

NA61/SHINE

what? why? and how?

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Outline

What?

- Brief Detector Description.
- Summary of Physics Programme.

Why?

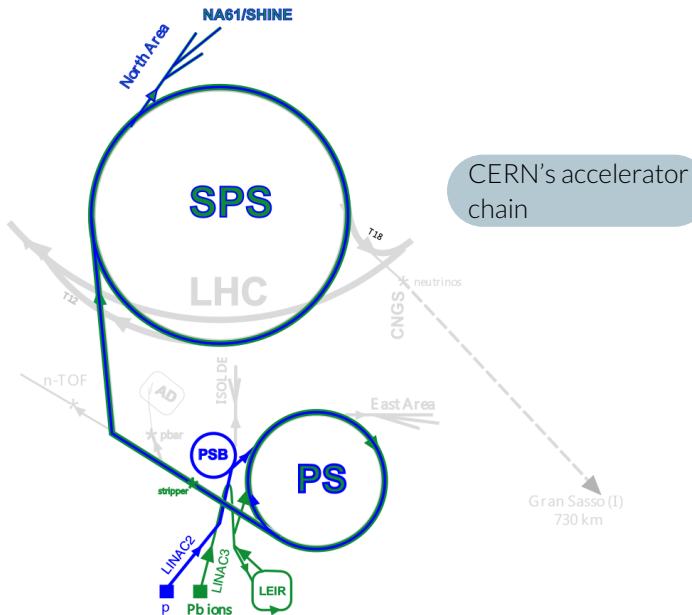
- Studies of the Phase Transitions.
- Model Predictions vs Experimental Results.

How?

- Particle Identification @ NA61.
- My tiny contribution.

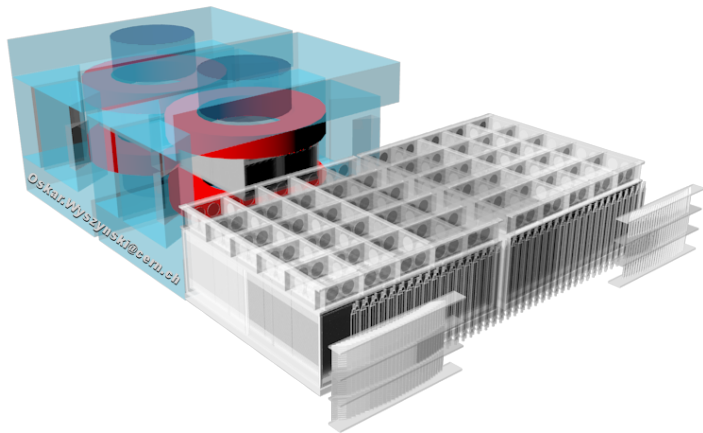
Section 1

What?



NA61/SHINE

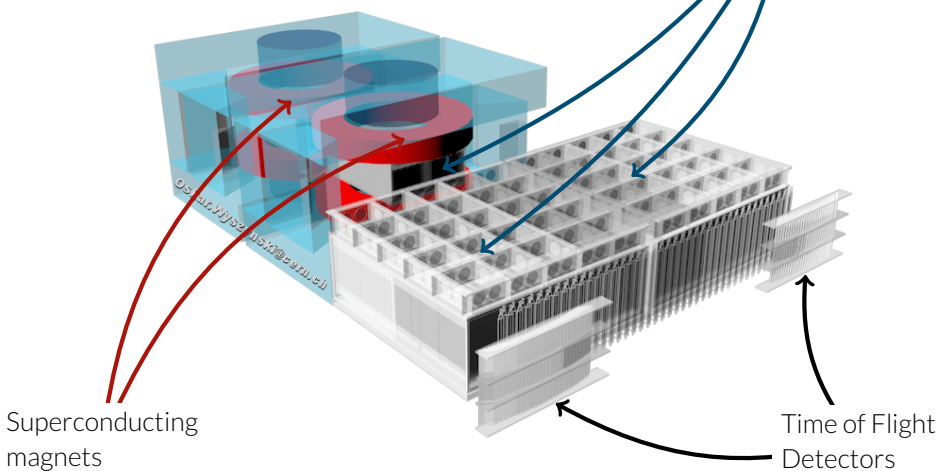
Facility



NA61/SHINE

Facility

Time Projection Chambers



Superconducting
magnets

Time of Flight
Detectors

Strong Interactions

- **Deconfinement Phase Transition.**
- Critical Point in QCD phase diagram.

