

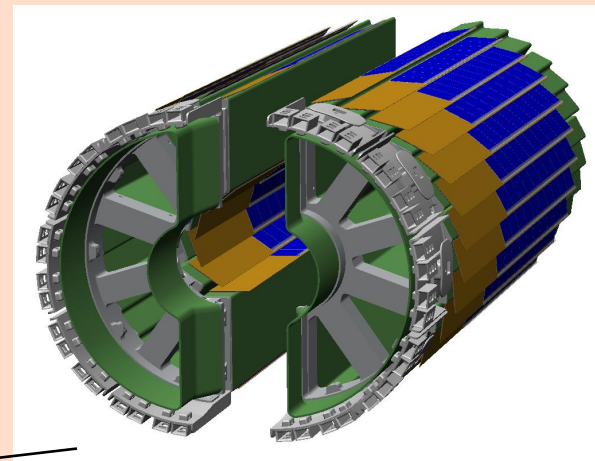
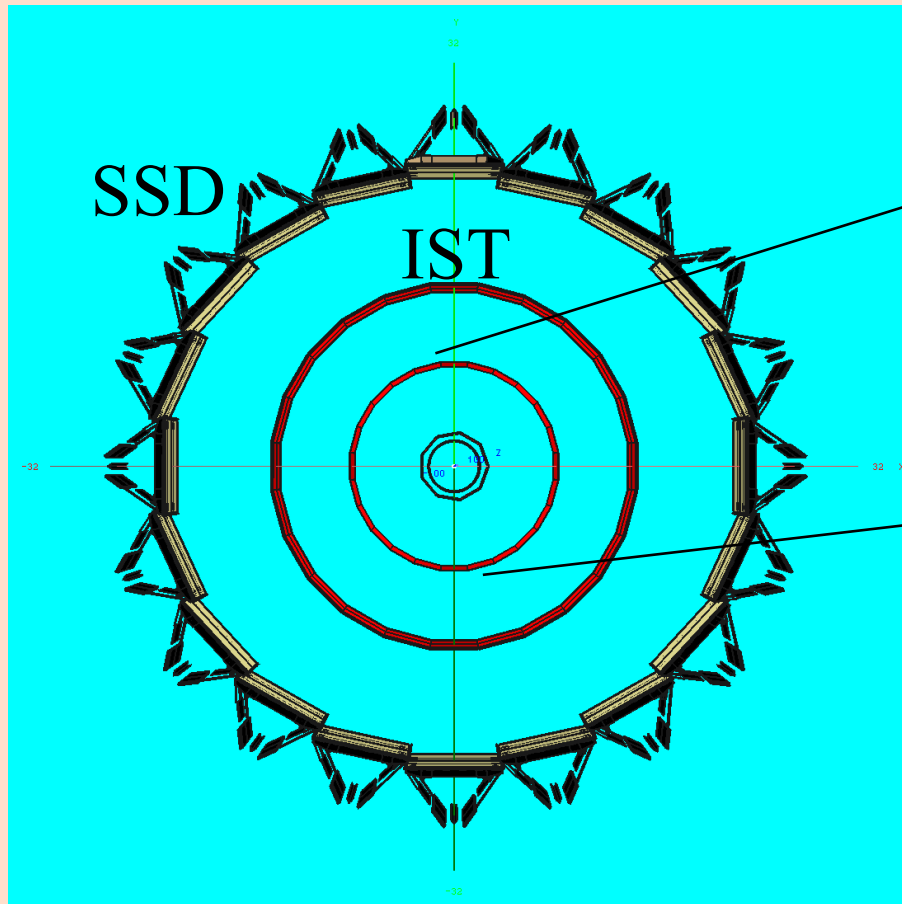
Simulation Details

S. Margetis
KSU

New for CDR

- We have used standard STAR environment
 - Simulation, Response simulation, Tracking, Evaluation Tools
 - No fuzzy factors, no short cuts.
 - No tracking optimization either
 - No fancy techniques to improve single track efficiency
 - Inside-out tracking
 - Vertex constraint
 - Momentum ordering, competitive algorithms etc
- Updated geometry to reflect current one
 - Beam pipe, Radii (HFT/IST), Resolutions, Average XO
 - Not detailed support structures (except 'old' SSD)
- Realistic PID (with TOF response)

Geometry



HFT

Detector response simulators etc etc

- TPC
 - Slow Response Simulator was used
 - Includes dead sectors, channels, 'old' response
 - New DAQ electronics improve TPC resolution $\sim 100\mu\text{m}$
- SSD
 - Fast simulator (no hit inefficiencies) but 'old' geometrical acceptance was included 91.8%
 - New SSD tiling will improve acceptance from 91.8 \rightarrow 95.2
 - New/repaired SSD has 94% of strips live. Not in simulation

- **IST**

- Fast Response Simulator was used with 'hit smearing'
- No dead areas were in simulation -> hermetic coverage
- No dead channels or noise was included either

- **PIXEL**

- Fast simulator (no hit inefficiencies) was used with hit smearing according to hardware simulation estimates (~10um)
- No dead areas, no overlaps, no dead channels were included
- Pile-up hits were included (conservative approach)
 - From out-of-time mbias AuAu events (random z-vertex)
 - UPC electrons (about same in magnitude)
 - Background (Hallo)

Data samples

- To use as background we ran 10K central Hijing AuAu events
 - 5 $D^0/D^+/D_s$ etc were simulated and embedded
 - Both uniform in pt (0-10GeV/c) and power-law at 0-2 GeV/c pt
 - Later on daughters of uninterested particles were removed from background estimations, yields were scaled to Phenix x-sections and proper scaling of signal/background was done when extrapolating to e.g. 500M events.
 - Details on procedure available

A comment on TPC space charge

- eTPC space charge in High Luminosity will increase distortions
- Bottom line: using current techniques net effect ranges from null to $\sqrt{2}$ increase in TPC-SSD projection uncertainty area.
- Simulations showed minor effect on single track efficiency
 - Assuming no correction of systematic hit shift
 - Assuming no use of HFT to correct the distortion
 - as it was our experience with the SVT

