

IFIN-HH Contribution to the ALICE Experiment at LHC (RONIPALICE)

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ALICE Collaboration: <http://aliceinfo.cern.ch/>

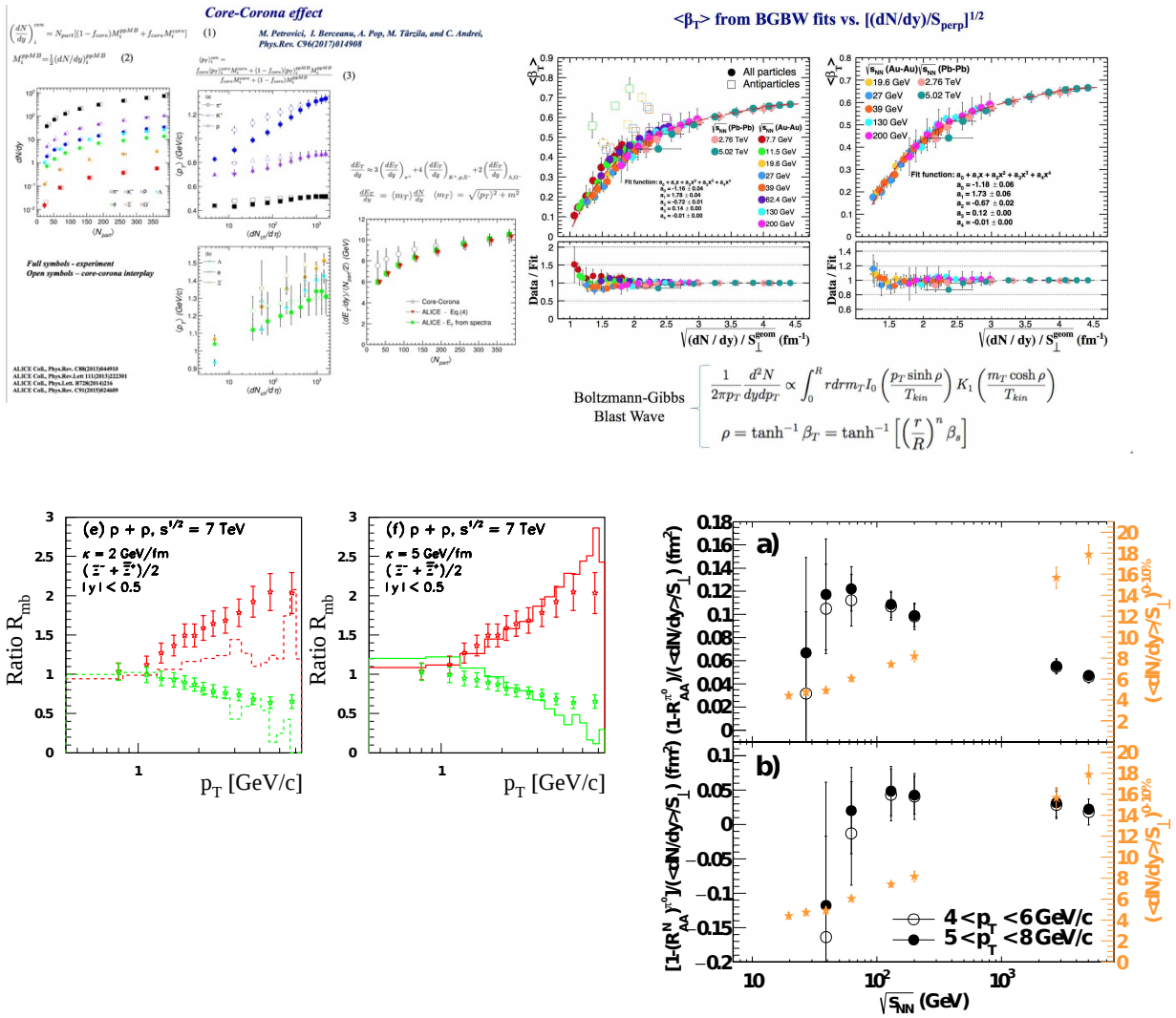
Project web page: http://niham.nipne.ro/RO-CERN_ALICE_20.html

Main objectives of the CERN Experiment/Collaboration:

