



R. Nania  
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For the ALICE collaboration

## Stato di ALICE

### Altre presentazioni di ALICE

S. Beolè                      Il commissioning di ALICE

C. Bianchin                      Studi di Heavy Flavours in pp e PbPb in ALICE

#### Poster

V. Altini                      Il trigger del Silicon Pixel Detector di ALICE

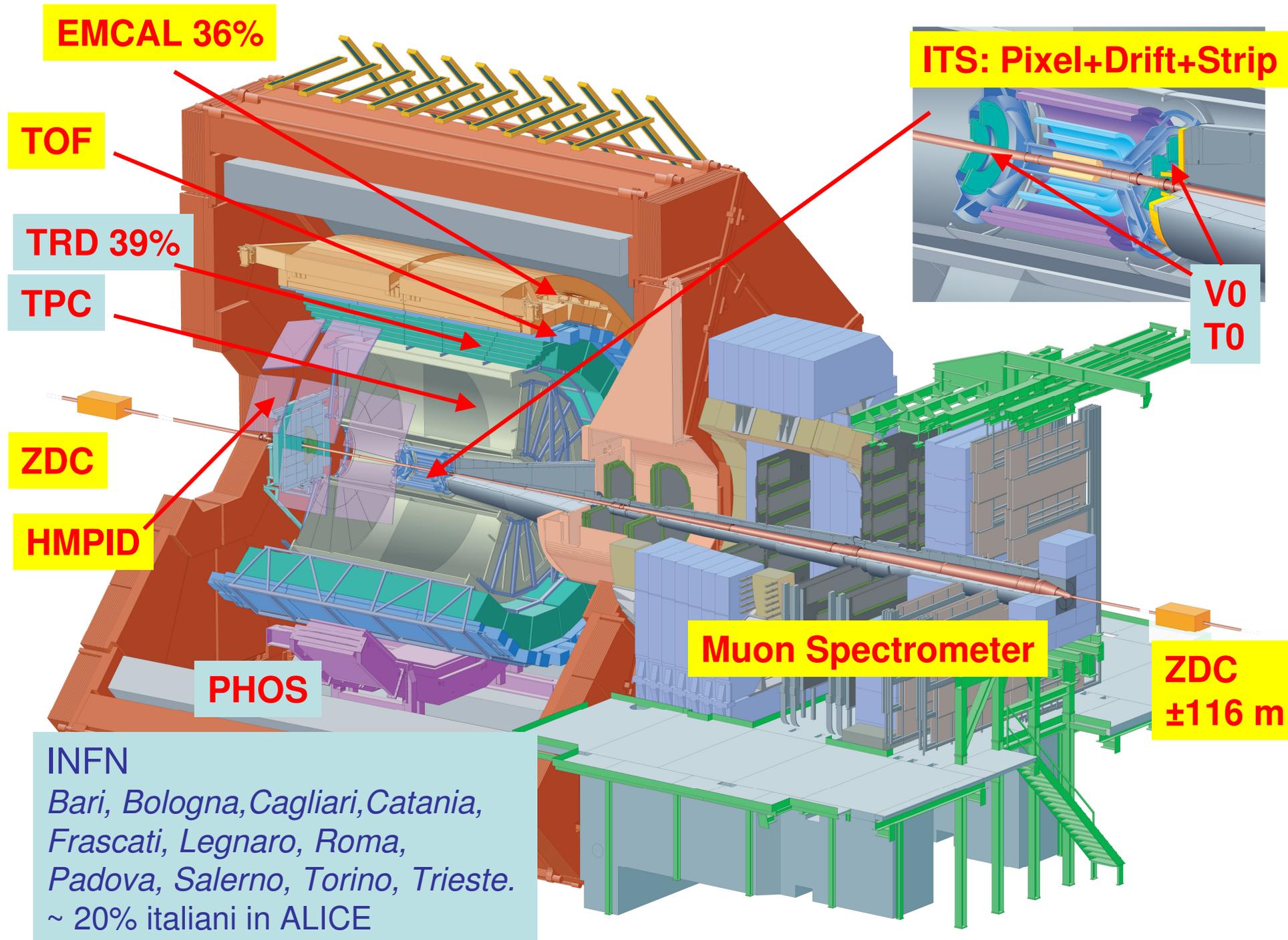
M. Caselle                      Monolithic silicon pixel detectors

