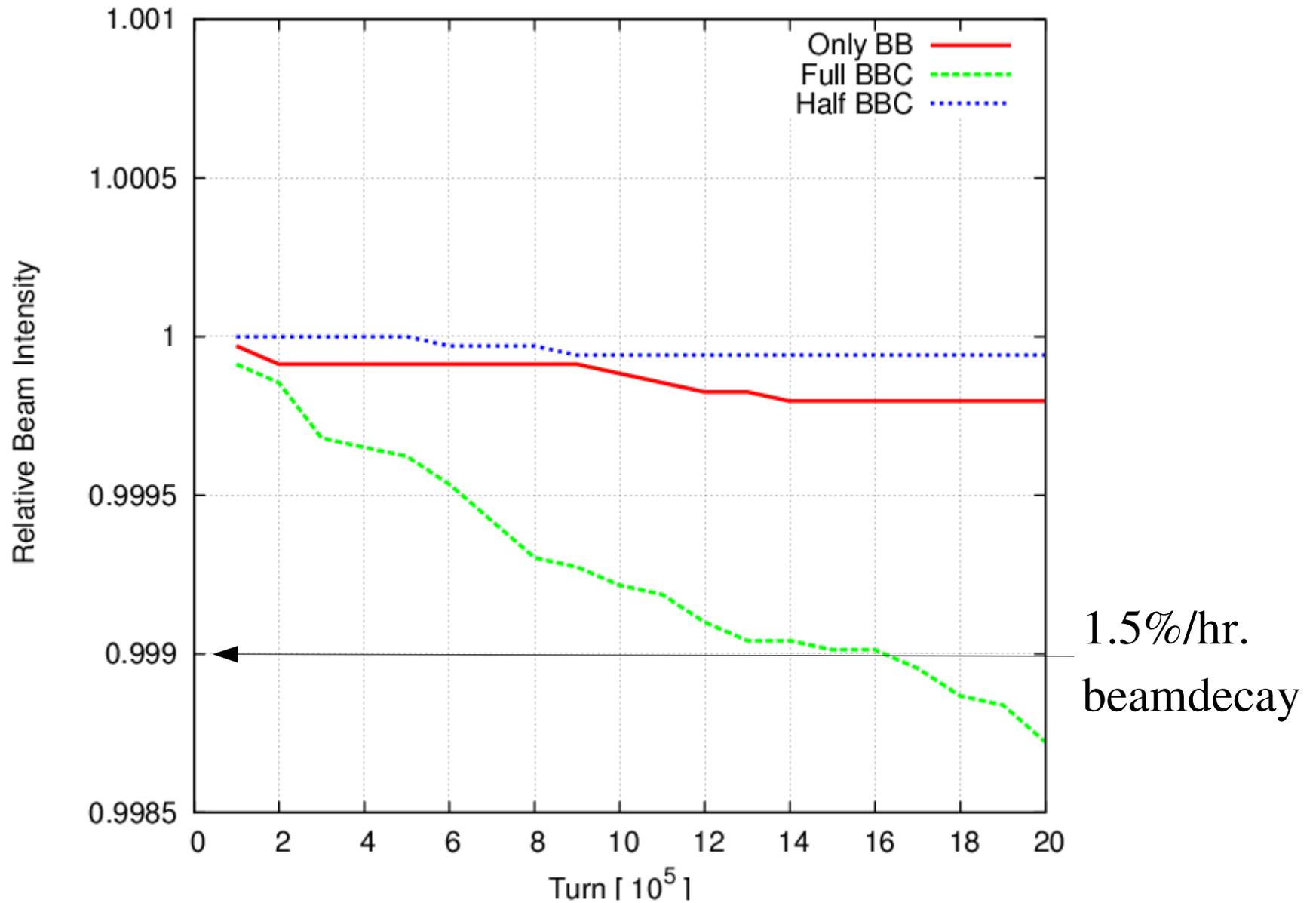
after IP10:
horizontal dphi_x = -0.57437789 pi = -103.3880302 degree
vertical   dphi_y = -0.031581712 pi = -5.68470816 degree

The matrix is:
-0.185947  10.4203
-0.091021  -0.277142
           0.99668  0.969285
           -0.0101253  0.993484

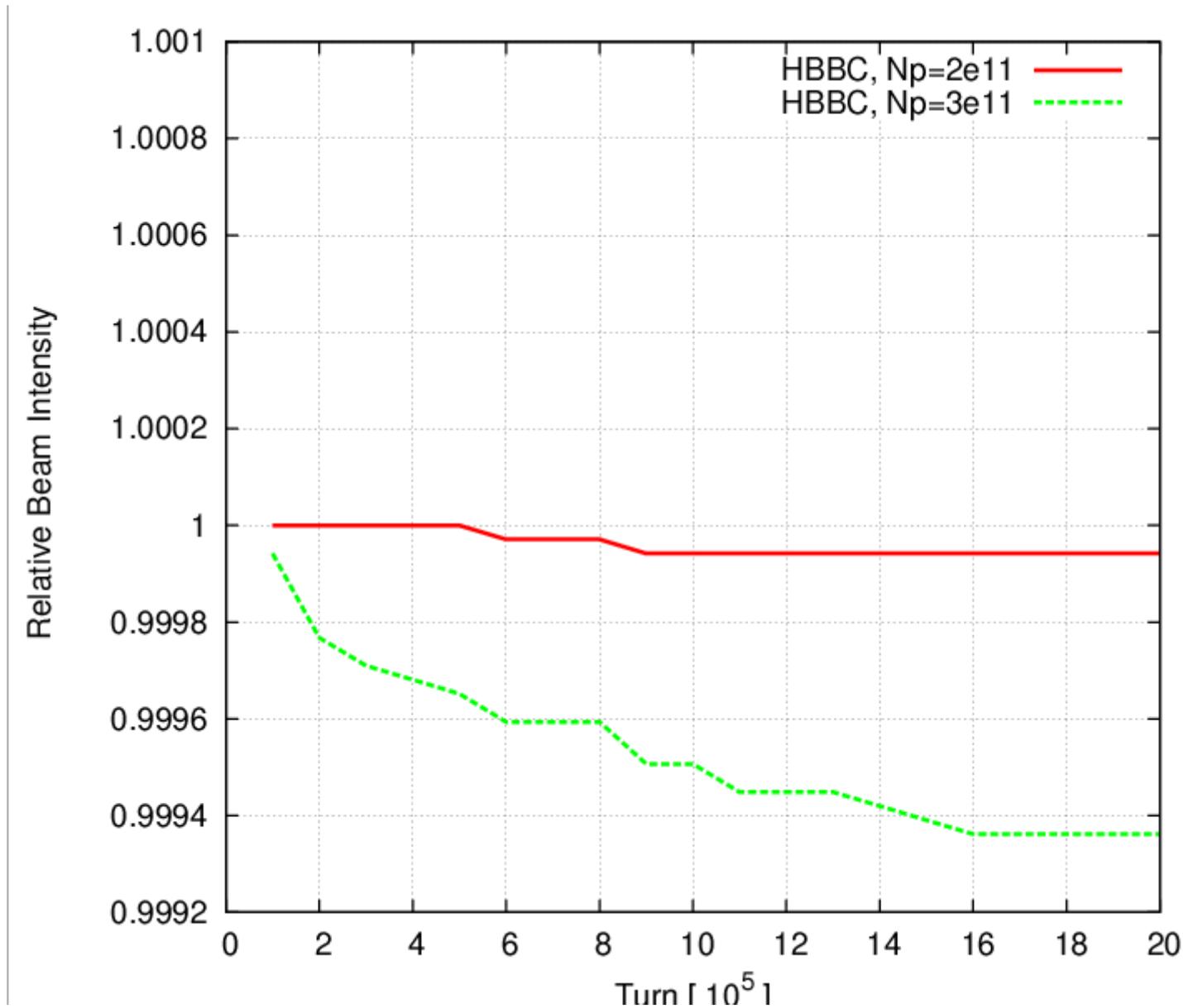
Another matrix is:8
-0.277142  -10.4203
 0.091021  -0.185947
           0.993484  -0.969285
           0.0101253  0.99668
```

For example, after adjusting, phase advances between IP8 and IP10 are (9pi, 11pi).

