# Strangeness Production in U+U $\sqrt{s_{NN}}$ =193GeV collisions at RHIC


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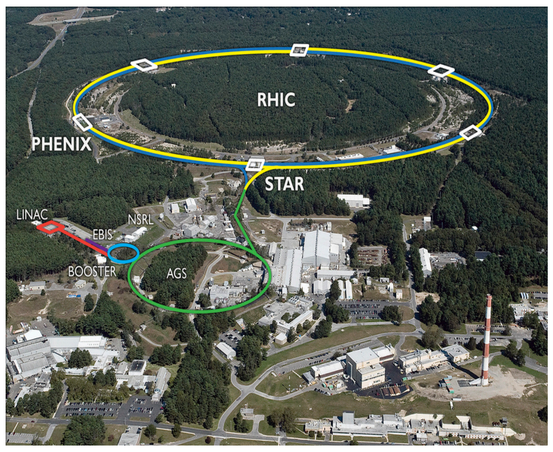
## Abstract

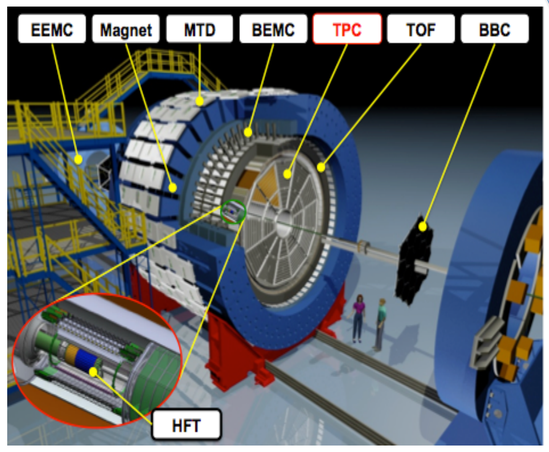
Strange quark production and its thermalization in the medium created aftermath in heavy-ion collisions is an interesting probe to understand the medium properties, since net strangeness is zero in colliding nuclei.

Advantages over Au+Au:

- Different geometrical orientation in same nuclei[1].
- Larger energy density than Au+Au system[2].
- Larger life time of fireball[3].


## STAR Experiment at RHIC



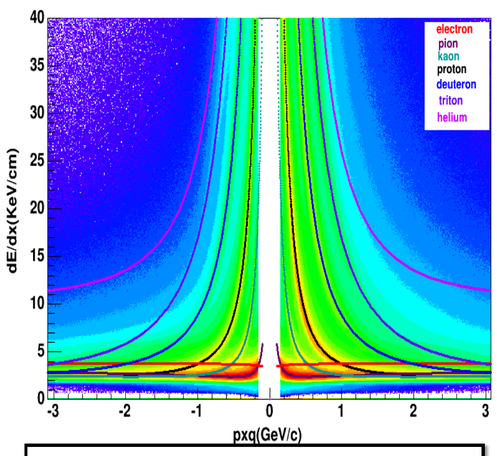

- Colliding systems: Au+Au, Cu+Cu, Cu+Au, **U+U**, d+Au, He+Au, p+p
- Center of mass energy: $\sqrt{s_{NN}}$ = 7.7GeV to 200GeV
- Magnetic field: 0.5T
- Large acceptance: $|\eta|<1.0$, $0<\varphi<2\pi$
- Excellent particle identification capabilities (Using Time Of Fight and Time Projection Chamber)

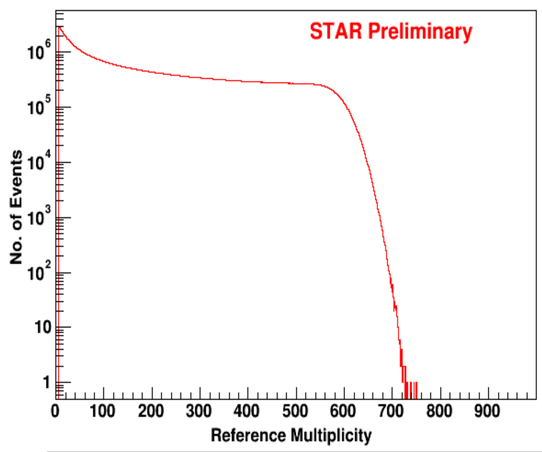
TPC detector is used for this analysis.

