D^0 Measurements in Au+Au Collisions at $\sqrt{s_{NN}}$ = 200 GeV at STAR using the Silicon Inner Tracker

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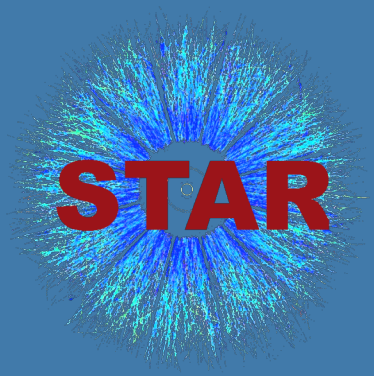


For further details see poster 311

D^0 Reconstruction

- $D^0 \rightarrow K^- \pi^+$
- $c\tau$ = 123 μm

Full hadronic D^0 reconstruction through identified displaced vertices.

Silicon Inner Tracker

- Composed of a SVT and SSD

SVT

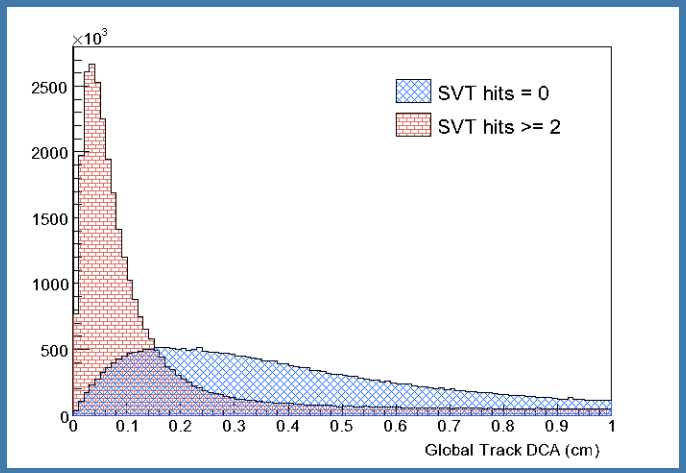
3 barrels w/ 2π coverage between r = 5 and 15 cm

SSD

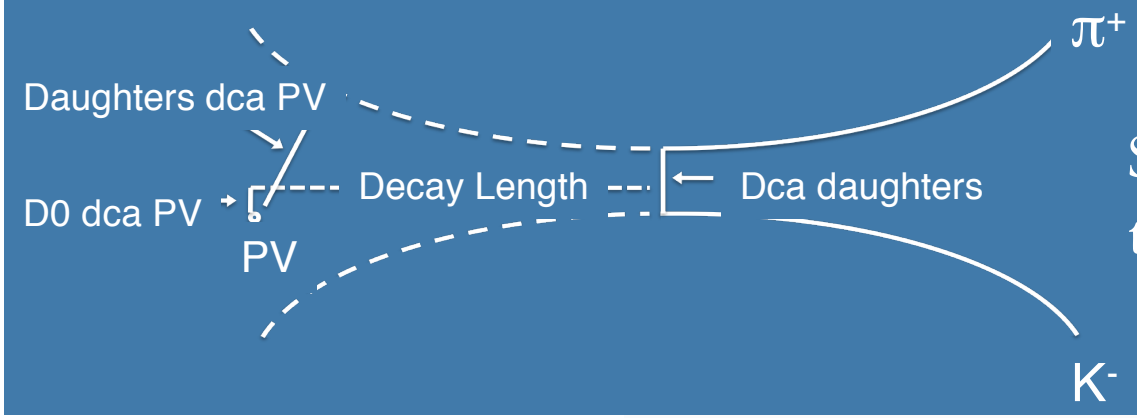
1 layer located at r = 23 cm

Detector Performance

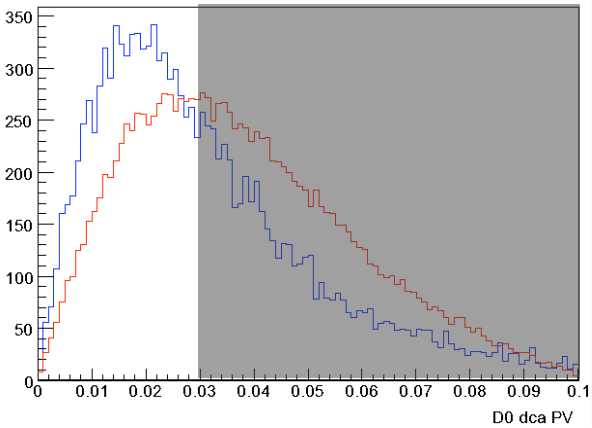
- Position resolution σ ~ 30 μm
  Order of magnitude improvement from TPC alone
- Impact parameter σ = 210 μm (p_T = 1 GeV/c)
  f : 15 improvement from TPC alone

