ALICE

Weekly Report

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ACO meeting

2 julio 2016

Outline

- I receive the invitation for HotQuarks2016
- About the paper (EPOS vs PYTHIA) status
- I'll comment the Review about the paper http://arxiv.org/pdf/1509.06735v2.pdf
- About Spherocity analysis note

Outline

- I receive the invitation for HotQuarks2016.
- Next weeks I will check, requirements for (usa) VISA for september

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Associate Professor

TO:
Mr. Hector Bello Martinez
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June 29, 2016

Dear Mr. Bello Martinez

It is my pleasure to invite you on behalf of the Organizing Committee to give a talk on your recent work titled

"Disentangling the non-radial flow effects in small systems"

at the 7th Hot Quarks Conference (Hot Quarks 2016), to be held September 12-17 2016, at the Hilton Garden Inn on South Padre Island, TX, USA. We are going to have a great roster of speakers at this year's Hot Quarks conference, and we are looking forward to hearing about your research.

We hope to see you on South Padre Island this September.

Sincerely,

Rainer Fries

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(for the OC)

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Outline

- About the paper (EPOS vs PYTHIA) status
- Paper text was remodified,
- Plots changed
- Now it ready for our last comments (internal review) this weekend
- Next week will be present internal review in the groups

- About spherocity analysis
  I am updating this with the Information of the last report (results with V0M vs ref)

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(will be inserted by the editor)

Unfolding the origin of the radial flow patterns in pp collisions

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Abstract In this work we propose a tool for tracing the origin of the collective-like behavior observed in small collision systems. We exploit the fundamental difference between the underlying mechanisms which produces flow patterns in two Monte Carlo generators, EPOS 3.117 and PYTHIA 8.212. Specifically, the strength of the correlation between the jet (hard partons) and the bulk (soft and semi-hard partons) matter. While in PYTHIA 8.212 color reconnection and multiple-partonic interactions are expected to give a strong correlation, in EPOS 3.117, where hydrodynamics is included in the simulations, a weak dependence should be observed. In practice, we study the transverse momentum ($p_{\rm T}$) distributions of identified particles, since they are sensitive to radial flow, as a function of the event multiplicity ($N_{\rm ch}$) and the transverse momentum of the leading jet ($p_{\rm T}^{\rm jet}$). The expectations are found to be in good agreement with the results. Namely, from the simultaneous fit of the blast-wave function to the $p_{\rm T}$ spectra of charged pions, kaons and (anti) protons; a strong (weak or no) dependence of the average transverse expansion velocity with $p_{\rm T}^{\rm jet}$ is found in PYTHIA 8.212 (EPOS 3.117). In addition, even in low multiplicity events, the balast-wave model nicely describes the $p_{\rm T}$ spectra when a jet is found within the acceptance. The results encourage to perform this kind of analysis using data from RHIC and LHC.