# 1) Phase advances between IP8-IP10: $9\pi/11\pi$ $N_p=2.0e11$

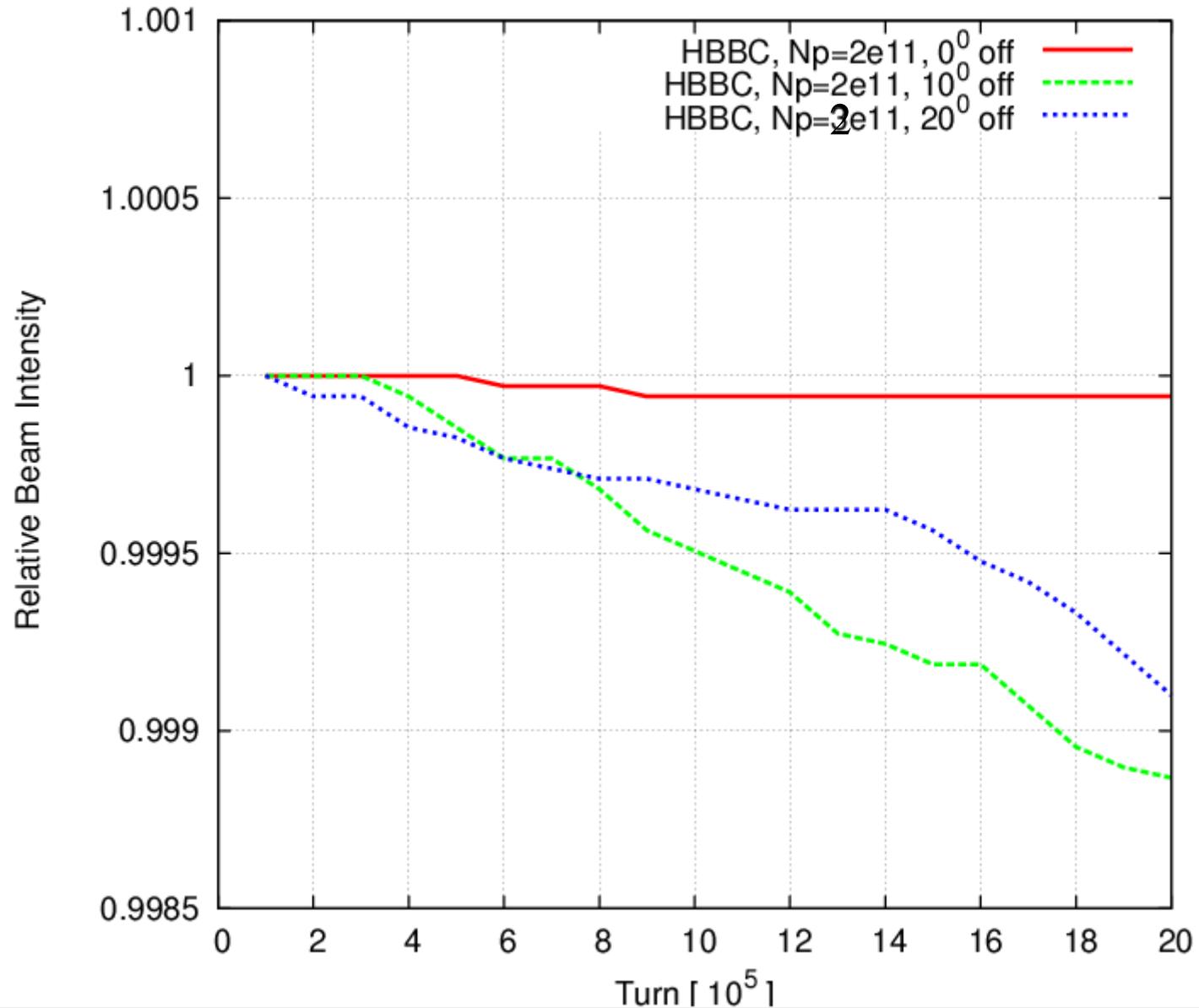


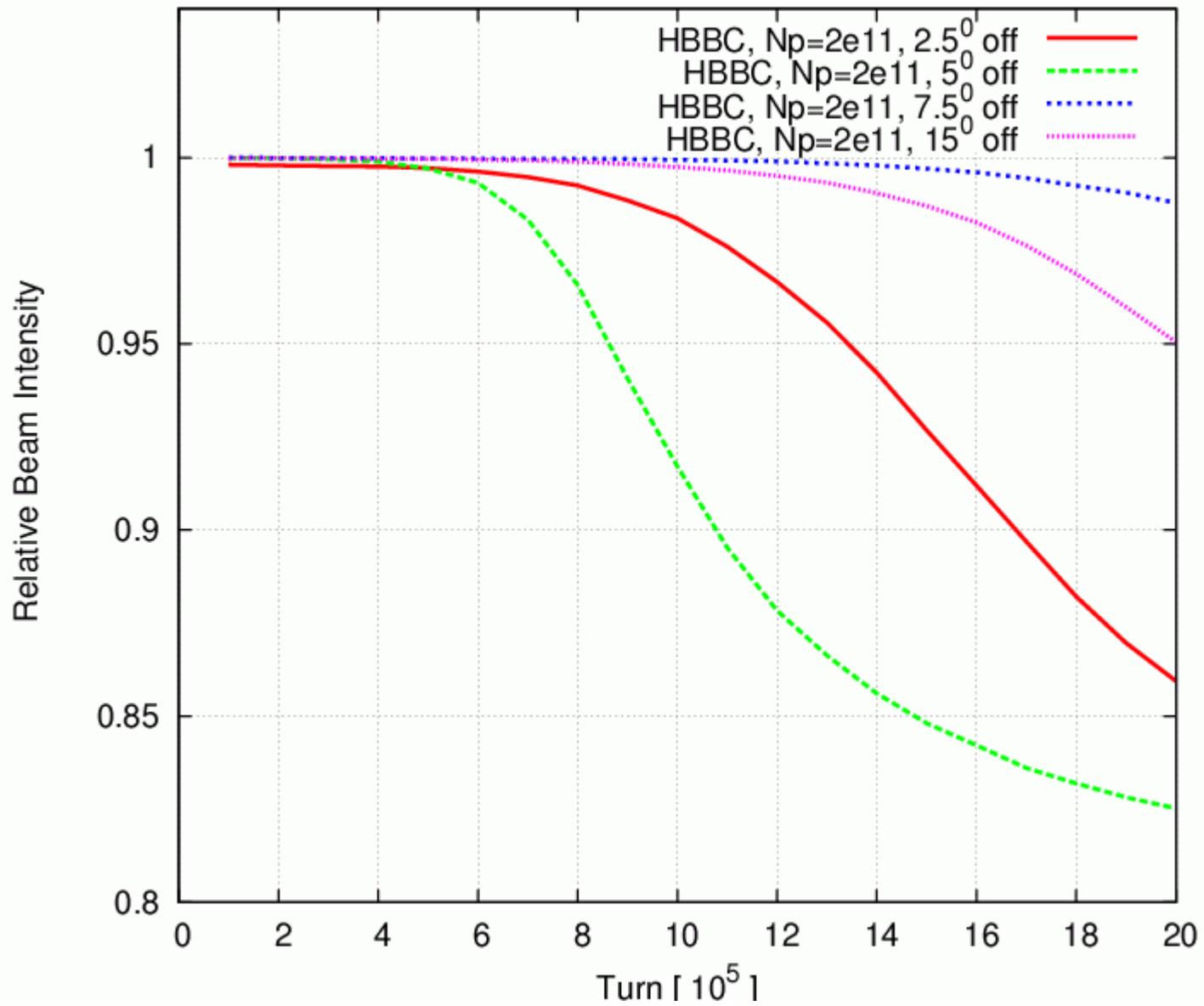
