Strangeness production in Au+Au collisions at $\sqrt{s_{NN}}$ = 19.6 GeV from STAR

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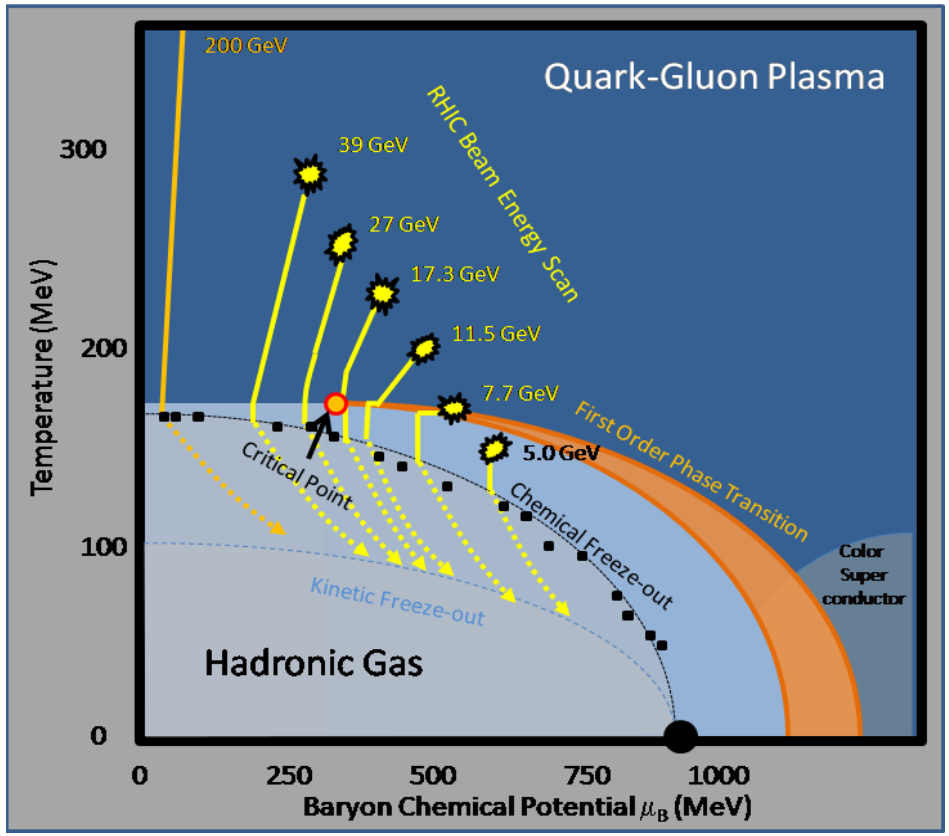
Beam Energy Scan (BES) Program At RHIC

RHIC Beam Energy Scan Program

- Study of QCD phase diagram.
- Search of QCD critical point
- Search for the first order phase transition