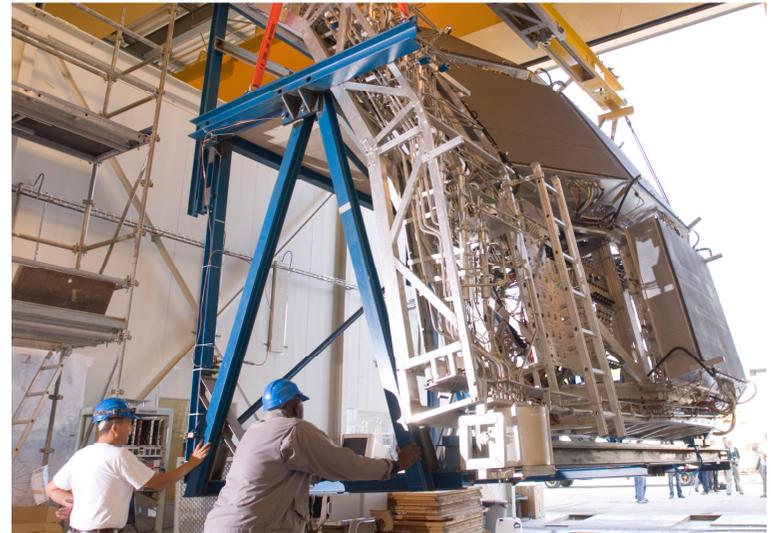
C. Di Giglio                      Studio produzione open Beauty via  $B \rightarrow J/\psi + X$  in ALICE