## 2) Phase advances between IP8-IP10: $9\pi/11\pi$ **HBBC 3.0e11**



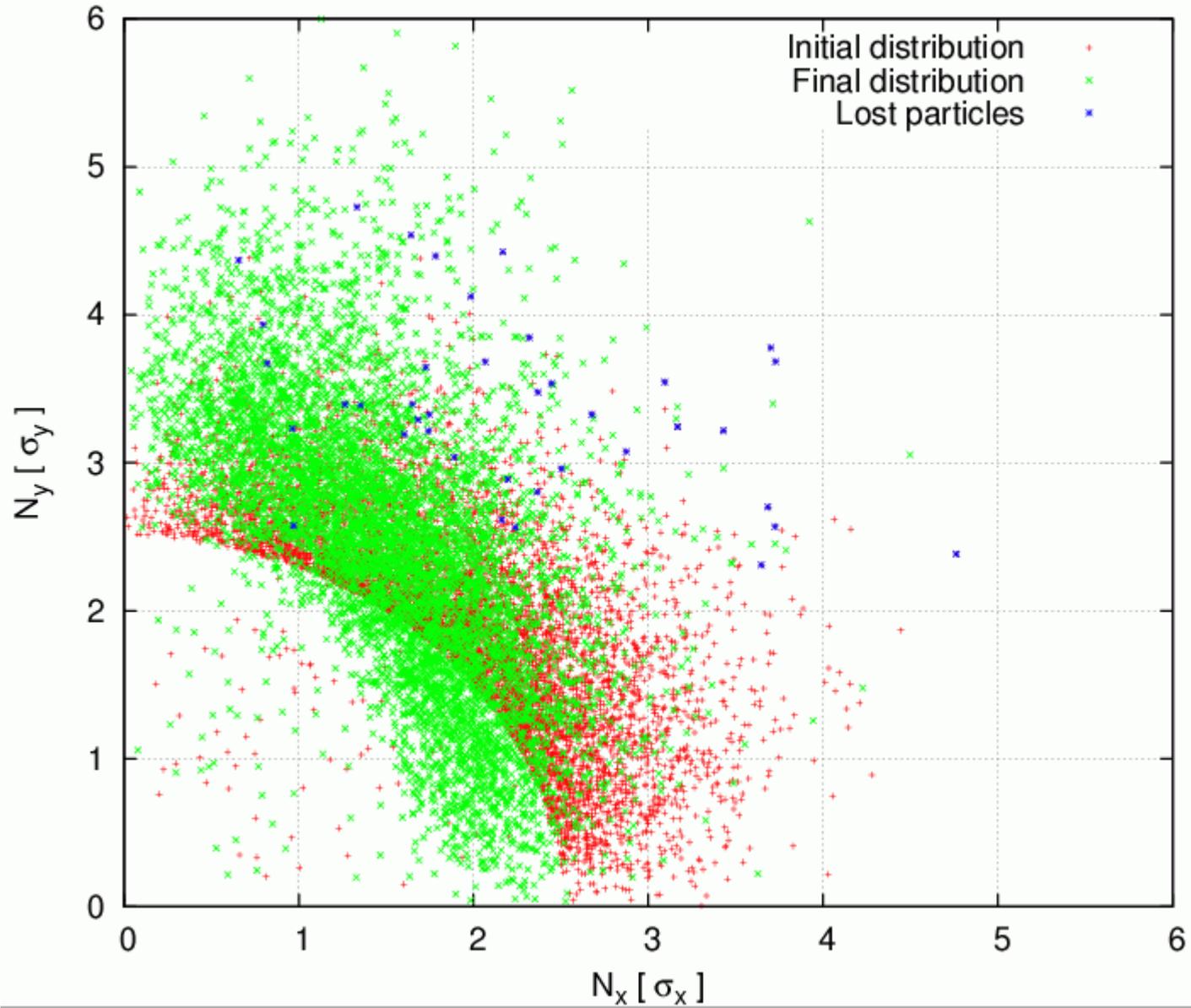
beam decays are above 1.5%/hr.

