Measurement of heavy-flavour decay electron – hadron correlation in p-Pb and pp collisions with ALICE

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Physics motivations

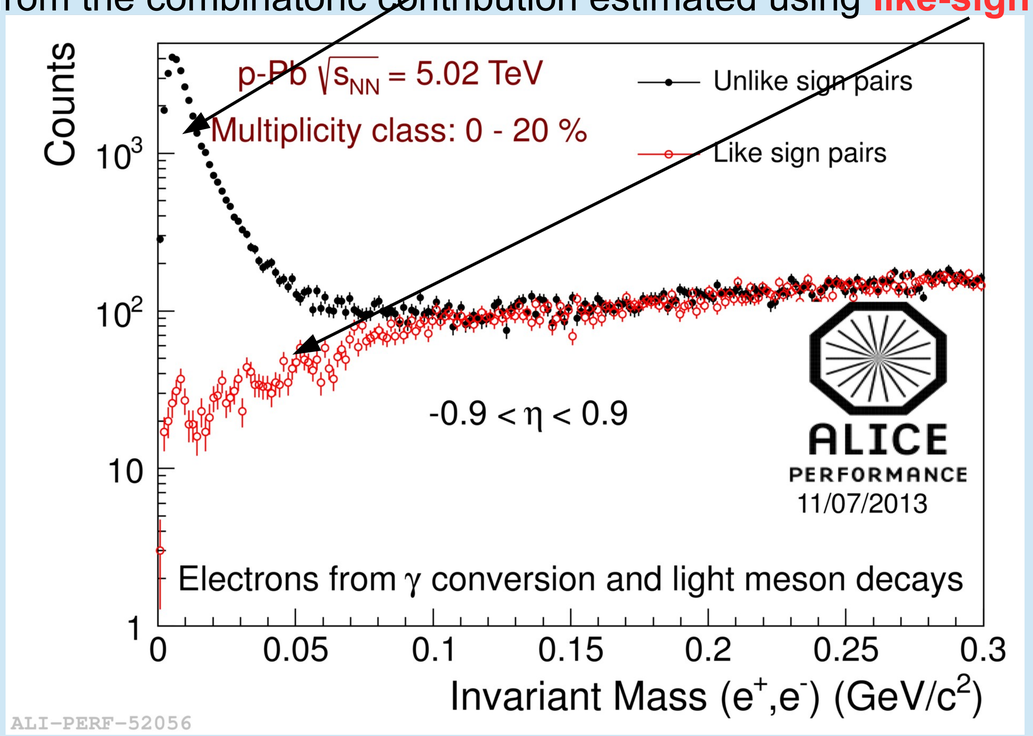
- **Heavy quarks** (charm and beauty) **are valuable probes to study the quark-gluon plasma (QGP) created in heavy-ion collisions**. Produced in the initial hard parton scatterings of the collision, **they experience the whole medium evolution**. Therefore, the measurements of hadrons carrying heavy quarks (mainly D and B mesons) as well as their decay products are powerful tools to study the QGP.

- **Angular correlation of electrons from heavy-flavour hadron decay with other charged particles of the collision** i.e. their distribution in $\Delta\varphi_{e\text{-}h} = \varphi_h - \varphi_e$ and in $\Delta\eta_{e\text{-}h} = \eta_h - \eta_e$ **gives valuable information about in-medium jet modification as well as collective effects** [1,2].

- **To constrain QGP properties one has to untangle hot nuclear matter effects** (due to its presence) **from cold nuclear matter effects;** to do this one has to **study p-Pb and pp collisions** where no QGP is expected to be formed.