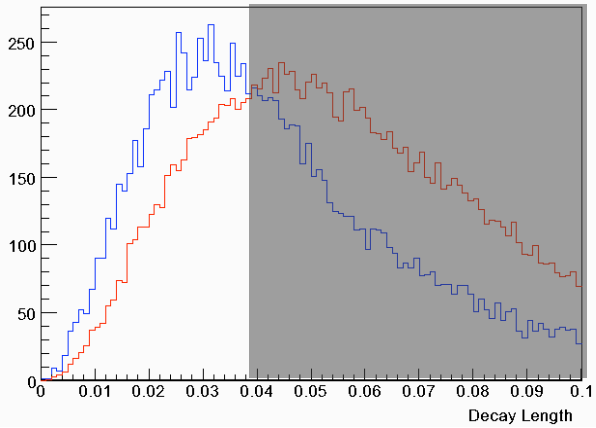


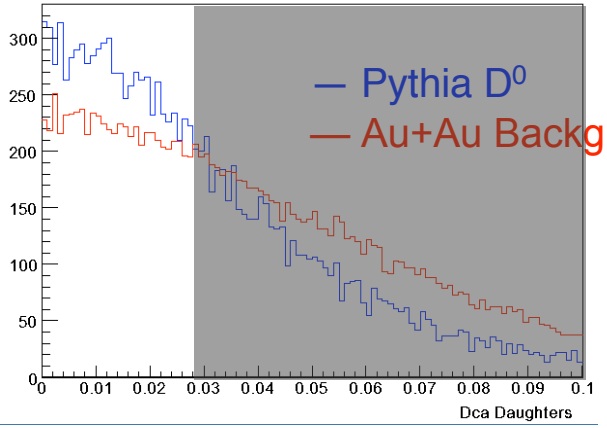
Geometrical Variable Distributions

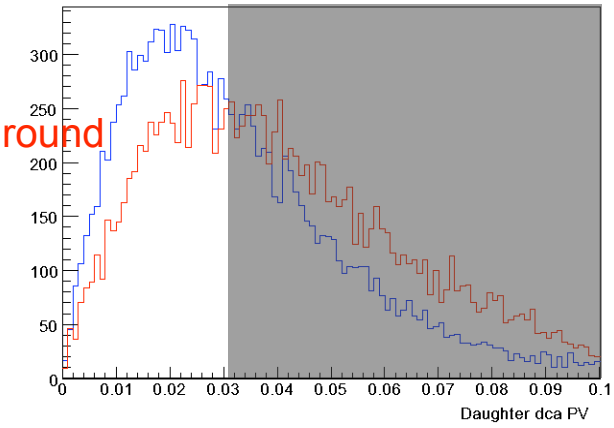


Studied geometric variables to optimize signal/bkg.









— Pythia D^0
— Au+Au Background

Optimized Cuts

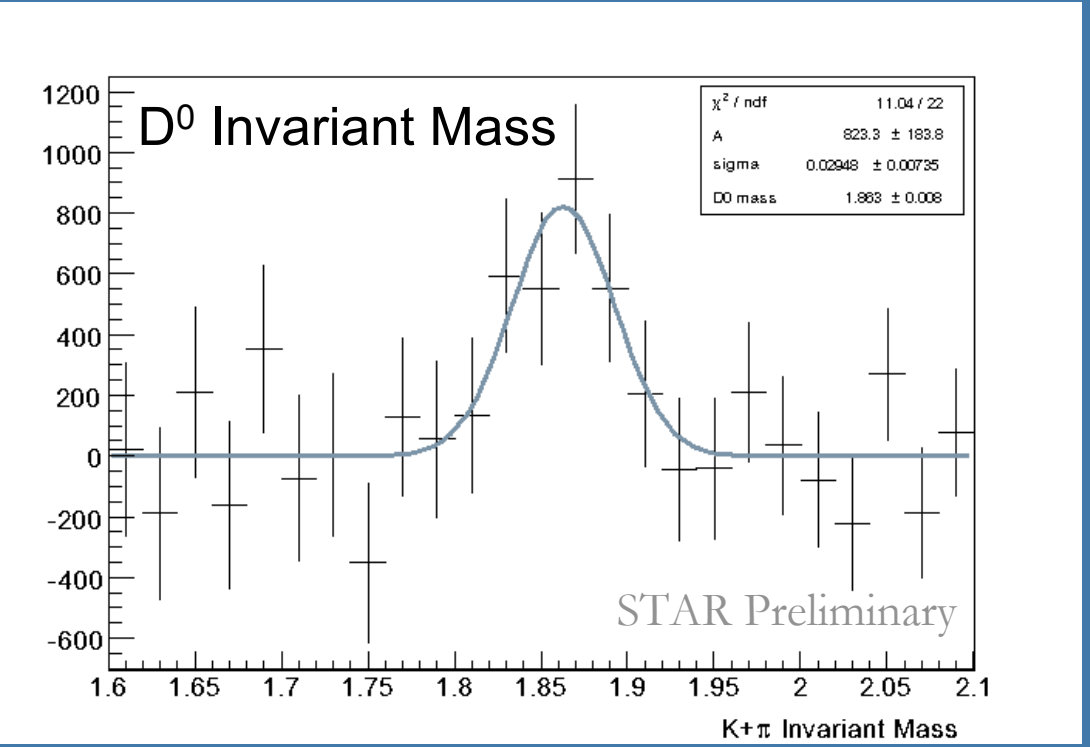
- TPC hits ≥ 25
- SVT hits = 3
- D0 dca PV ≤ 300 μm
- Decay Length ≥ 150 & ≤ 350 μm
- Dca Daughters ≤ 50 μm
- Daughter dca PV ≥ 150 & ≤ 300 μm

Results

Preliminary analysis done using 17M of the 47M run 7 Au+Au events

signal ~ 3000
signal/bkg = 0.006
$\sigma = s/\sqrt{(s+b)} = 4.5$

Order of magnitude improvement of signal/bkg with respect to TPC alone analysis



The estimated D^0+D^0bar signal for the entire data set ~ 15k

Outlook and Plans

- First D^0 measurement in heavy ion collisions using displaced vertices
- Unambiguous determination of the D- and B- meson contribution to the non-photonic electron spectrum
- Projected p_T reach of 4 GeV/c

  Physics
  - v_2 optimize analysis based on the purity of the sample
  - R_{CP} optimize for greater statistics
- Cross check with other background subtraction methods
- Improve s/b based on further optimization

A successful determination of v_2 and R_{CP} will not only provide insight of the interaction of charm with the medium but will be a good reference to the results that will come from the HFT in STAR and the VTX in PHENIX

For further details see poster 311