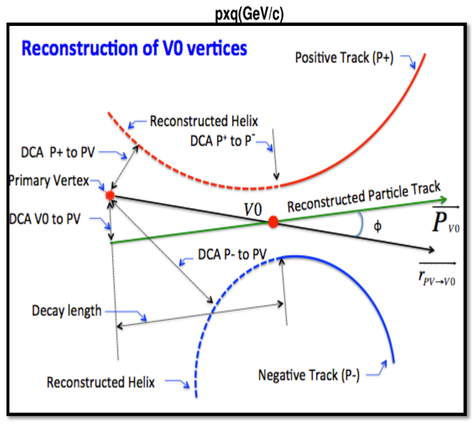
## Analysis Technique

$k^0_s$->$\pi^+\pi^-$(69.2±0.5%)
Mass:497.614±0.024 MeV/$c^2$
Decay length:2.68 cm
Life Time:(0.8954±0.0004)×$10^{-10}$s

Λ->pπ(63.9±0.5%)
Mass:1115.683±0.006 MeV/$c^2$
Decay Length:7.89 cm
Life Time:(2.632±0.020)×$10^{-10}$s



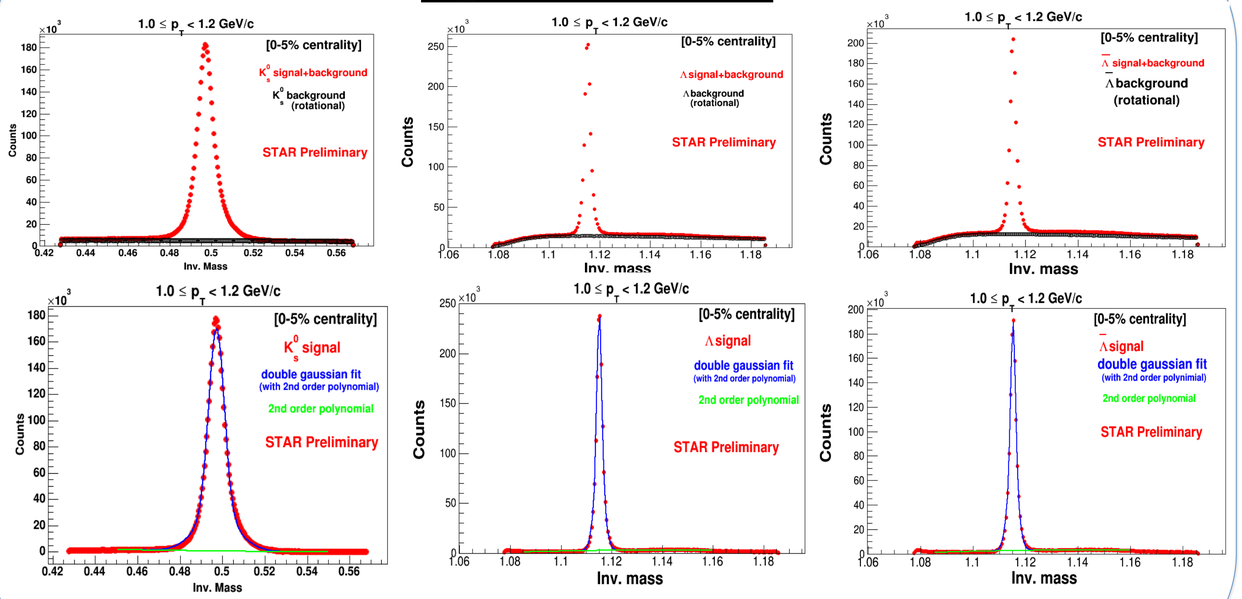

Reference multiplicity:
No. of charged particles with $|\eta|<0.5$

$$\eta = \frac{1}{2}\ln\left(\frac{|\vec{p}|+p_z}{|\vec{p}|-p_z}\right) = -\ln\left[\tan\left(\frac{\theta}{2}\right)\right]$$