Neutrino Physics

- Production of pions and kaons measurements.
- Carbon targets (T2K replica).
- Initial Neutrino fluxes, beam composition.

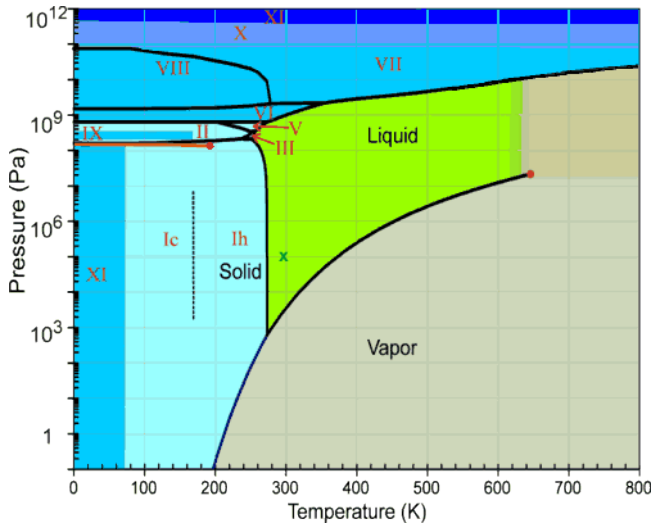
Cosmic Rays

- Production of hadrons from pion-carbon interactions.
- Approximation of pions interacting with nuclei of air.

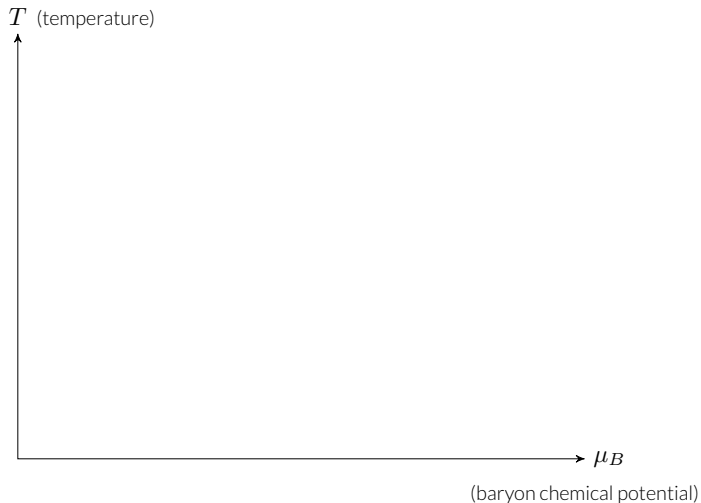
Section 2

Why?