Background subtraction

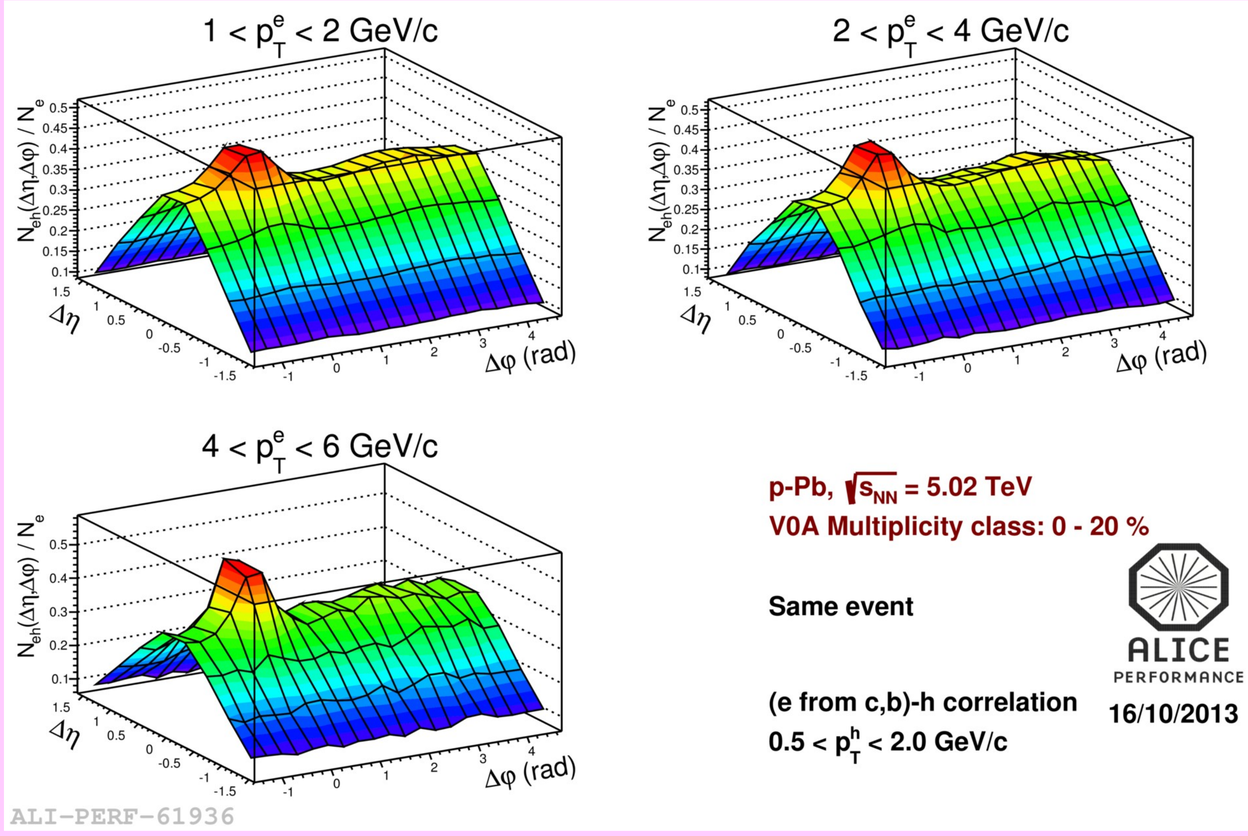
After electron identification based in d*E*/d*x* measurement with ALICE Time Projection Chamber, electron background, that comes mainly **from photon conversion and Dalitz decay** is estimated from **invariant mass** of **unlike-sign electron pairs** subtracted from the combinatoric contribution estimated using **like-sign pairs**



The single electron background distribution (where only one electron of the pair is reconstructed) is estimated from simulations and from the reconstructed background distribution (assuming no qualitative difference)

Raw angular correlation distributions

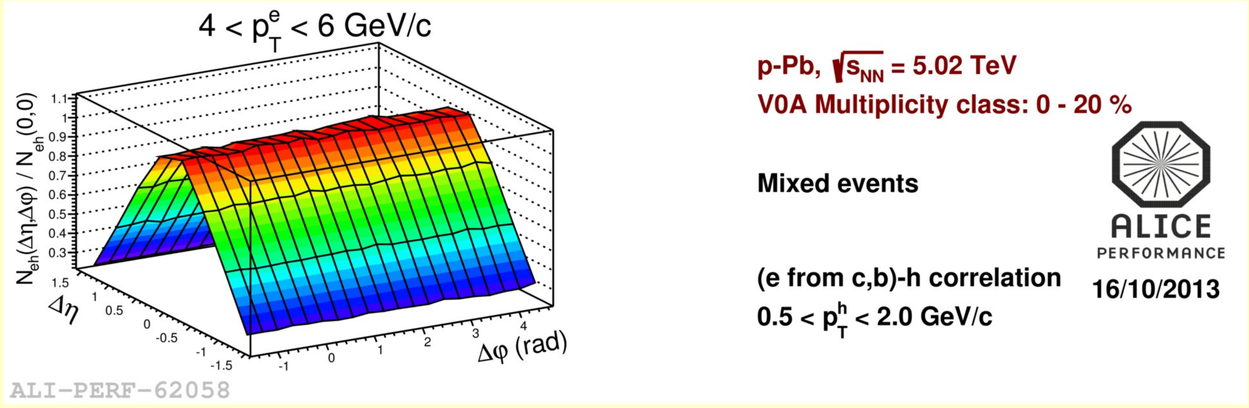
The distribution of electron-charged hadron angular correlation is obtained for **|Δη|<1.6 and full φ** (at mid-rapidity: |η| < 0.9):