BES-I

$\sqrt{s_{NN}}$ = 62.4,39,27,19.6,14.5,11.5,7.7 GeV

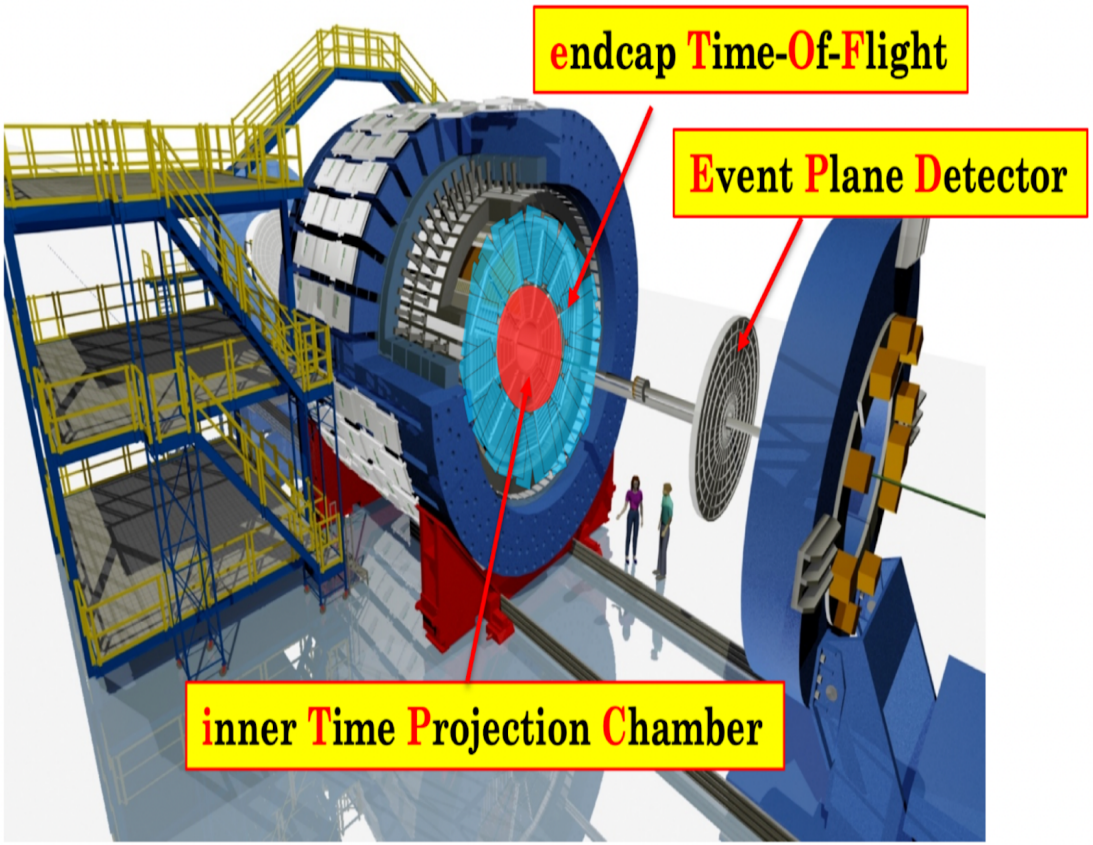
BES-II

$\sqrt{s_{NN}}$ = 54.4,27,19.6,17.3,14.6,11.5,9.2,7.7 GeV (collider mode)

$\sqrt{s_{NN}}$ = 13.7,11.5,9.2,7.7,7.2,6.2,5.2,4.5,3.9,3.5,3.2,3.0 GeV (FXT)

- Searches for the QCD critical point and the onset of deconfinement are the main motivation of the beam energy scan program at RHIC
- Strange hadrons (Λ, Ξ, Ω) are excellent probe for identifying the phase bounday and the onset of deconfinement.

The STAR Detector



iTPC upgrade

Particle Identification:

- better momentum resolution
- better dE/dx resolution
- improved acceptance
  $|\eta| < 1.0 \rightarrow |\eta| < 1.5$

Strange hadrons reconstruction:

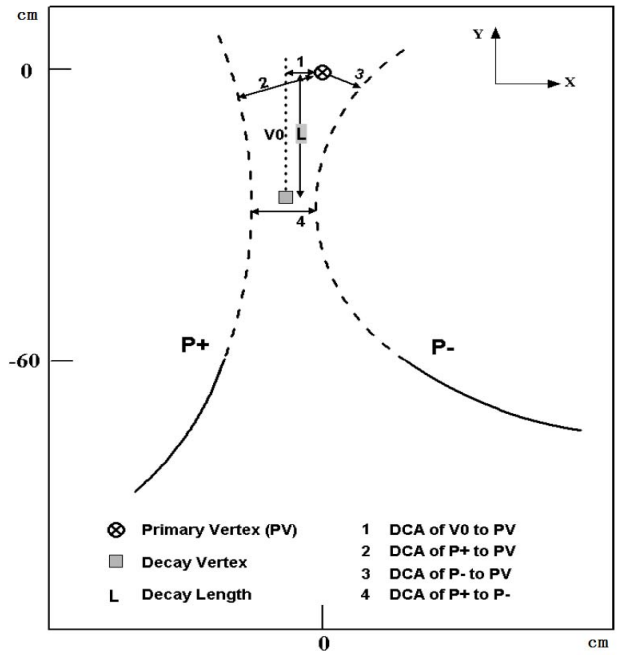
- lower p_T acceptance and broader rapidity acceptance

The Solenoidal Tracker At RHIC (STAR) consists of several sub-detectors:

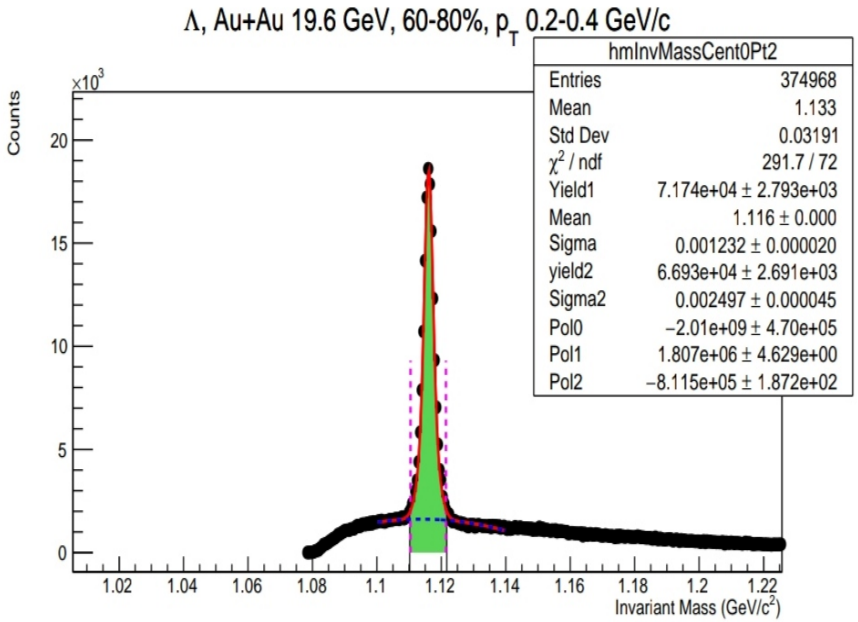
- **Tracking:** Time Projection Chamber (TPC)
- **Particle Identification:** Time Projection Chamber and Time Of Flight (TOF)