### 3) Scan of phase advances : $(9\pi/11\pi) \pm \Delta\phi$ $N_p=2.0e11$

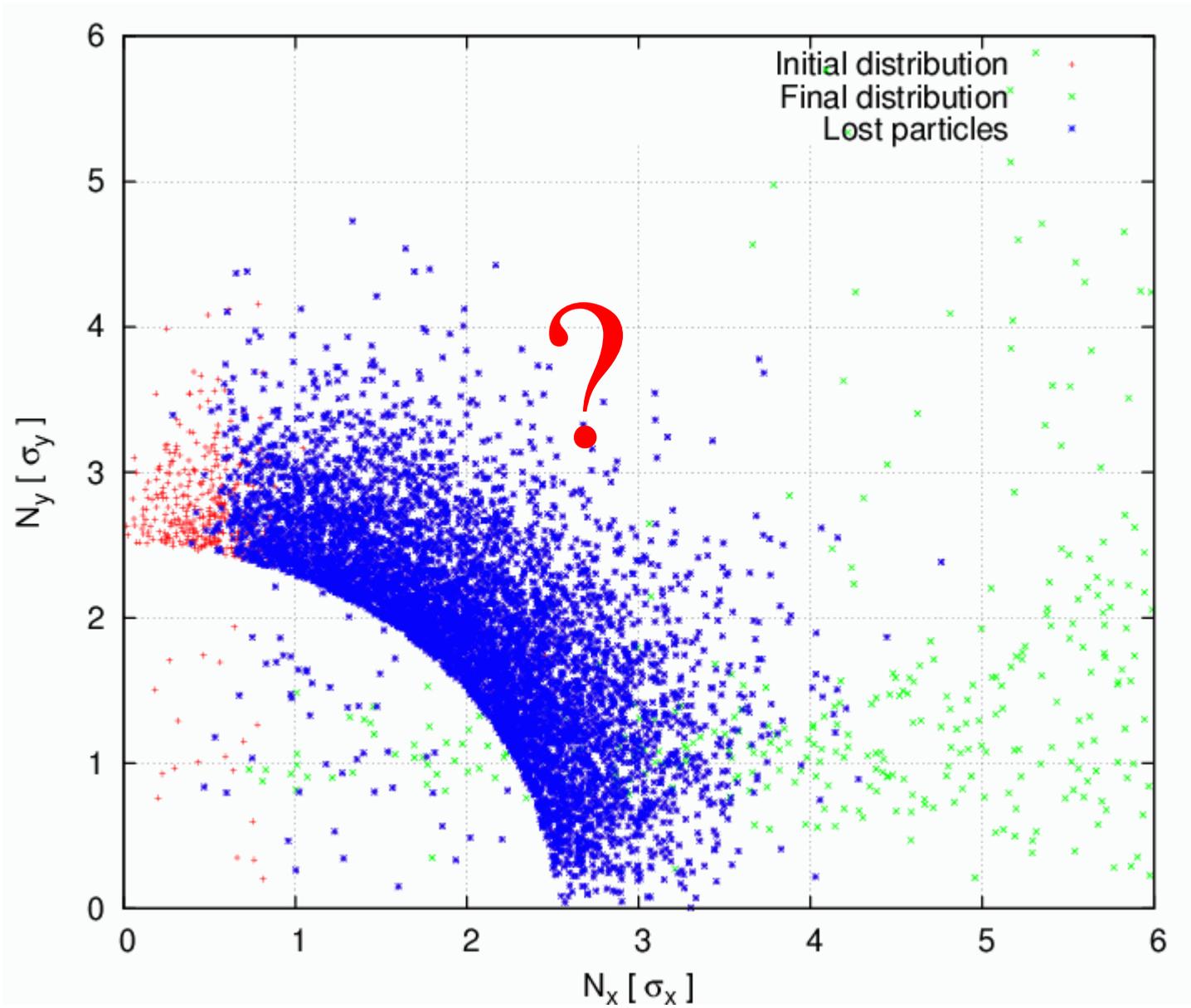




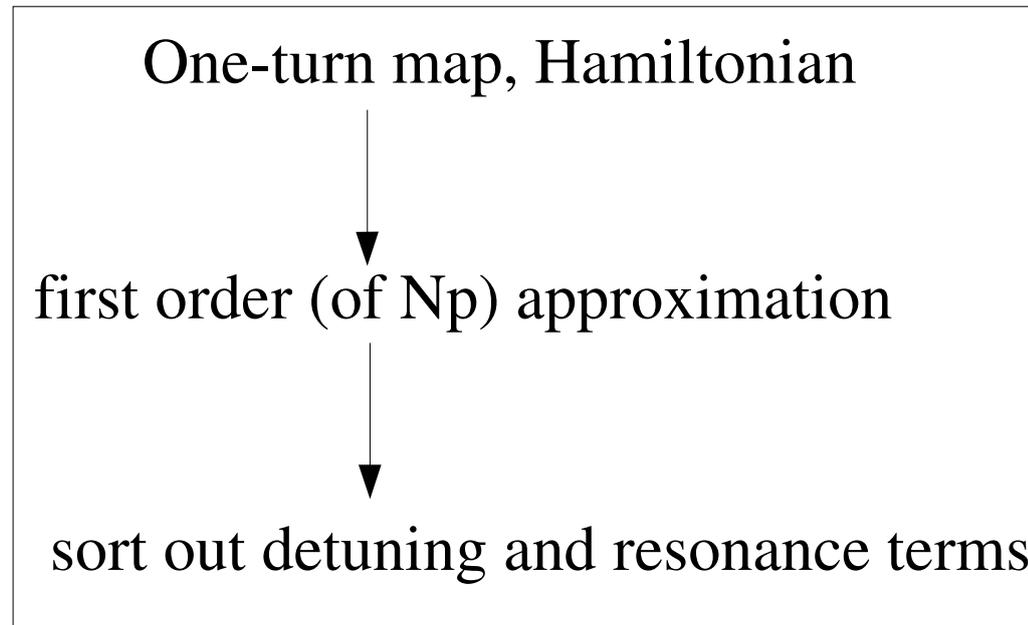
**$(9\pi/11\pi)\pm 10\text{degree}$**



$(9\pi/11\pi)\pm 5\text{degree}$



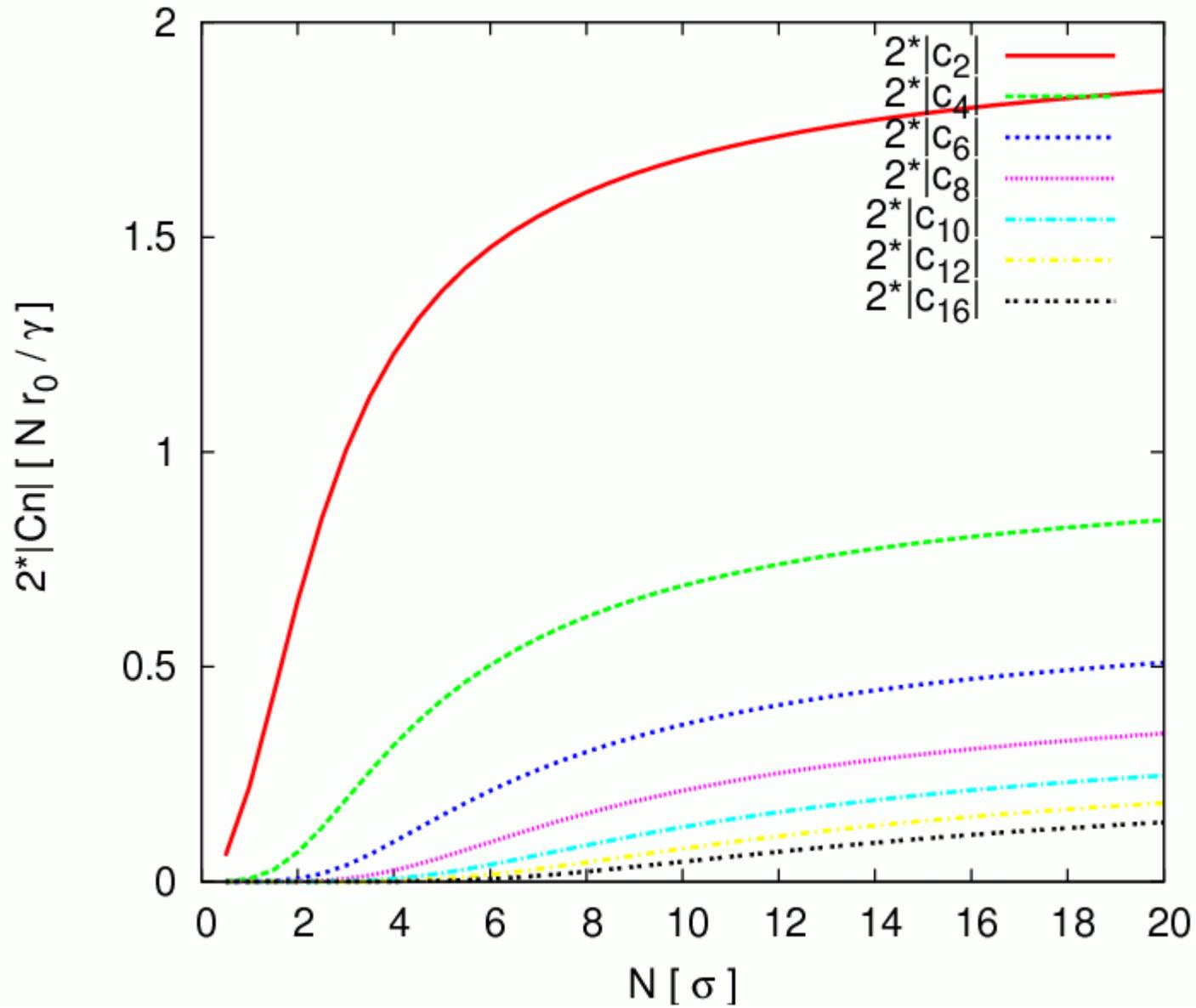