R. Ferretti                      Setting-up e calibrazioni del Silicon Pixel Detector di ALICE

C. Terrevoli                      Performances del Silicon Pixel Detector di ALICE

A. Dainese                      Rassegna di fisica degli ioni pesanti



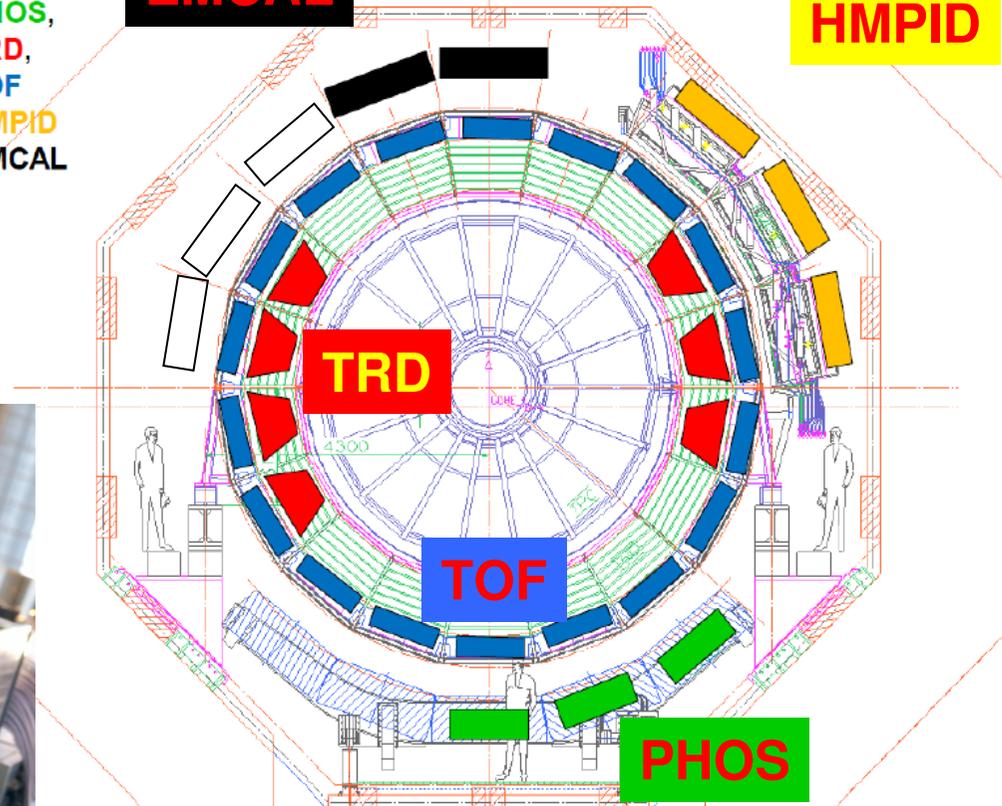


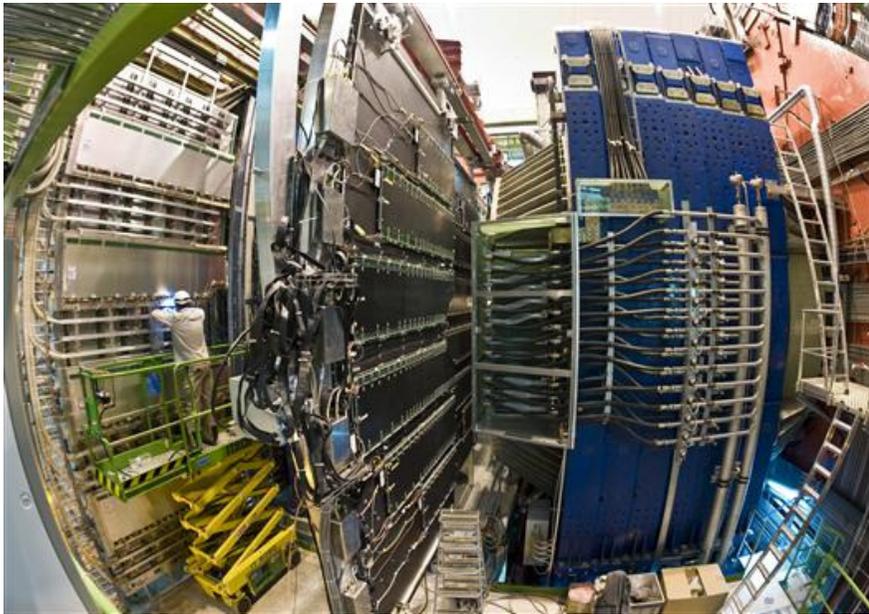