Keywords Color reconnection, hydrodynamics, particle production

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1 Introduction

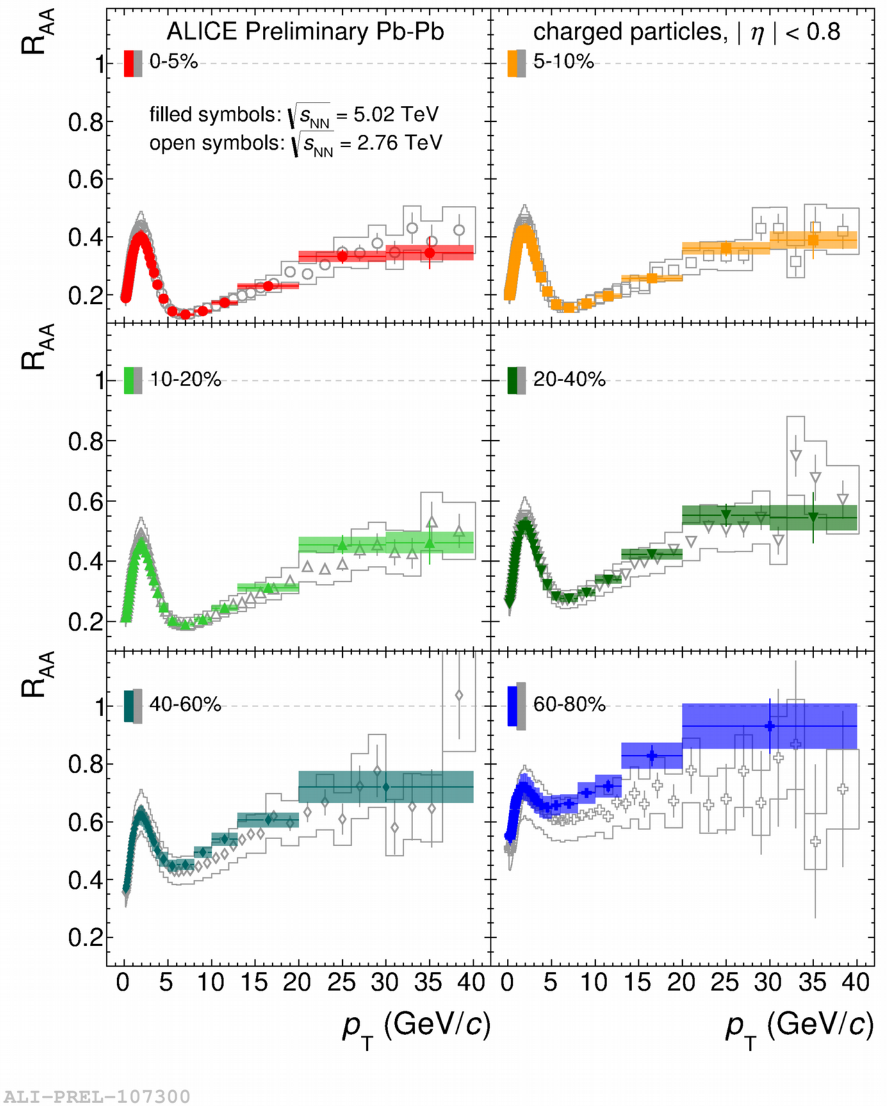
The study of high multiplicity events in small collision systems, like pp, has become crucial due to the recent results of the experiments at the LHC. Specifically, for high multiplicity pp and p-Pb collisions, radial flow signals [1,2], long-range angular correlations [3,4] and the strangeness enhancement [5,6], have been reported. Those effects are well known in heavy-ion collisions, where they are attributed to the Quark-Gluon Plasma (QGP) formation [7,8,9]. The understanding of the phenomena is crucial because for heavy-ion physics, pp and p-Pb collisions are historically used as the baseline to extract the genuine QGP effects. However, it is worth mentioning that so far no jet quenching effects have been found in p-Pb collisions [10], suggesting that other mechanisms could cause the collective-like behavior in small collision systems [11].

For example, within the dilute-dense limit of the color glass condensate it has been demonstrated that the physics of fluctuating color fields can generate the azimuthal multiparticle correlations [12]. The same observable has been studied using the multi-phase transport model, where, it has been shown that the ridge structure can be generated assuming the incoherent elastic scattering of partons and the string melting mechanism which converts all excited strings into quarks and antiquarks [13]. Other mechanisms like "color ropes", which are formed by the fusion of color strings close in space, produce more strange particles and baryons, and also contribute to increase the radial flow-like effects [14]. Finally, it has been also reported that in pp collisions, multi parton interactions (MPI) and color reconnection (CR) produce radial flow patterns via boosted color strings [15].

Motivations

Recent preliminary plots on RAA and discusions on the ALICE col gives 2 important points:

- 1.- RAA_{pions} ~ RAA_{D} (no color charge dependence).
- 2.- Same suppresion is seen for 2.76 TeV and 5.02 TeV, data.