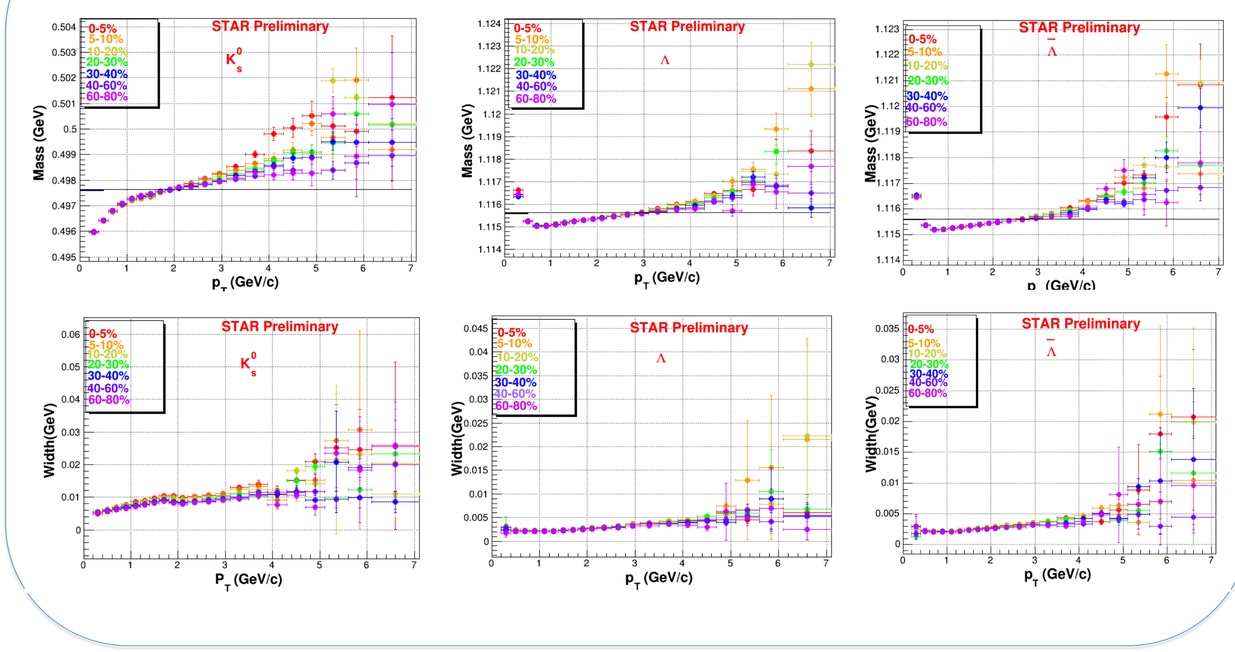
$$-\left\langle\frac{dE}{dx}\right\rangle \sim A\left(1+\frac{m^2}{p^2}\right)$$

$$N\sigma = \frac{1}{R}\times\log\left(\frac{dE/dx_{measured}}{dE/dx_{theory}}\right)$$

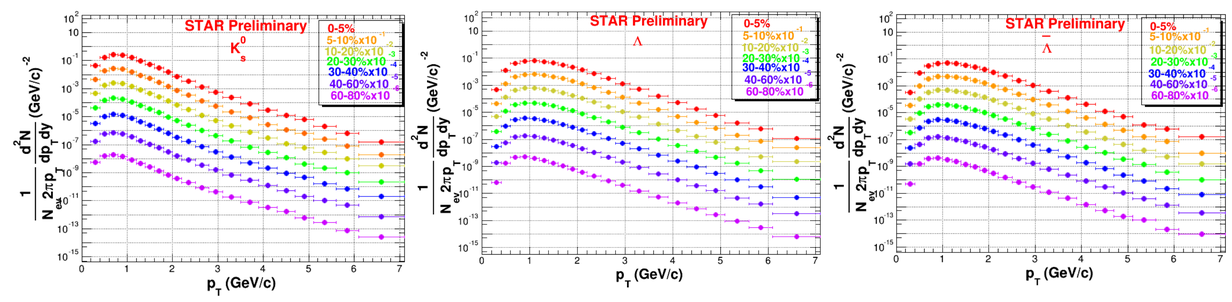
## Signal Extraction




## Mass & Width variation




## Uncorrected $p_T$ spectra




Errors shown are statistical only & within symbol size.

## Summery & Outlook

- ✓ First measurement of single-strange hadrons($k^0_s$, Λ($\bar{\Lambda}$) ) in U+U $\sqrt{s_{NN}}$ =193GeV data via their dominant hadronic decay channels.
- ✓ Measured mass of these particles are consistent with PDG value( less than 1% deviation).
- ➢To correct spectra for detector acceptance and efficiency.
- ➢To look for multi-strange hadrons.
- ➢To do systematics study for all particles.

## References:


1. R. Haque, Z. Lin and B.Mohanty, Phys.Rev.C 85,034905,2012
2. D. Kikola, G.Odyniec, and R.Vogt, Phys.Rev.C 84,054907,2011
3. John Campbell,QM -2014 Poster,I-08