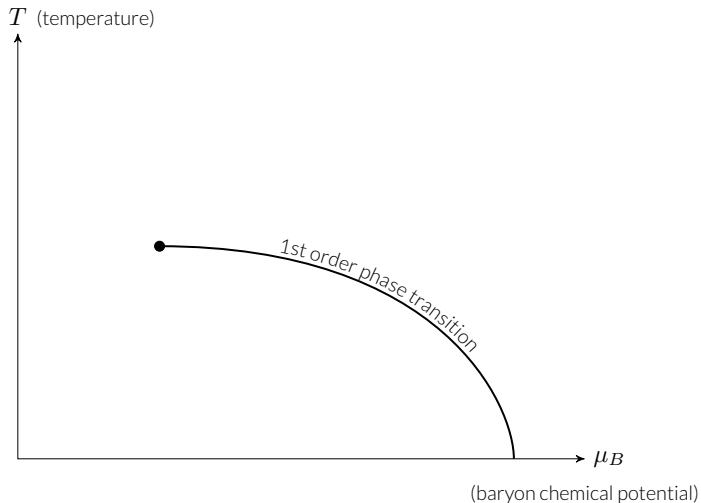
Phase Transitions of Water



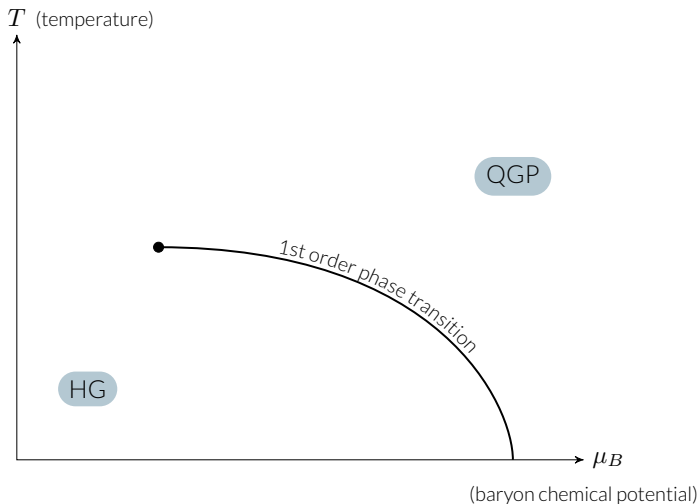
Phase Transitions in QCD



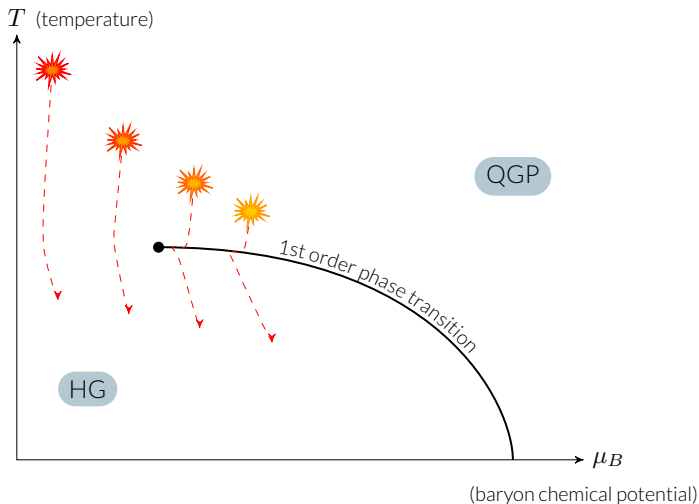
Phase Transitions in QCD



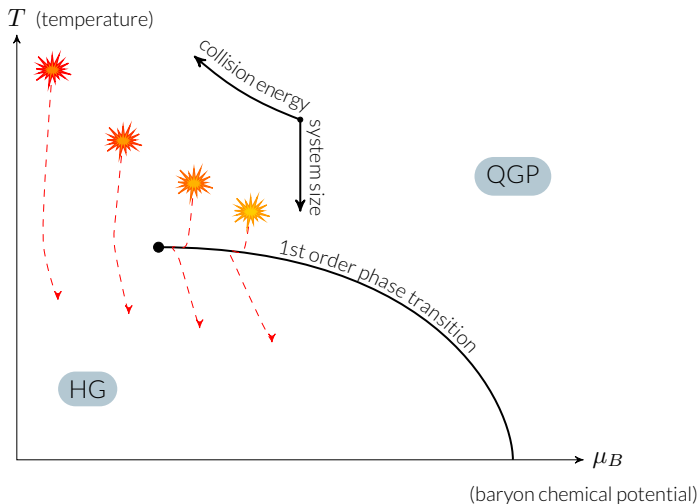
Phase Transitions in QCD



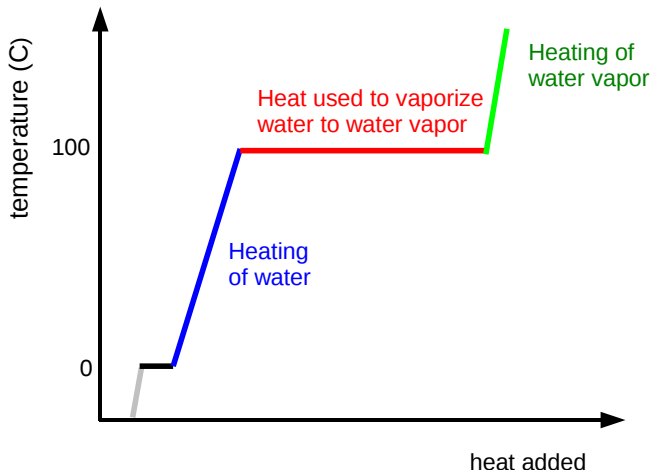
Phase Transitions in QCD



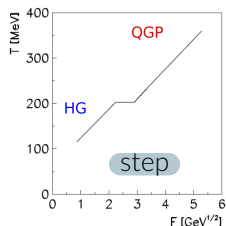
Phase Transitions in QCD



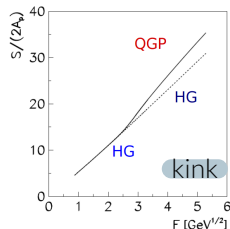
Phase Transitions of Water



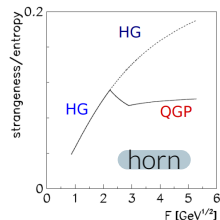
Onset of deconfinement



Plateau in "temperature" dependence on collision energy.