## 2. Beam-beam resonance driving term calculation



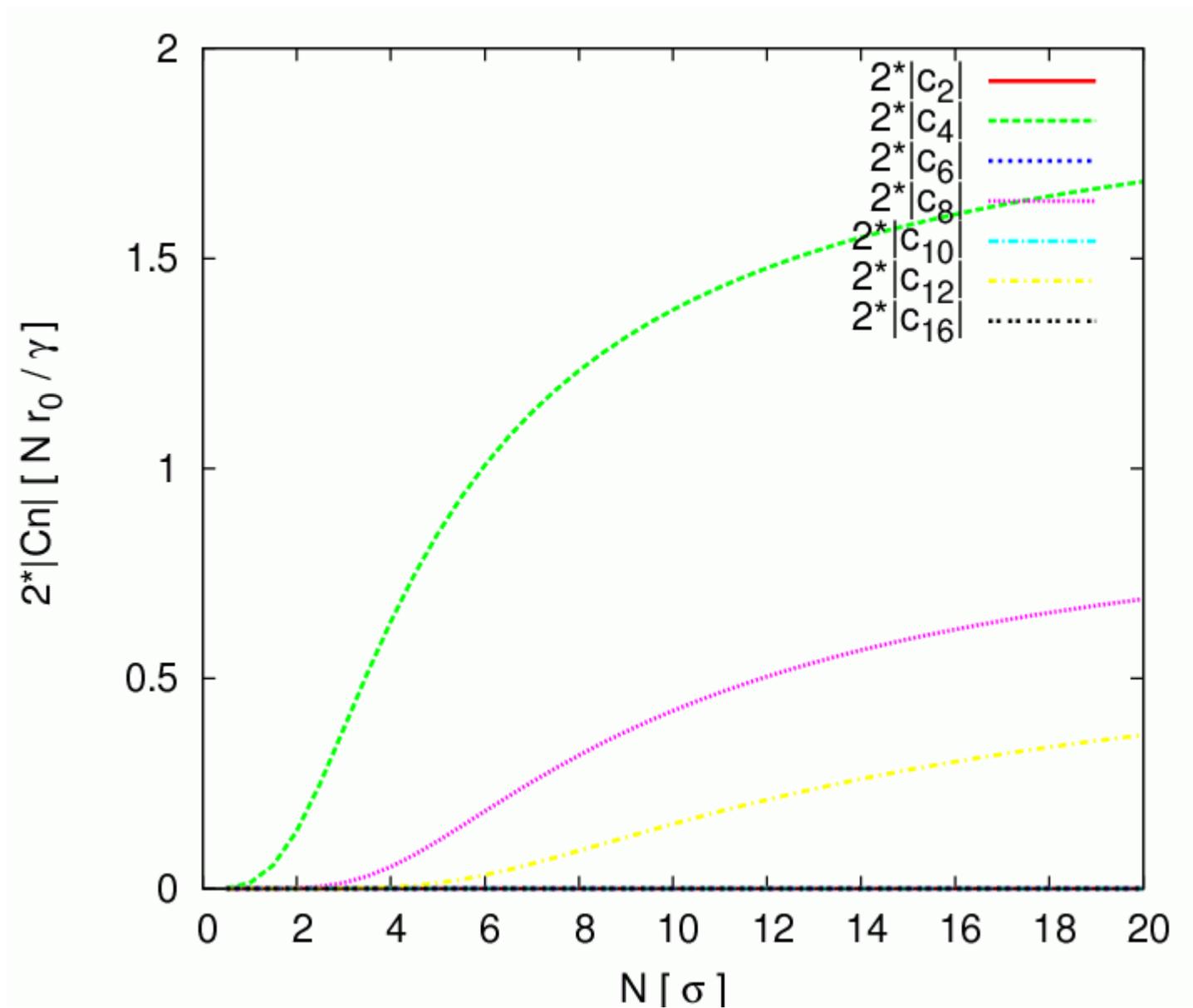
RDT actually are Fourier transform terms of beam-beam potential.

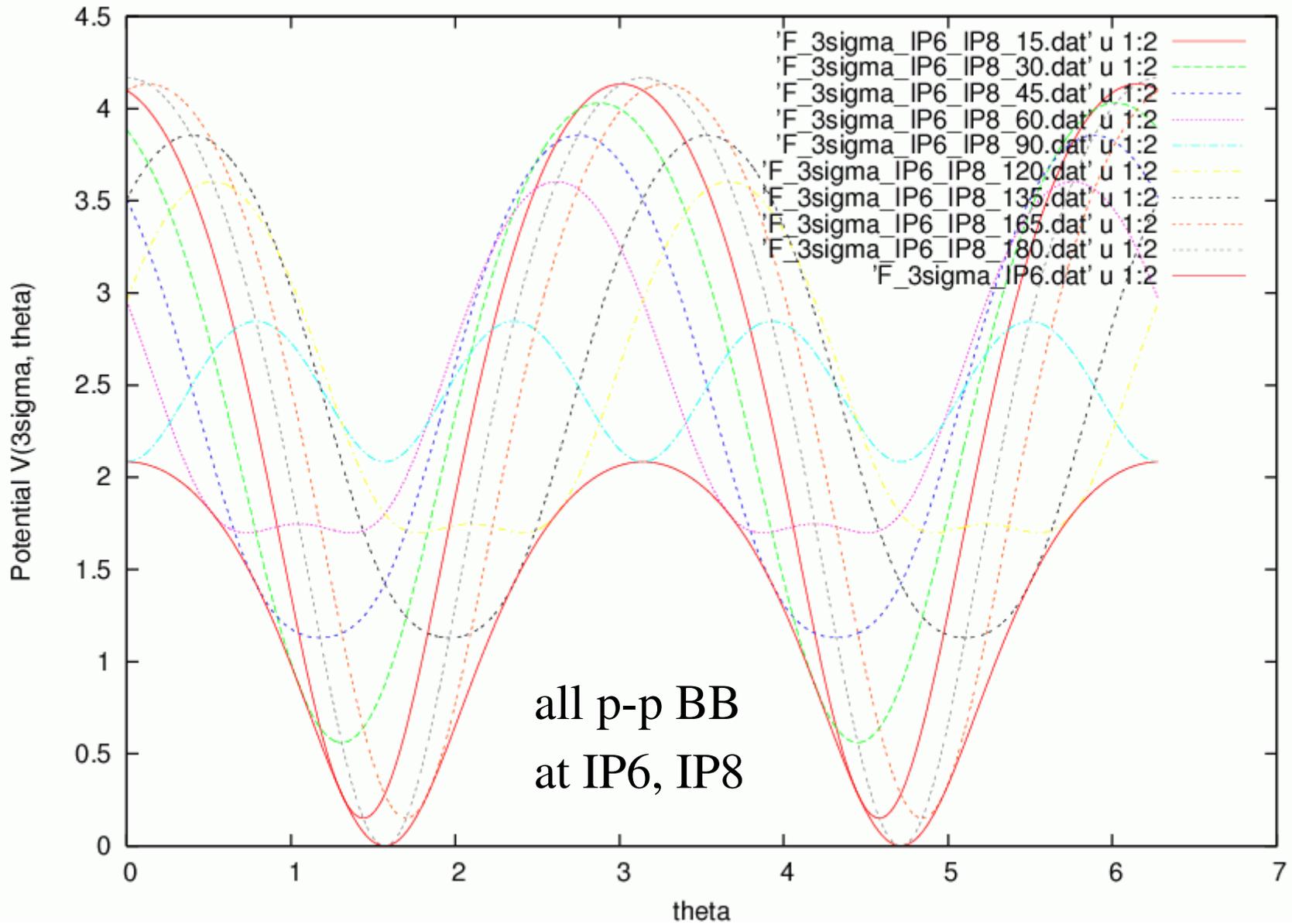
Different approach from AG Ruggiero, Keil, Zieman etc. They expand the BB force instead of BB potential.