For p-Pb collisions, **3 multiplicity classes have been studied**: 0-20 % (highest multiplicity range, figure above), 20-60 % and 60-100 %

Acceptance and efficiency corrections

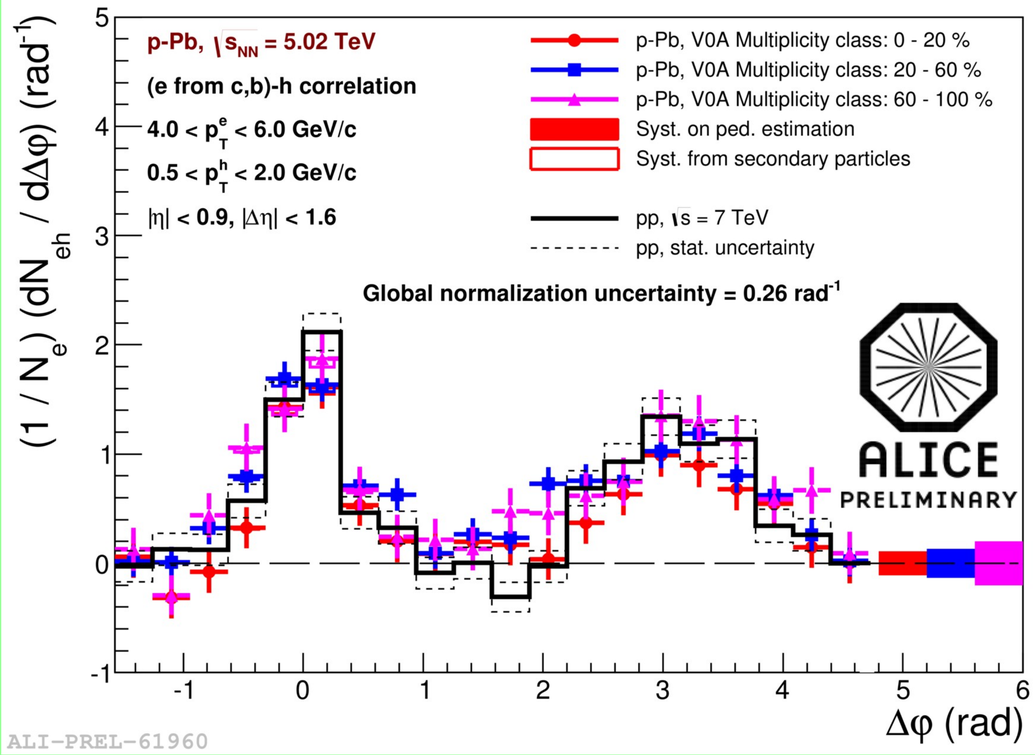
Efficiency/acceptance correction of pair reconstruction is partially obtained from a data-driven method that relies on **mixed event** (an electron trigger is associated with charged particles of another collision) distribution of electron-charged hadrons:



Monte-Carlo simulations are used to find the **absolute normalization of this correction** (arbitrarily normalized to 1 at maximum in the above figure). In addition these simulations are used to correct from the contribution of **secondary particles** to the charged hadron distribution.

Preliminary results and outlook

Corrected correlation distribution can be projected along Δφ axis:



Preliminary results are compatible with no jet modification and no collective behaviour in 4 < p_T^e < 6 GeV/*c*. Lower p_T^e ranges, where collective behaviour could be expected, are under study.

Work in progress towards publication of the results.

[1] M. Gyulassy and M. Plumer, "Jet Quenching in Dense Matter," *Phys. Lett.* **B243**(1990) 432–438.
[2] S. Voloshin and Y. Zhang, "Flow study in relativistic nuclear collisions by Fourier expansion of Azimuthal particle distributions," *Z.Phys.* **C70** (1996) 665–672