Enhancement of entropy production in QGP phase (per participating nucleon).



Suppression of strangeness production in QGP phase.

All plots shown in dependence on **Fermi Energy Measure** ($\propto s_{AB}^{1/4}$).

Predictions of the **Statistical Model of the Early Stage**.

Critical End Point

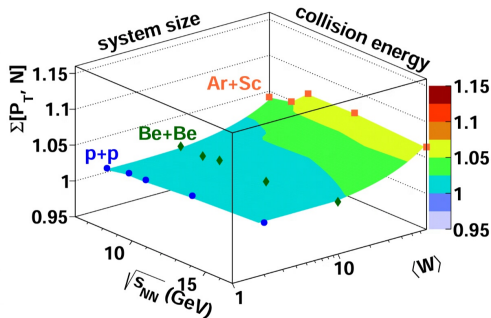
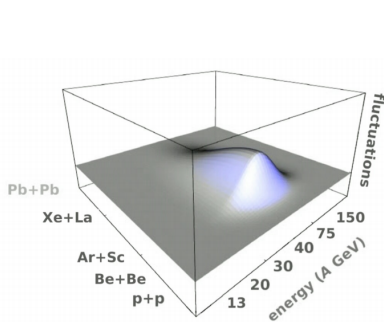


Figure :

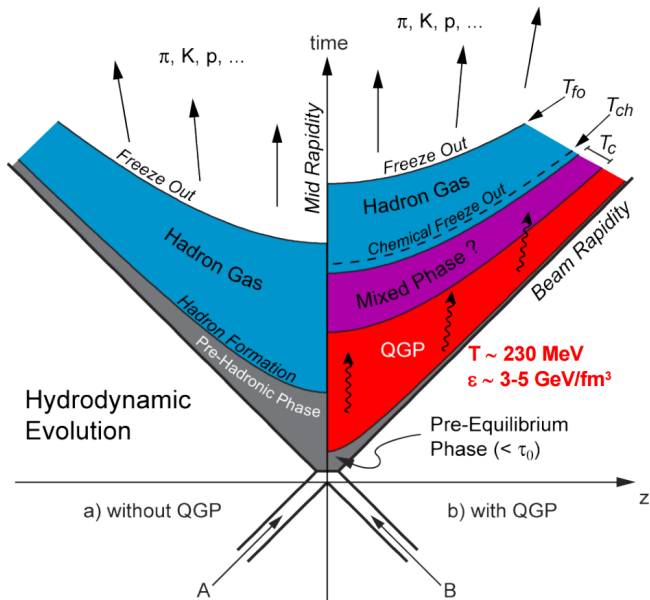
Right: Expected behaviour of fluctuations in the vicinity of CP

Left: The fluctuations measurements from N61/SHINE with the newest preliminary results from Ar+Sc interactions.

