

# Status of multi-particle tracking for RHIC e-lens

## 1. Two focuses :

SixTrack\_elens coding

Track output and physics analysis

## 2. Priority:

Better to quickly FINALIZE the code

Put more effect and time on PHYSICS

DOCUMENT the results

### 3. Two new features of tracking:

--> each macro-particle has an unique ID ( very important )

so that we can trace each particle forth and back

--> speed up the loss rate tracking with hollow beam

first we should verify that there is a boundary  
below which no particle lose at all

Before: tracking 12800p from 0-5 \sigmas:

1/12800 --> 1.4%/hr

Now : tracking 6400p from 3-5\sigmas:

1/105634 --> 0.17%/hr

Need benchmarks before going ahead

## 4. Emittance calculation seems difficult

limited by tracking turns  
affected by losing particles

emittance growth is long-term observable  
particle loss more sensitive in 2 min. tracking

LAST TO TRY:

extend tracking turn to  $10^7$   
calculate sigmas in the code (every 1000 turns)  
calculate sigmas more frequently ( each turn ? )

## 5. Analysis of tracking data

--> lost particles:

initial coordinates, why they lose  
they are in bunch tail? limited by DA?

-->core particles:

they get more stable comparing to noBBC  
criteria: avg\_J, rms\_J

-->How to increase DA( lifetime) for BBC:

phase advances before BB and BBC

test IP12

calculate resonance driving terms (RTDs)

tune footprint folding

New idea ? new algorithm ? tell me. Even yourself look into the data directly

## 6. Benchmark our code against RHIC observation Predict future RHIC operation

should be done earlier

but we have no time to do that at this point

will come back after e-lens simulation