pp @ 7 TeV with EPOS

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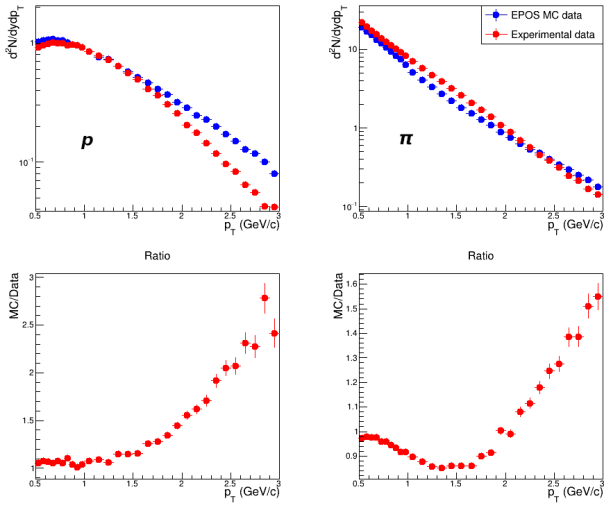
EPOS is a model based on multiple scattering between partons, each scattering creating a parton ladder. A rather remarkable feature of this model is that it can be used for *pp*, *p*-*A* and *A*-*A* and also for air showers, at energies which are not (yet) accessible at particle accelerators.

Here, we have used EPOS to simulate *pp* collisions at 7 Tev. Then, we compare the predictions with LHC data. The plots are made at the highest multiplicity where there is still enough statistics, that is multiplicity bin 40-49 for $|\eta| < 0.8$. As it can be seen, from the bootom plots, the data are reproduced rather well. The ratio MC/Data, shows that the model works better in the "soft" p_T region bellow 1.5 GeV/c, while the high p_T values are largely overestimated.

pp collisions at 14 TeV which are considered for Run3 of the LHC would give way more statistics at higher multiplicities, therefore multi-differential analysis is essential in order to discriminate among different theoretical approaches.