Section 3

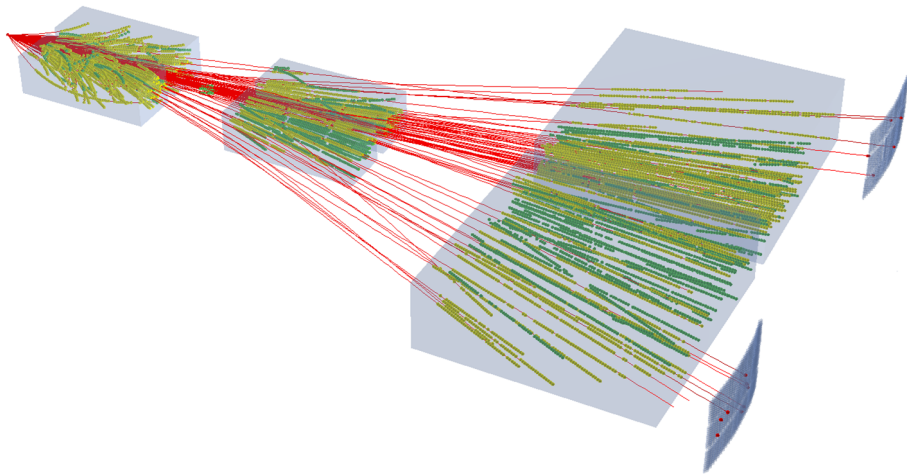
How?

HIC – Probes of Strong Interactions



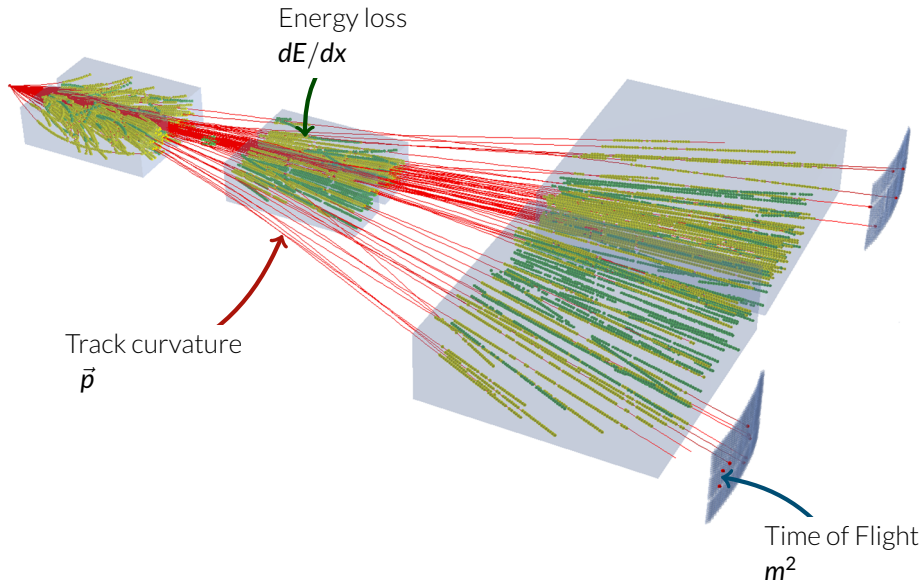
Heavy Ion Collisions

Ar+Sc @ 158A GeV/c

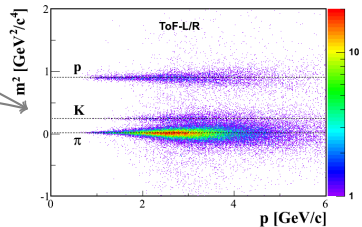
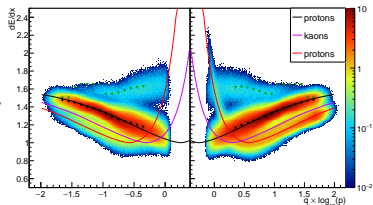
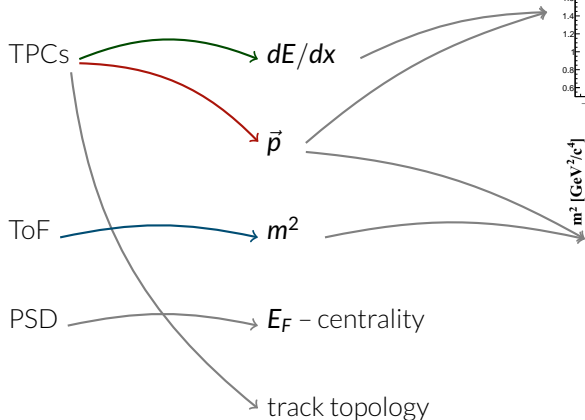