A review of the paper

- **Scaling properties of fractional momentum loss of high-pT hadrons in nucleus-nucleus collisions at √sNN from 62.4 GeV to 2.76 TeV**
- **http://arxiv.org/pdf/1509.06735v2.pdf**

Scaling properties of fractional momentum loss of high-pT hadrons in nucleus-nucleus collisions at √sNN from 62.4 GeV to 2.76 TeV

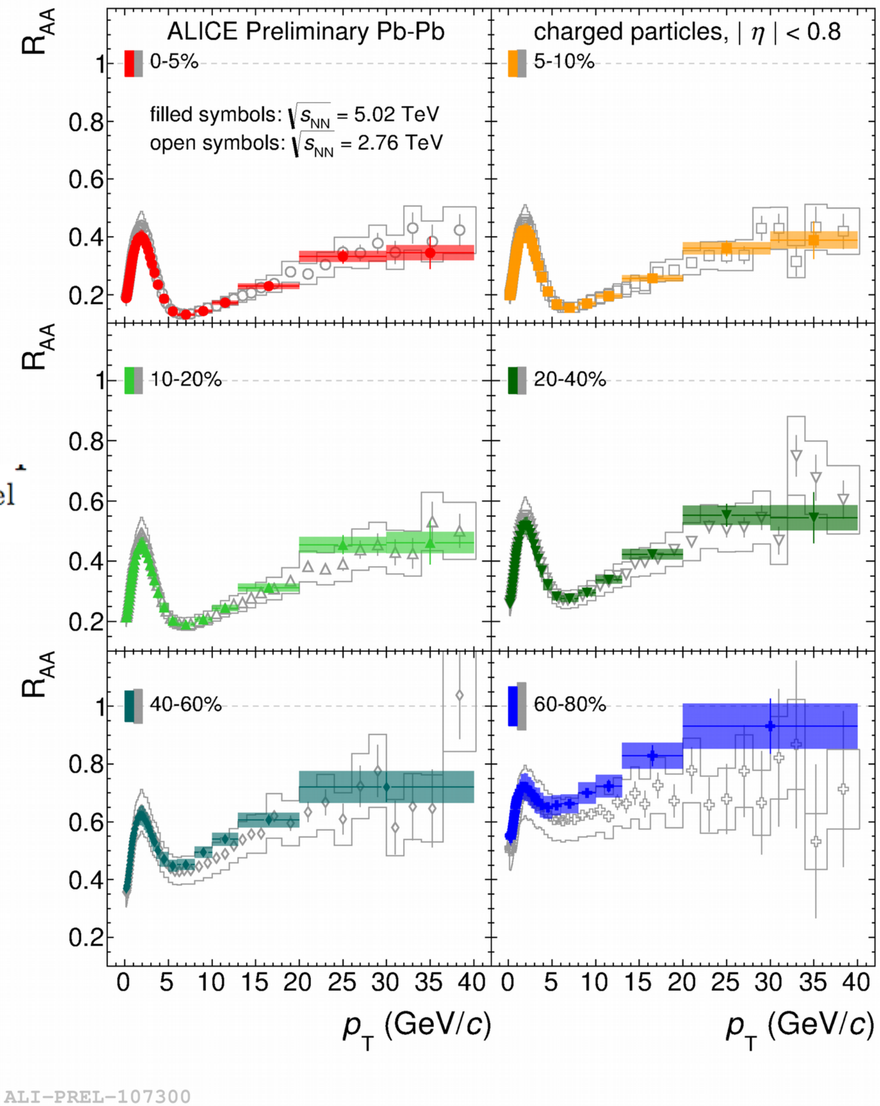
In heavy ion collisions a hot, dense medium is rapidly forme capable of interacting with the high pT partons in primordial hard scattering and making them lose some energy.

$$R_{AA}(p_T) = \frac{(1/N_{AA}^{evt})d^2N_{AA}^h/dp_Tdy}{\langle T_{AA}\rangle \times d^2\sigma_{pp}^h/dp_Tdy}, \quad \langle T_{AA}\rangle = \langle N_{coll}\rangle / \sigma_{pp}^{inel}$$

RAA=1, it is usually assumed that the yield measured in A+A collisions is explained by the primordial hardproductior as observed in p+p collisions with no nuclear or medium eff

RAA<1 (suppression) the A+A yield at a given pT is less tha that expected from the scaled p+p.