The HPD Experience

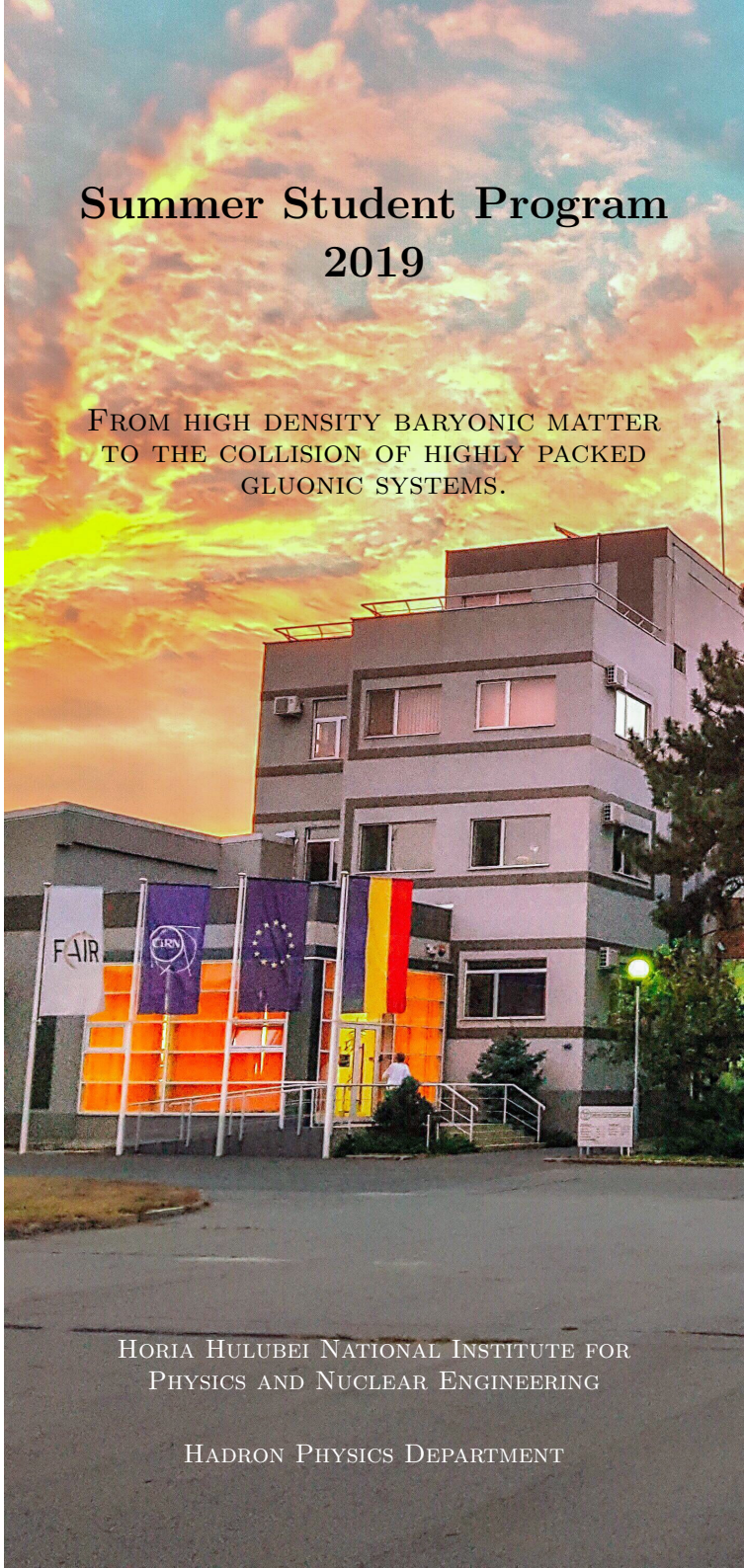
I am truly grateful for such an amazing opportunity and the experience that came with it. My time at HPD has taught me what it takes to work in international experiments such as CBM and ALICE. I couldn't help but feel inspired by the dedication researchers put into their work.

This program has been a great opportunity to take a closer look into the world of research, in a center of international importance in nuclear and hadron physics, with the companionship of charming colleages, the guidance of great experts in the field and the confort of great facilities.

The two months that I have spent at HPD have been very interesting. During this time, apart from the scientific activity at the institute, I had the opportunity to interact with the scientists of this unique department, which are an inspiration both from a professional and personal point of view.

Summer Student Program 2019

From high density baryonic matter to the collision of highly packed gluonic systems.



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Hit Density in the Inner CBM-ToF Wall

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We have studied the particle density at the level of the inner zone of ToF wall of CBM experiment at FAIR for SIS100. Such studies are relevant to assess the detector granularity i.e. strip length. For this task we used 8k central $Au-Au$ events at an incident energy of 10A GeV, generated by UrQMD model and the most updated experimental configuration included in GEANT.

The task was to count the number of particles (primary and secondary) incident on the 8 modules (2xM1, 2xM2 and 4xM3) of the inner zone at a distance of 7.25 m from the target position.

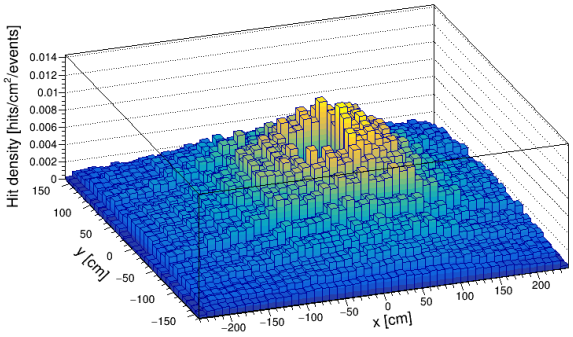

Figure 1: Particle density distribution in the inner zone of the ToF detector.