**EMCAL**

**HMPID**

PHOS,  
TRD,  
TOF  
HMPID  
EMCAL

**ZDC**





**Muoni**

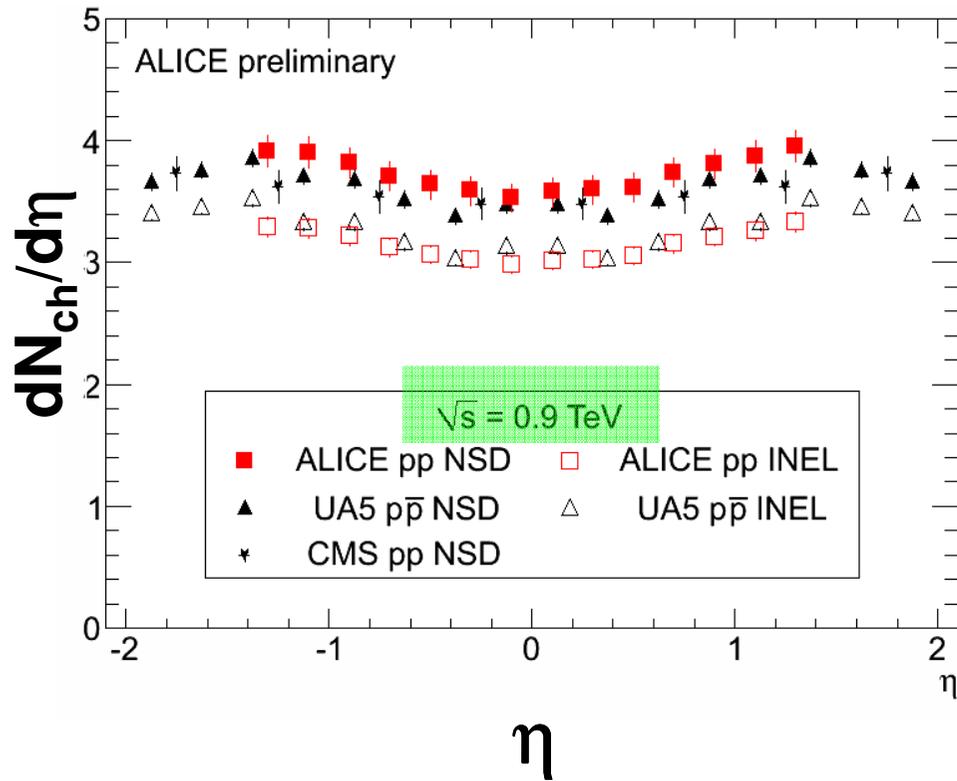


**ITS**



**TOF**

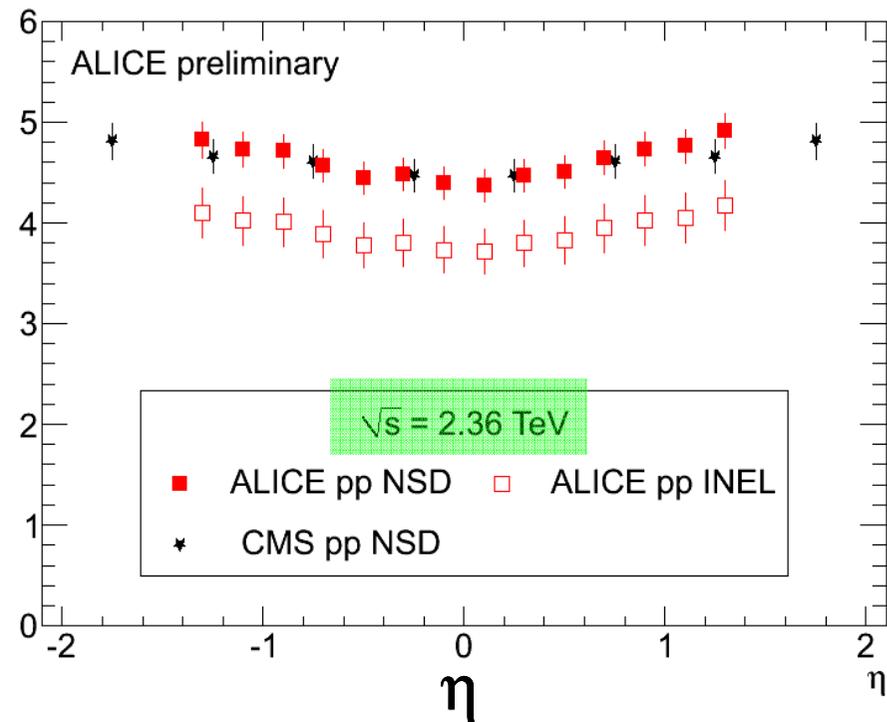


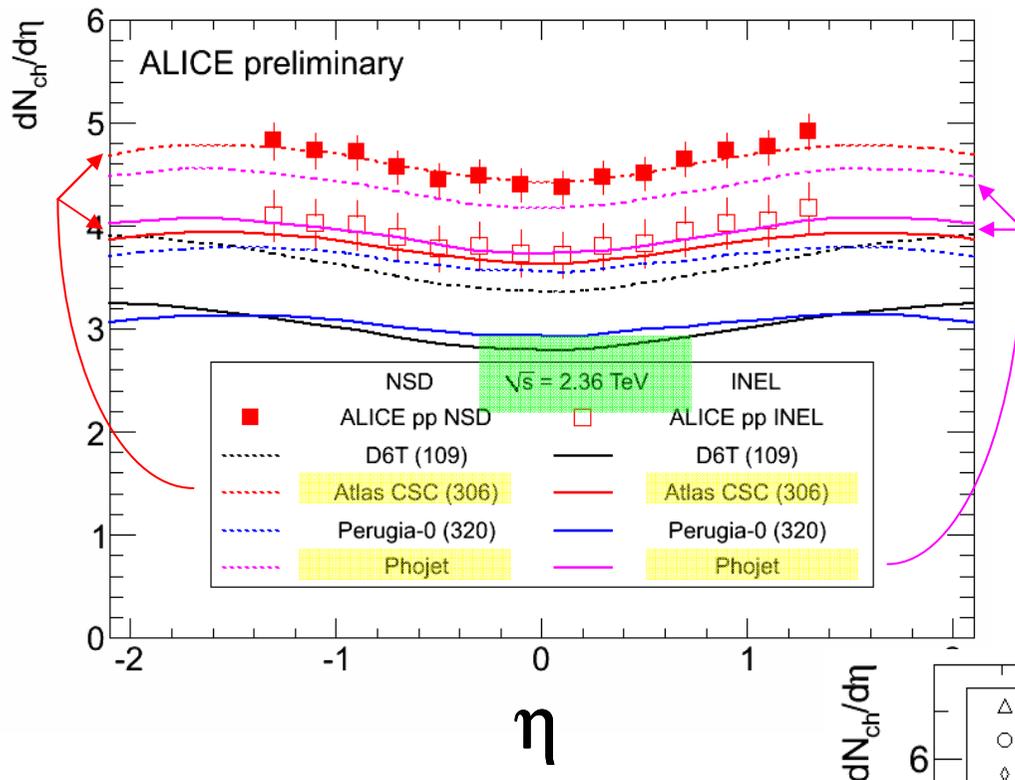


- CMS no ch leptons  $\rightarrow \sim 1.5\%$  diff.
- ALICE and CMS stat. + syst.
- UA5 only stat. error