Heavy Ion Collisions

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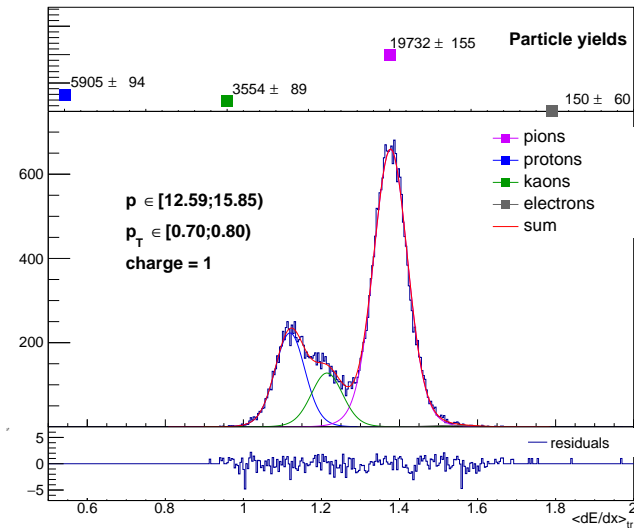


Particle Identification



Particle Identification – dE/dx

This is where my contribution begins



Analysis

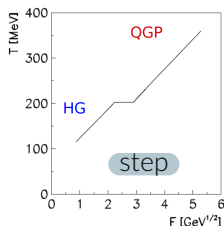
Analysis steps:

- 1 Particle Identification.
- 2 Corrections and extrapolation.
- 3 Calculation of particle yields:
 π^+ , π^- , p , \bar{p} , K^+ , K^- , d , \bar{d}

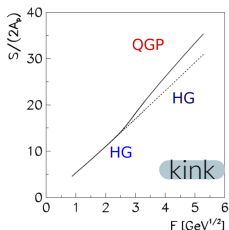
Analysis results:

- Exponent fit to p_T spectrum – \propto "temperature".
- Total number of produced particles – \propto entropy production.
- Production of kaons – \propto strangeness production.

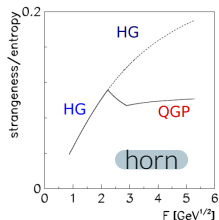
Onset of deconinement



Plateau in "temperature" dependence on collision energy.



Enhancement of entropy production in QGP phase (per participating nucleon).

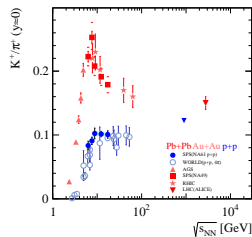
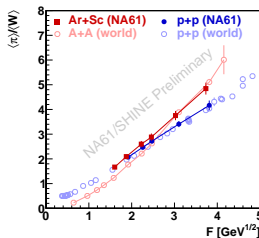
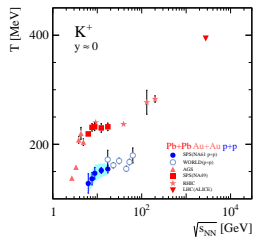
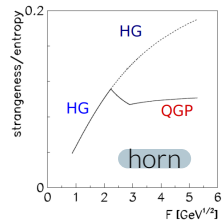
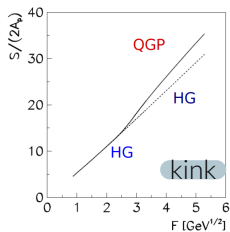
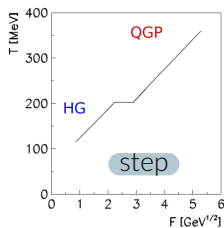


Suppression of strangeness production in QGP phase.

All plots shown in dependence on **Fermi Energy Measure** ($\propto s_{AB}^{1/4}$).

Predictions of the **Statistical Model of the Early Stage**.

Onset of deconfinement



Ion+Ion and proton+proton collisions



"That's all Folks!"

Isberg®