From the latest simmulations we can observe that the particle density increased approximately 2 times relative to the previous estimates. This result shows that the present granularity of the inner zone of CBM-ToF subdetector can't be reduced anymore.

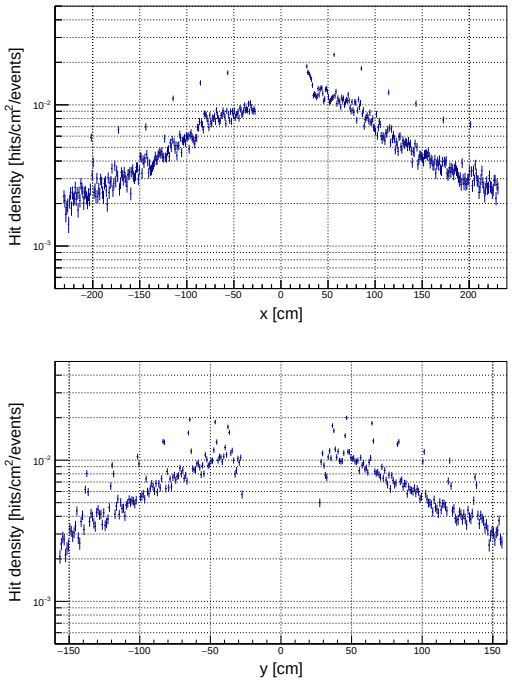

Figure 2: Hit density (hits/cm^2/event) of primary and secondary charged particles as a function of position in the inner zone of ToF plane, X (top plot) and Y (bottom plot) relative to the beam axis.

Transverse momentum with Pythia and Rivet

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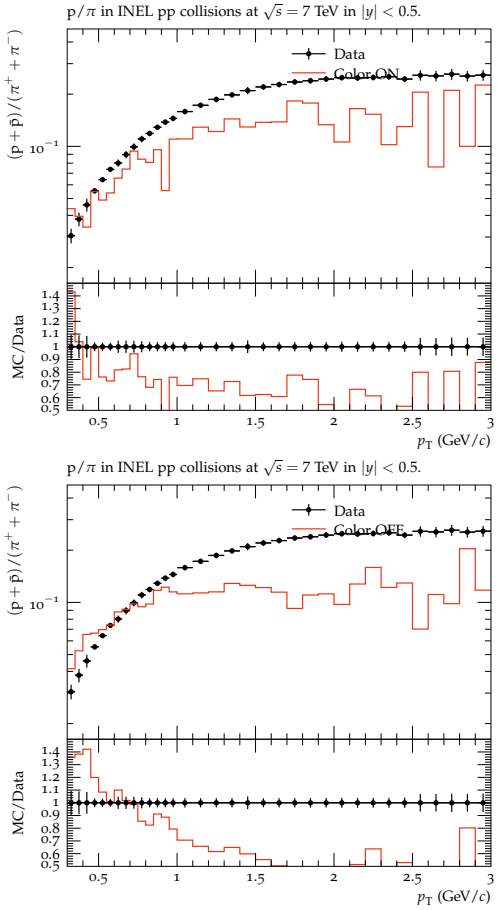
In the simulation of a collision, the colour field lines connects remnants in a way analog to electric and mangetic fields, with differences due to gluon self interaction which makes these lines attract each other and form narrow tubes of strong colour field.



Pythia is a high energy physics event generator written in C++. We have used this software to simulate the INEL pp collisions at 7 TeV of the Alice experiment both with and without color reconnection. The generated events have been compared with data using Rivet environment, a software designed for validation of Monte Carlo events generator and compares the simulated results with experimental data from the alice experiment.

Within the present statistics the experimental $(p+\bar{p})/(\pi^+ + \pi^-)$ ratio as a function of p_T is better reproduced by pythia cr version (upper plot) relative to the version without cr (bottom plot).