1) only IP6



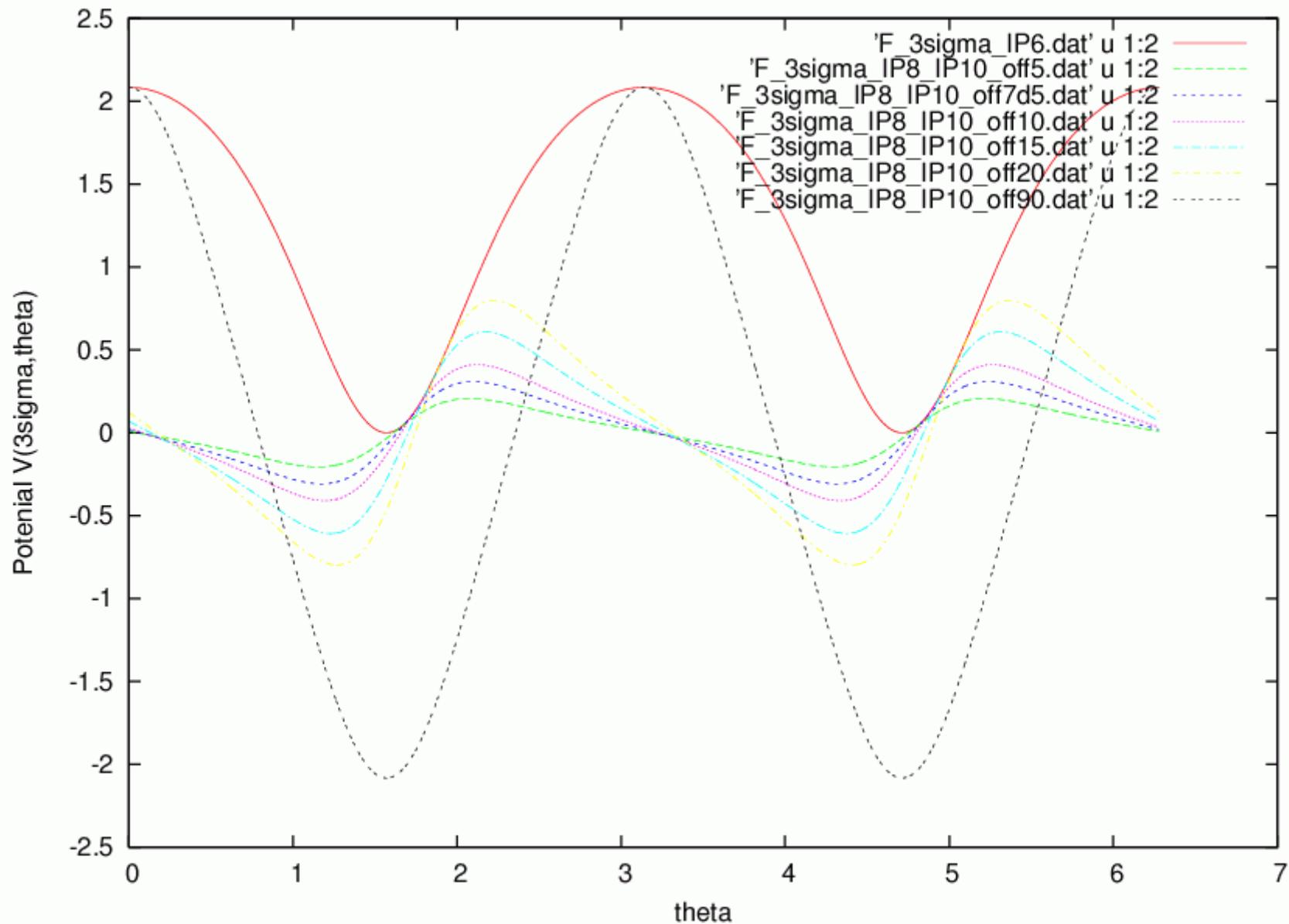
2) Two IPs, IP6 and IP8 separated by 90 degree



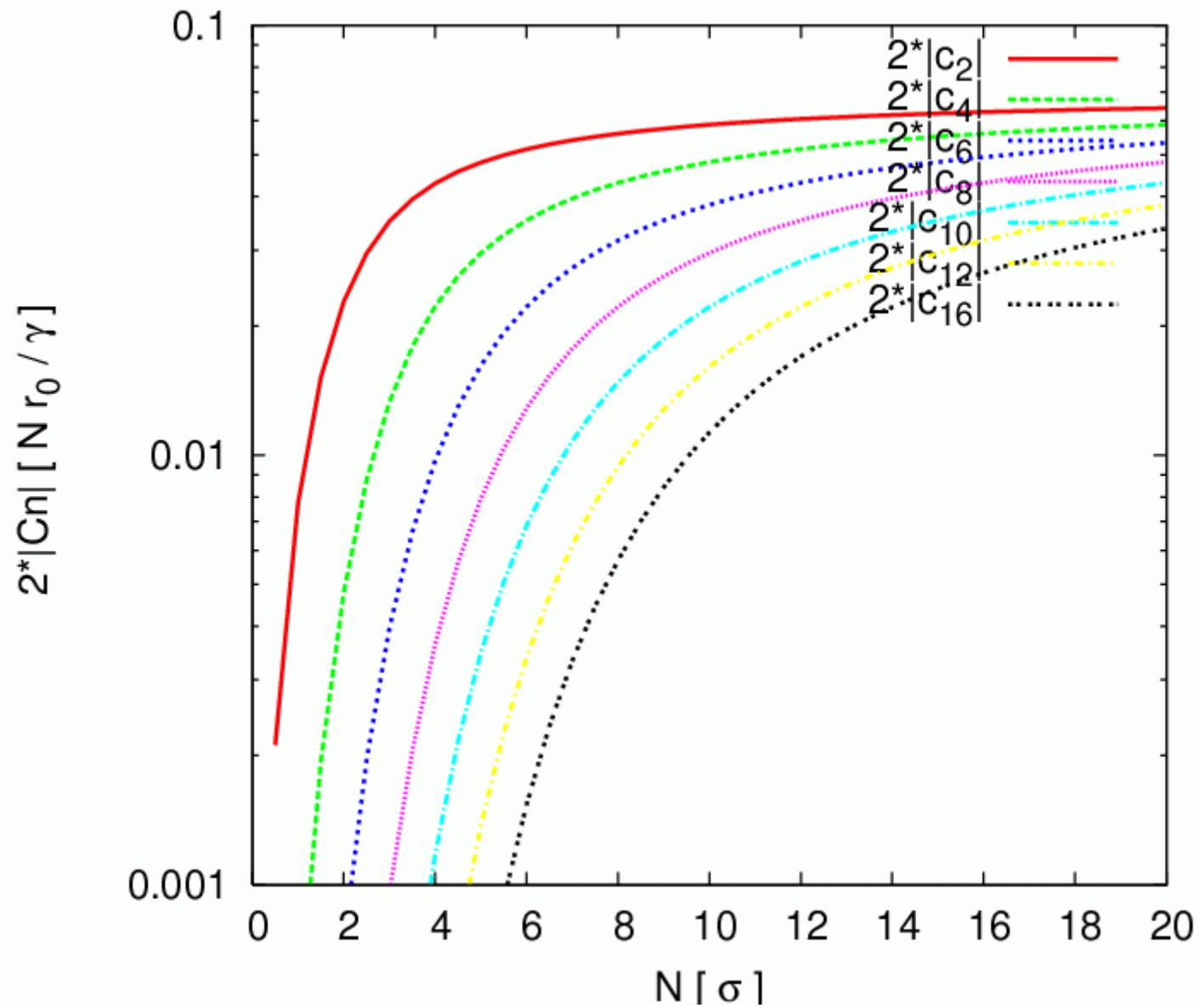


Fourier transform of  $V$  gives the RDTs.

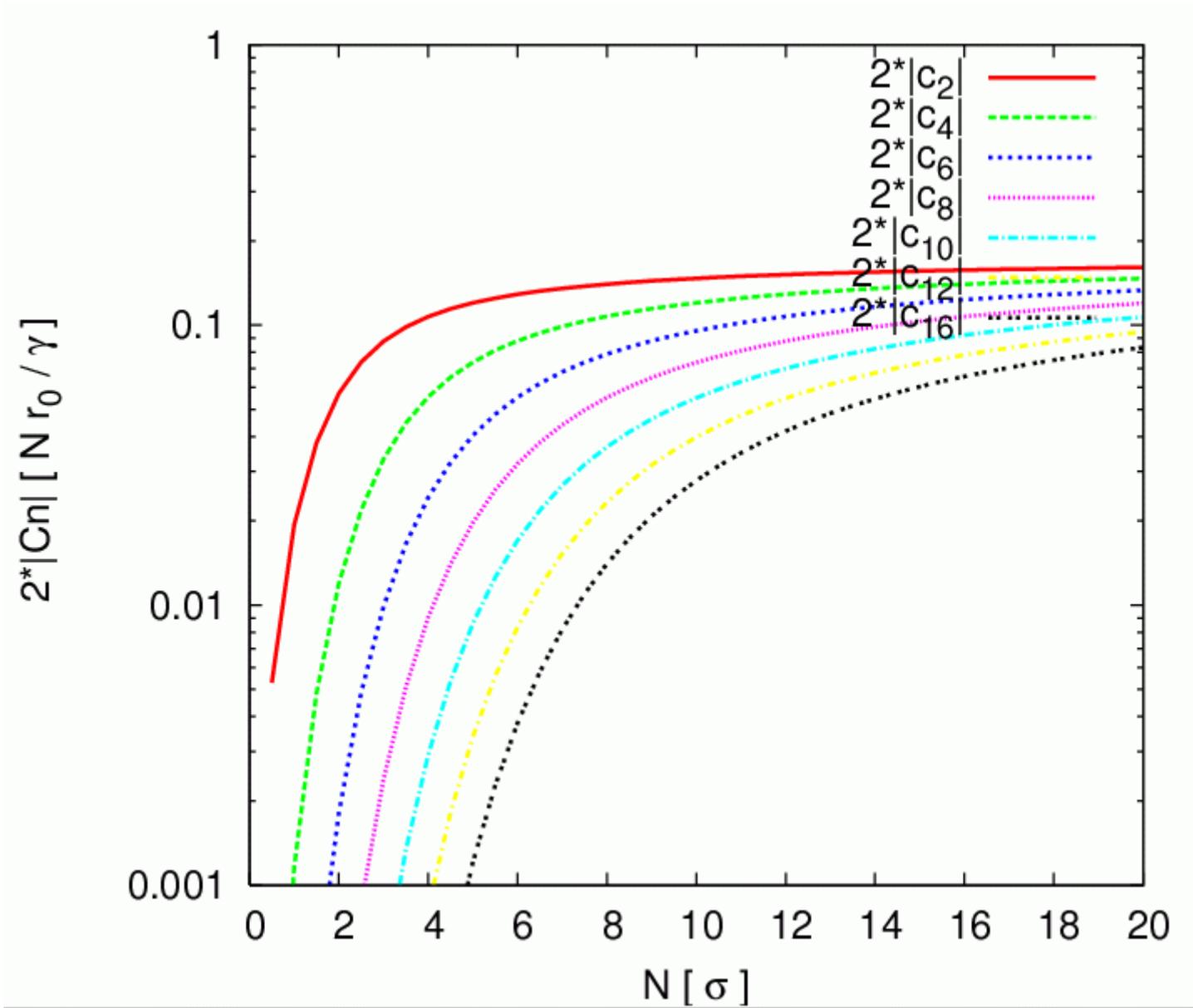
### 3) Two IPs, IP8: p-p, IP10:p-e



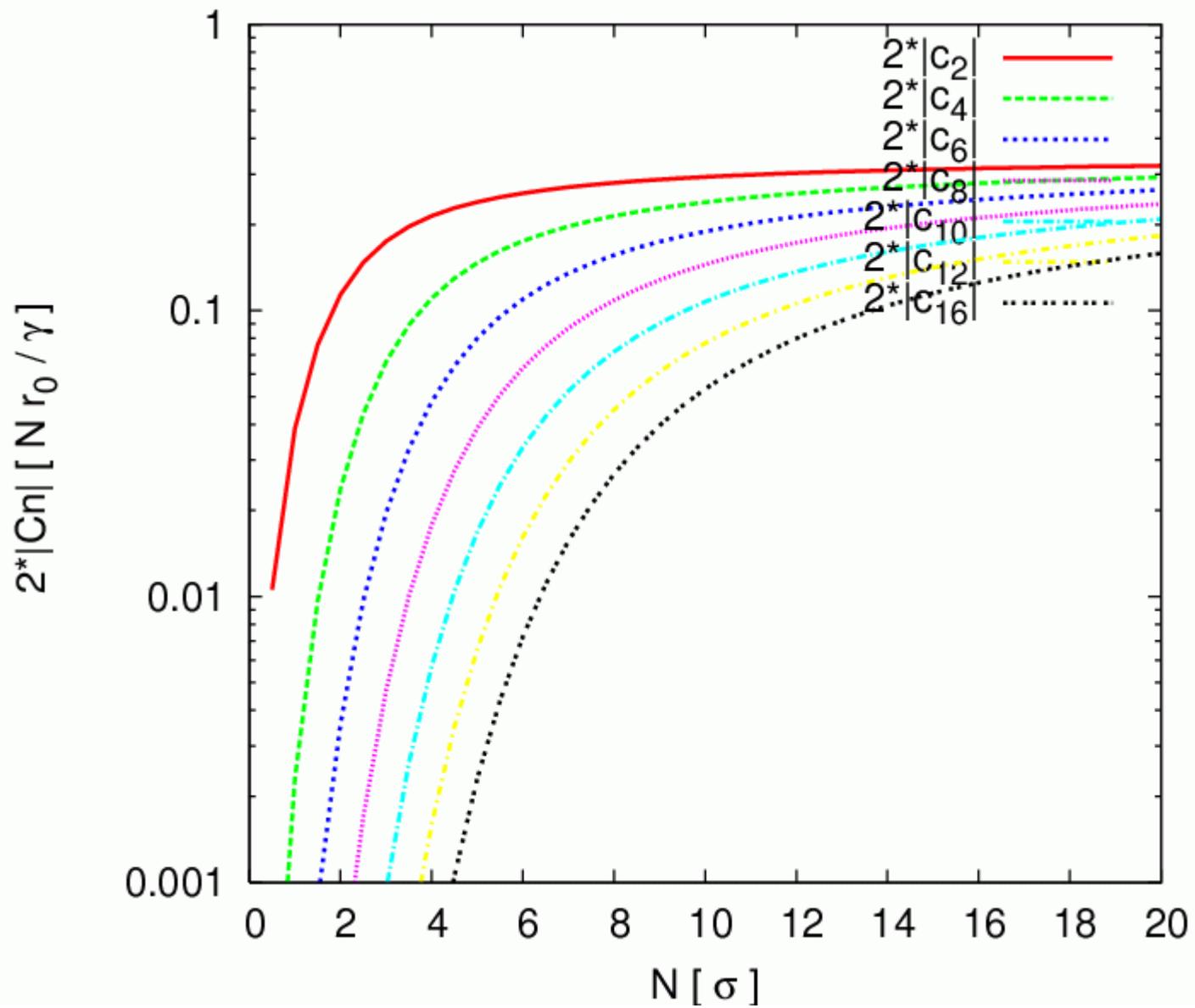
