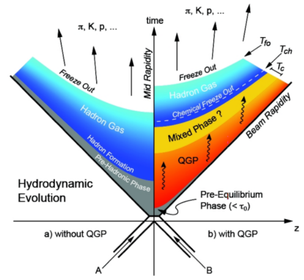
Strange Baryon production in Au+Au collisions at STAR energies using AMPT model

Ashish Jalotra[1] (ashishjalotra@gmail.com),
Sanjeev Singh Sambyal[2] (sanjeevsambyal@yahoo.com),
Department of Physics, University of Jammu, Jammu

Introduction

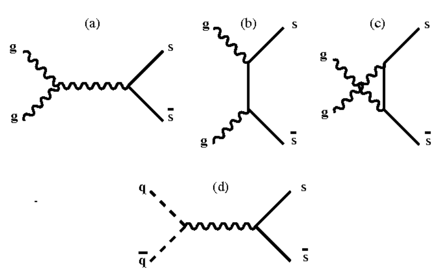
- The primary goal of ultra-relativistic heavy ion collision is to study the properties of strongly interaction matter under extreme conditions of temperature and pressure.
- In these heavy ion collisions, large energy densities are expected to be achieved and a state of matter *viz.* Quark Gluon Plasma (QGP) is formed where quarks and gluons are no longer confined into the hadronic volume.



- The Formation of such a medium leads to some experimental signatures such as bulk properties and the suppression of high momentum particles and suppression of high p_T particles.
- These signatures cannot be measured directly but are measured indirectly after hadronization phase takes place and in this evolution of system in- elastic and elastic interactions may still happen.
- Therefore, understanding the effects of this hadronic phase is of extreme importance to find out the properties of the QGP

Motivation

- Strange particle production is a critical tool to analyse the phase transition between the confined state and deconfined state i.e the QGP.
- Strange quarks are produced in pairs & In QGP: strange and anti-strange quarks are in same numbers.
- As soon as the hadronization of particles take place the density of strange particles increases and more multi-strange particles are produced.
- Moreover the strange particle production time is similar to the lifetime of QGP leading to abundance of strange quarks in QGP.



The dominant production channel for the strange particles production is gluon gluon interaction or the fusion of two light quarks[1].

$\Lambda \rightarrow p\pi^-$	BR: 64.1 ± 0.5 %	$c\tau$ = 7.89 cm
$\Xi \rightarrow \Lambda\pi^-$	BR: 99.887 ±0.035 %	$c\tau$ = 4.91 cm
$\Omega \rightarrow \Lambda k^-$	BR: 67.8 ± 0.7 %	$c\tau$ = 3.46 cm

Conclusion

- The yields of strange baryons provides crucial information about equilibrium dynamics of the system produced in heavy ion collisions.
- The Yields are calculated using impact parameter & in 4 centralities.
- The observed yields are well described by the Au+Au case.
- It would be interesting to compare these results with data from STAR detector and other models.

References

[1] J. Rafelski and B. Muller, Strangeness production in the Quark Gluon Plasma, PRL, 1982, 48, 1066.
[2] B. Andersson, A general model for jet fragmentation Z. Phys C, 1983, 20, 317.
[3] B. Andersson, Parton fragmentation and string dynamics, Phys. Rept. 97, 1983, 31.

AMPT: A Multi-Phase Transport Model

- AMPT is a Montecarlo transport model for. Heavy ion collisions at relativistic energies.[2,3]
- Includes both initial partonic and final hadronic interactions and the transition between the two phases of matter.
- Aims to provide a kinetic description of all essential stages of heavy ion collisions.

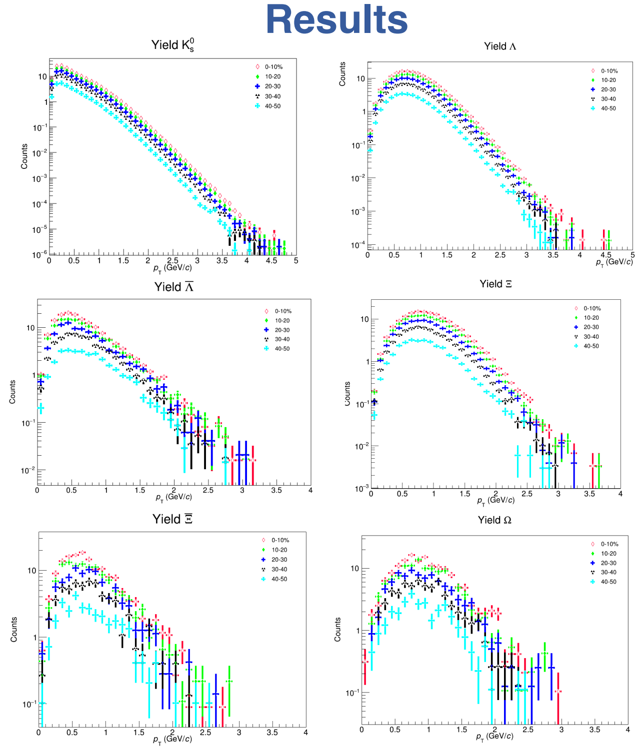
$A + B$ → **Initial conditions** → **Parton interaction** → **Hadronization** → **Hadron Cascade** → **Final particle spectra**

Collision systems:
$p + A$, $A + A$

Two versions of AMPT model are available: **Default and String Melting**

- **Default mode:** Partons are recombined with their parent strings when they stop interacting, and the resulting strings are converted to hadrons using the Lund string fragmentation model.
- **String Melting:** a quark coalescence model is used instead to combine partons into hadrons. The dynamics of the subsequent hadronic matter is described by a hadronic cascade model.

Results



- Ω has triple strange quark content, is less stable and thus less produced as compared to others.