Parton energy loss is expected to depend both on system si and collision energy, but RAA is similar.



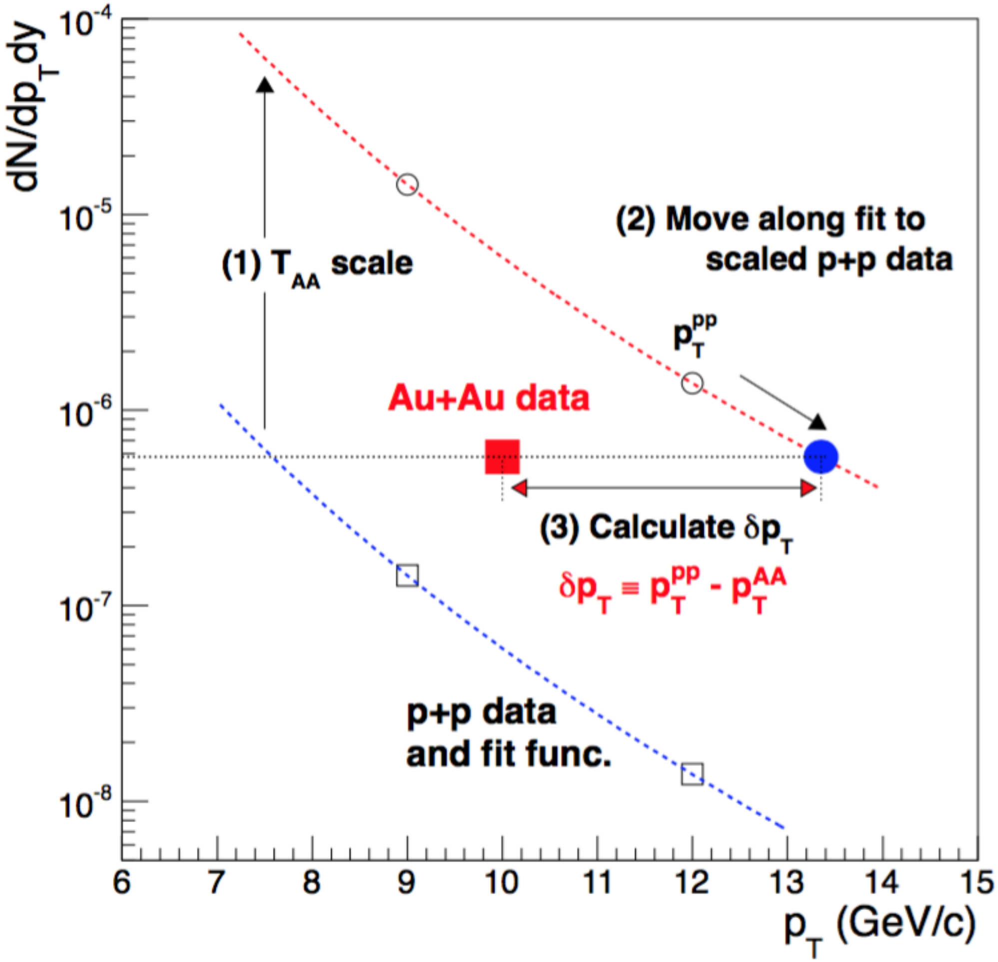
the fractional energy loss of partons $\Delta E/E$ is indeed significantly different between LHC and RHIC even though the RAA is similar