phase advance:  $\pi+1$ degree



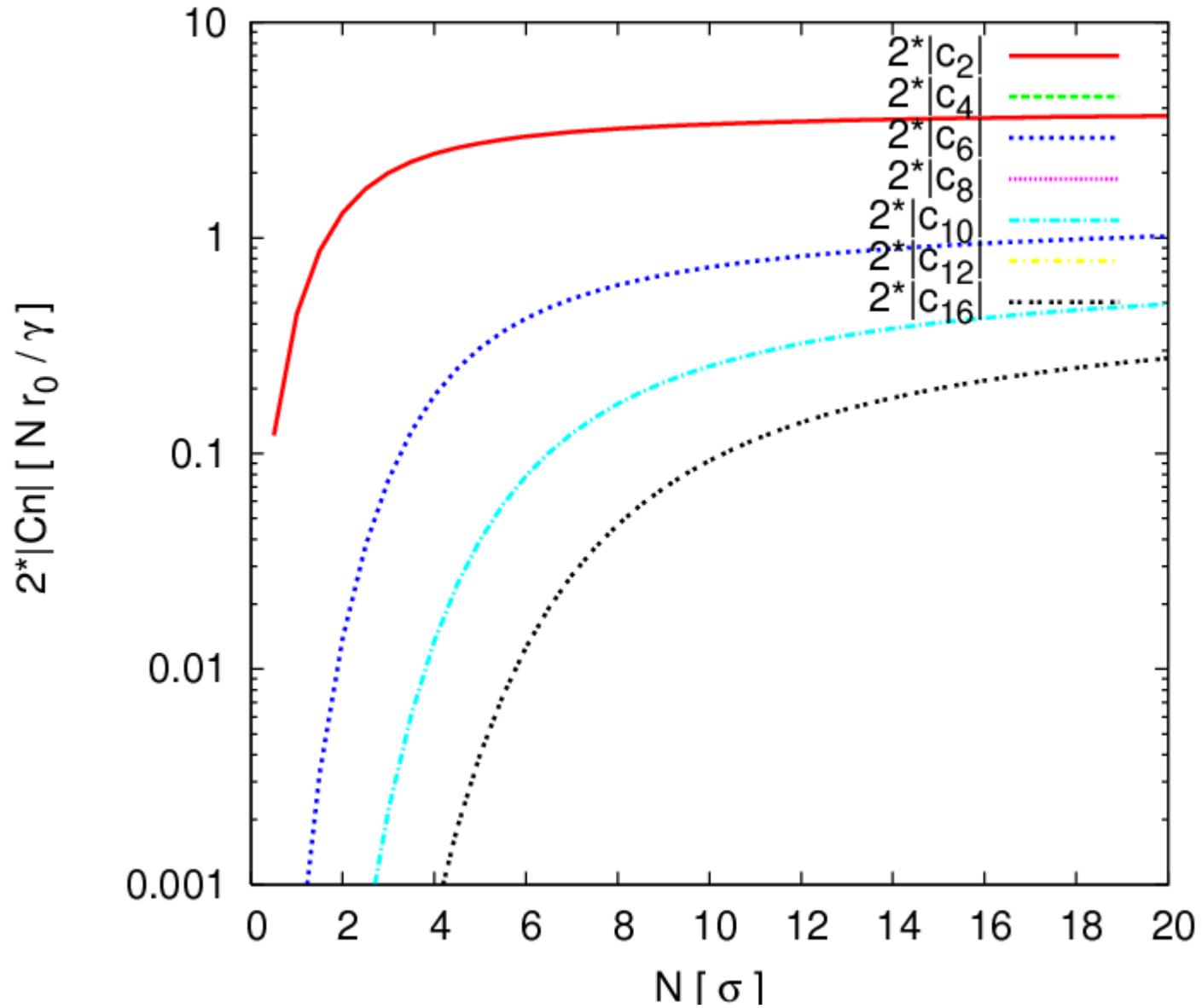
phase advance:  $\pi + 2.5$  degree



phase advance:  $\pi+5\text{degree}$



phase advance:  $\pi+90$ degree



### 3. Discussion

1) tracking results of high beam decays seem not reasonable  
**what went wrong ? SixTrack's phase trombone ?**

2) **How to use RDTs**

linked to resonance's width

be careful of higher terms

3) **Tolerances of phase advances between IPs**

tracking should answer it.

4) **effects of nonlinear elements before IPs**