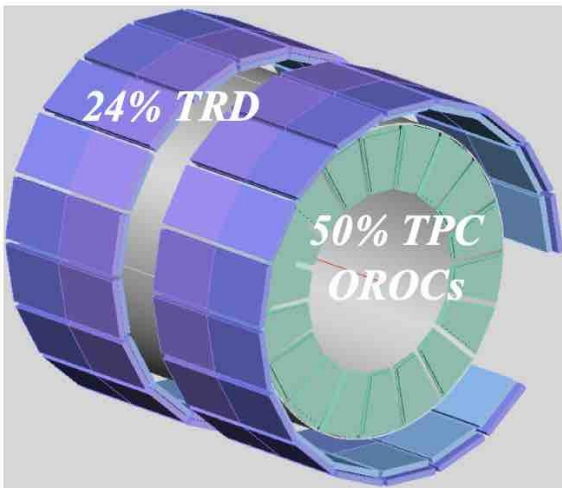
Since 1999, the Hadron Physics Department of the National Institute for Physics and Nuclear Engineering (IFIN-HH) is member of the ALICE Collaboration. ALICE (A Large Ion Collider Experiment), an experiment carried out at the Large Hadron Collider at CERN-Geneva, is optimised for the study of heavy ion and pp collisions with the aim to obtain information on the properties of the hot deconfined matter formed in such collisions and its dynamical evolution. To achieve this goal, ALICE is designed to measure a large set of observables over a large phase space.

Main objectives of the Romanian participation in ALICE Experiment:

Since the beginning of data taking in ALICE, our group proposed and worked out a physics topic related to collective type phenomena in pp collisions, which turned out to be one of the most interesting phenomena to be studied in detail at LHC energies. By analysing the transverse momentum distributions at midrapidity of charged particles, pions, kaons and protons as a function of charged particle multiplicity in pp collisions at $\sqrt{s} = 7$ TeV, similarities with features evidenced in heavy ion collisions have been observed (Nucl.Phys. A931(2014)888). Selection of high multiplicity events close to azimuthal isotropy based on event shape global observables shown to be feasible. Results were presented at international conferences and papers and an extensive paper on multiplicity dependence of light flavour hadron production in pp collisions at $\sqrt{s} = 7$ TeV was published (Phys. Rev. C99(2019)024906). A detailed study of core-corona interplay in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV, the geometrical scaling from energies available at RHIC to those at LHC, the multiplicity dependent transverse momentum distributions of identified particles in pp collisions at $\sqrt{s} = 7$ TeV within HIJING/BB v2.0 model and considerations on suppression in A-A and pp collisions signaling a possible evidence for a new type of deconfined matter at LHC are topics lately published by us in Phys. Rev. C papers (Phys. Rev.C 96(2017)014908)



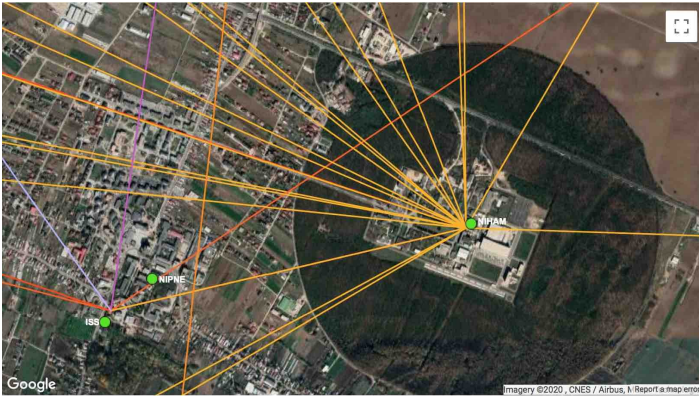
In-progress work is related to multi-differential analysis of p_T spectra of charged and identified particles and two-particle correlations in pp collisions at $\sqrt{s} = 7 \text{ TeV}$ and 13 TeV . Besides the analysis and results obtained by our group in ALICE Collaboration or independent ones related to ALICE physics, the co-authorship of an impressive amount of papers and contributions at international conferences is based on important contributions we had in building the ALICE experiment (24% of the ALICE multiwire proportional chamber of the transition radiation sub-detector and 50% of the outer read-out chambers of the upgraded ALICE-TPC based on GEM technology were



assembled and tested in our team from HPD. A member of our team had an important contribution in developing the TRD tracking.

The PASA CHIP for TRD subdetector was designed with a major contribution of one of our electronic engineer.

Last but not least, our Tier2 Data Centre is one of the most performant site of the ALICE GRID.



Done jobs - NIHAM:

- $6.7 \cdot 10^6$

- 4.7 % of total Tier2 ALICE contribution

CPU:

- 6.6 Mhours 12.46 Mhours

- 4.2 % of total Tier2 ALICE contribution

In Run3 and Run4 at LHC, ALICE will take data for pp and Pb-Pb collisions at high luminosity using the upgraded setup. Operated in this mode, the accumulated statistics will increase such that any kind of multi-differential analysis will be feasible, charge particles multiplicity which could be accessed in pp collisions increasing by one order of magnitude.

More details on HPD contributions to ALICE Experiment at LHC and obtained results could be accessed on <http://niham.nipne.ro> or in <https://www.facebook.com/Hadron-Physics-Department-211078852968333/>