S_loss

Instead of RAA one can employ the fractional Momentum loss (Sloss) of high pT hadrons as a measure of parton energy loss wich would Reflect the average fractional energy loss of the initial partons. $\langle \Delta E/E \rangle \sim S_{\rm loss}$

Sloss is defined as

$$S_{\rm loss} \equiv \delta p_T/p_T = \frac{p_T^{pp} - p_T^{AA}}{p_T^{pp}}$$



- **http://arxiv.org/pdf/1509.06735v2.pdf**

S_loss

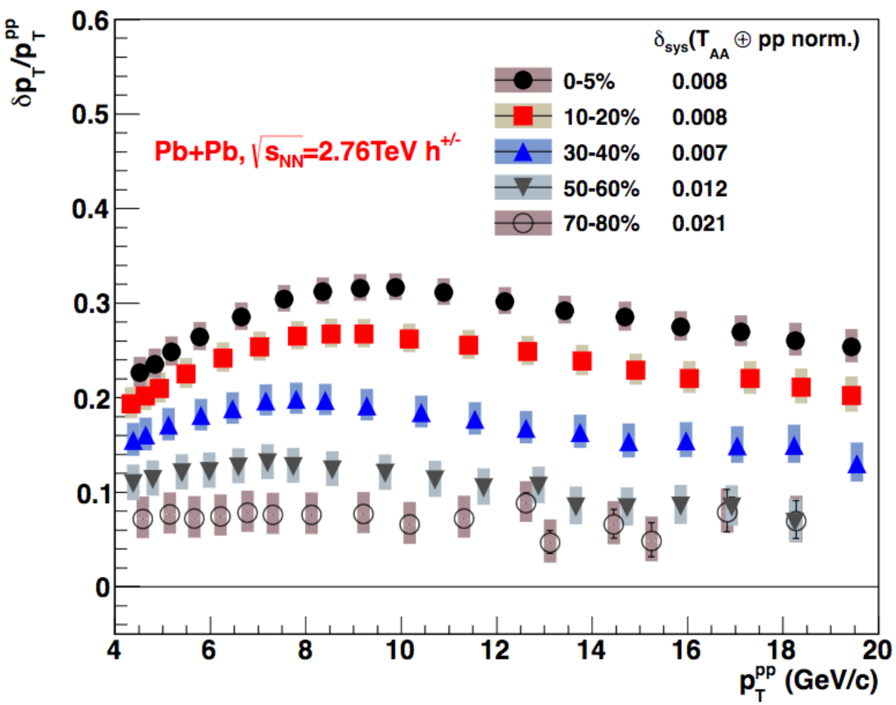


FIG. 7. (Color online) p_T^{pp} dependence of $S_{\rm loss}$ for charged hadrons in 2.76 TeV Pb+Pb collisions using the result from the ALICE experiment [16, 19]. $\delta_{\rm sys}(T_{AA} \oplus$ pp norm) are Type-C errors and show the absolute amount that the data points would move.