Analysis Technique

Decay topology of $\Lambda(\bar{\Lambda})$



Raw yield extraction



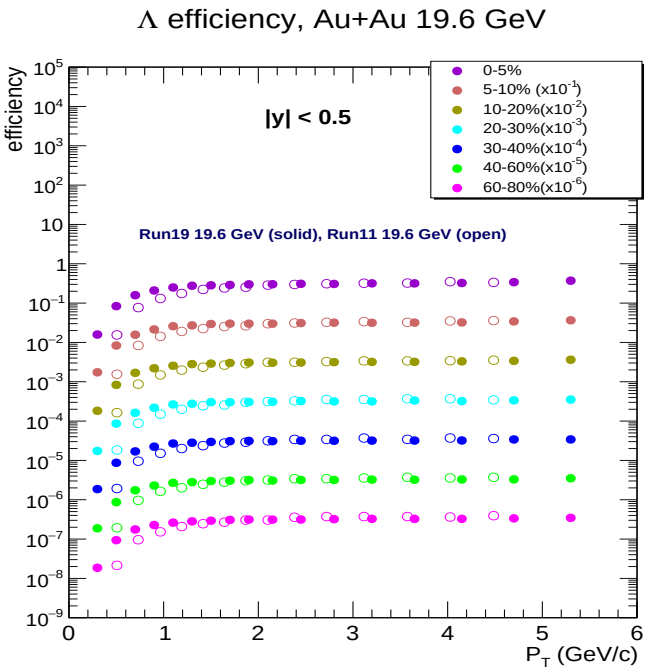
➢ $\Lambda(\bar{\Lambda}) \longrightarrow p(\bar{p}) + \pi^{-}\ (\pi^{+})$

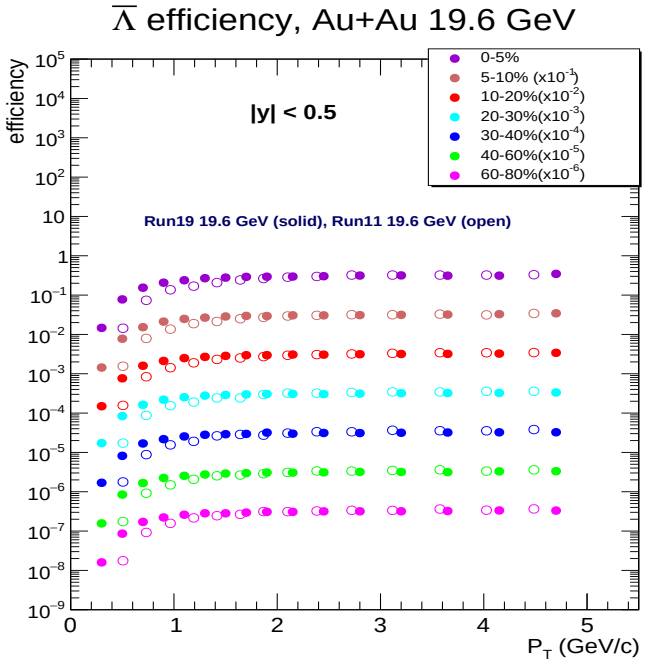
❒ Fitted with double Gaussian and second order polynomial.

$$a_0 + a_1 + a_2x^2 + \frac{Y_1}{\sqrt{2\pi\sigma_1}} \exp\left(\frac{-(m-m_0)^2}{2\sigma_1^2}\right) + \frac{Y_1}{\sqrt{2\pi\sigma_2}} \exp\left(\frac{-(m-m_0)^2}{2\sigma_2^2}\right)$$

Reconstruction Efficiency

➢ **Efficiency Vs p_T plots for Λ and $\overline{\Lambda}$**





➢ Efficiency drops quickly below 1 GeV/c

➢ The iTPC upgrade significantly enhances the efficiency below 1 GeV/c for BES-II.

Summary:

iTPC upgrade improves the reconstruction efficiency of $\Lambda(\overline{\Lambda})$ at low p_T region.