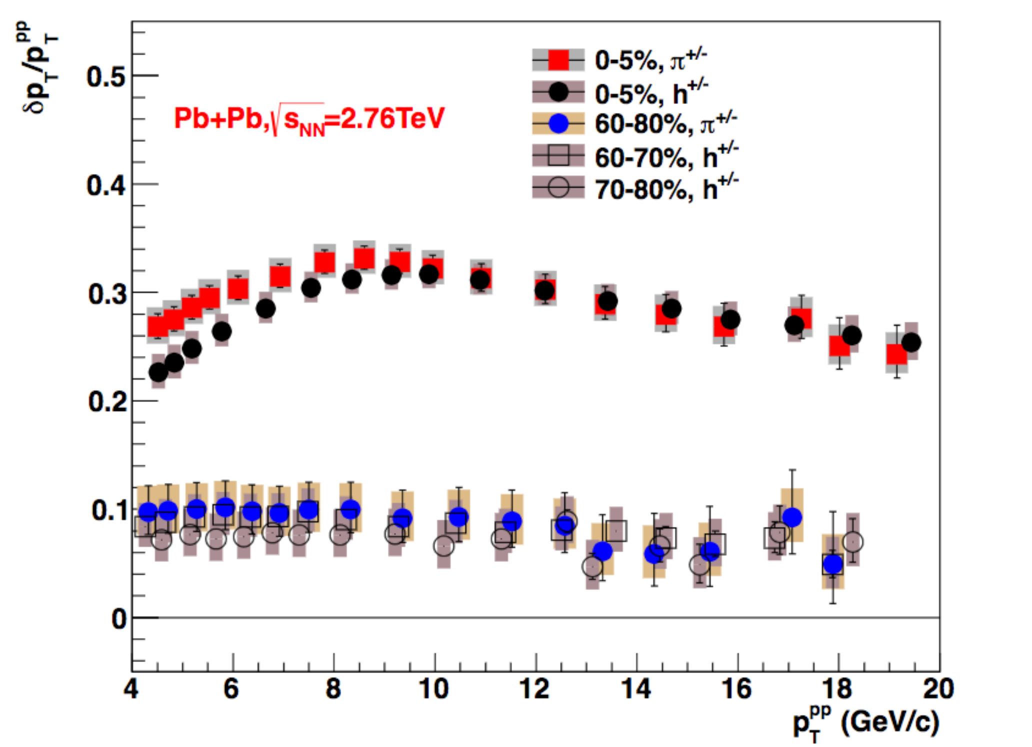
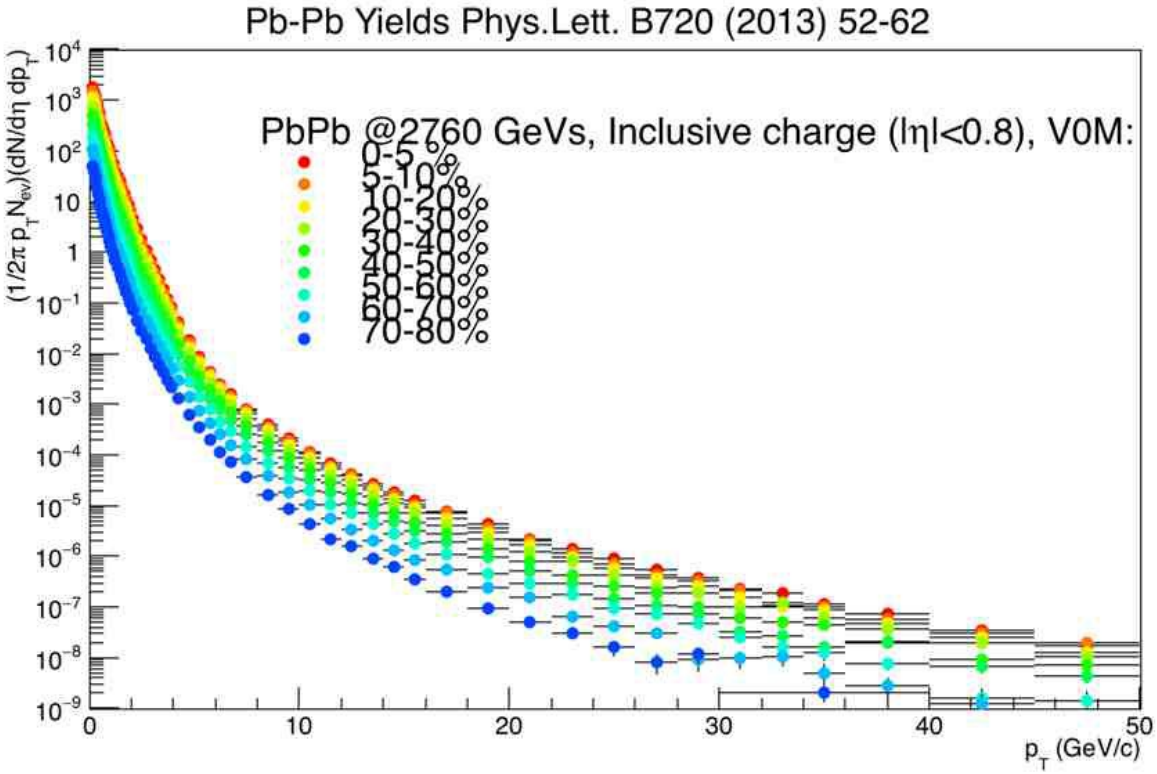
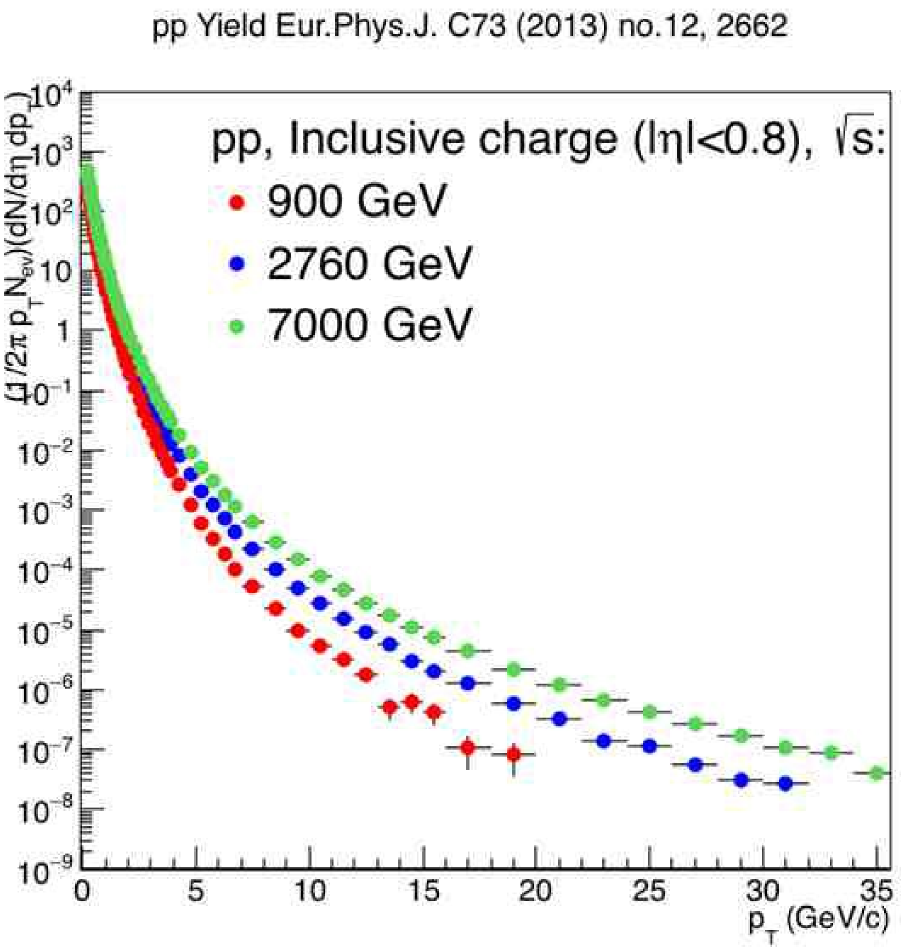


FIG. 8. (Color online) p_T^{pp} dependence of $S_{\rm loss}$ for charged pions in 2.76 TeV Pb+Pb collisions together with those for charged hadrons from the same collision system. The charged pion result is from the ALICE experiment [17].

- **http://arxiv.org/pdf/1509.06735v2.pdf**

Yield spectra for 0.276 TeVs (Durham database)





S_loss

To done:

- I need to get the TAA for scaling pp data for each PbPb centrality.
- Calculate for Pi/k/P and Ds.
- The idea is to include .502 TeV when data is ready.