$\frac{dN_{ch}}{d\eta}$

$\frac{dN_{ch}}{d\eta}$

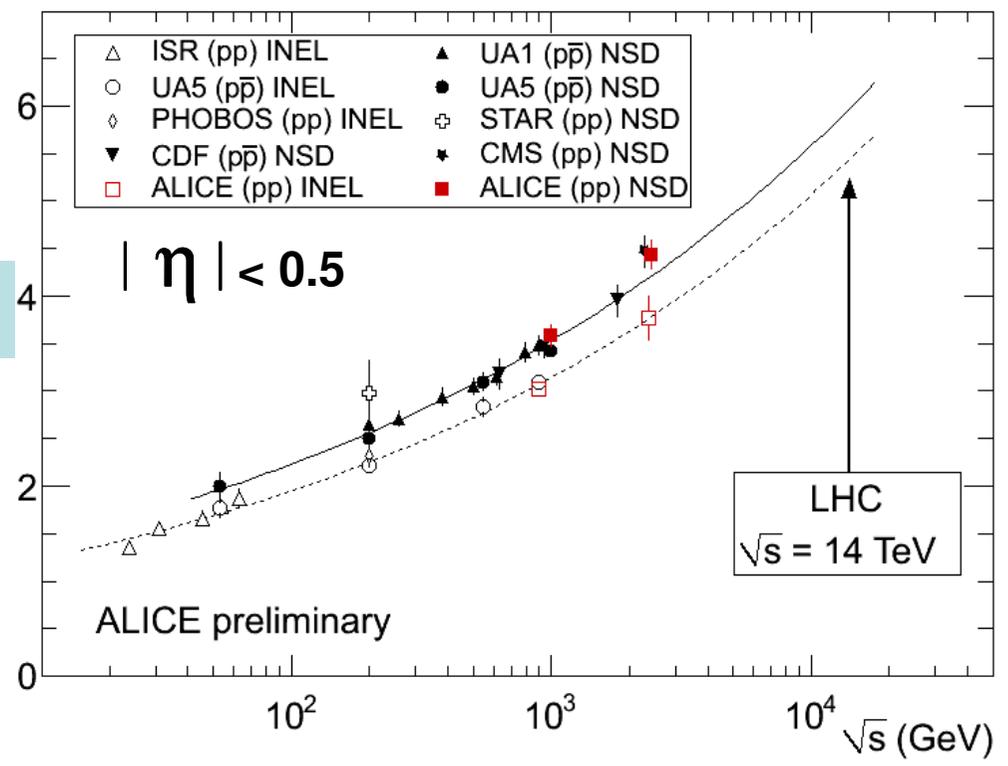




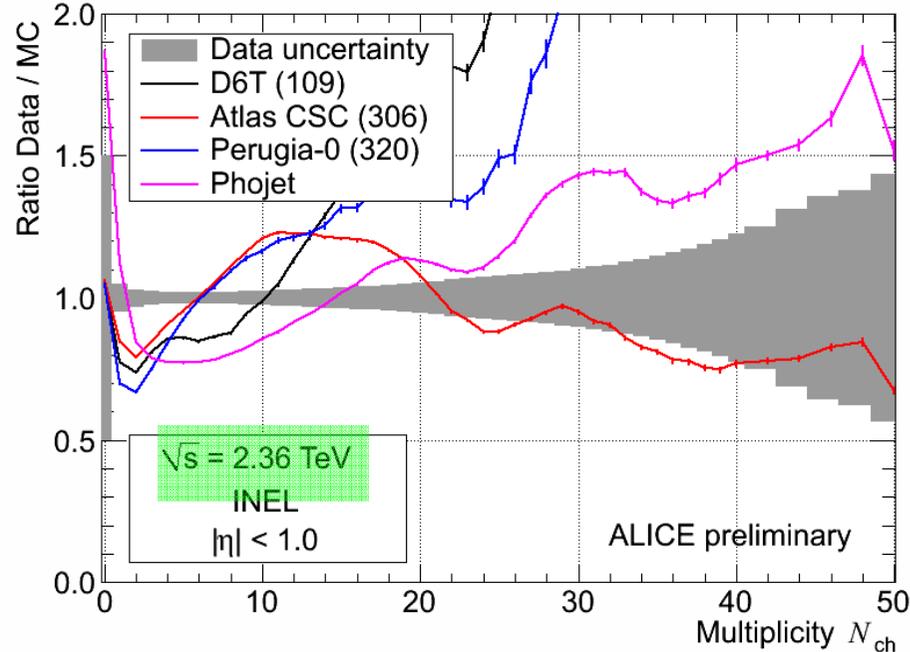
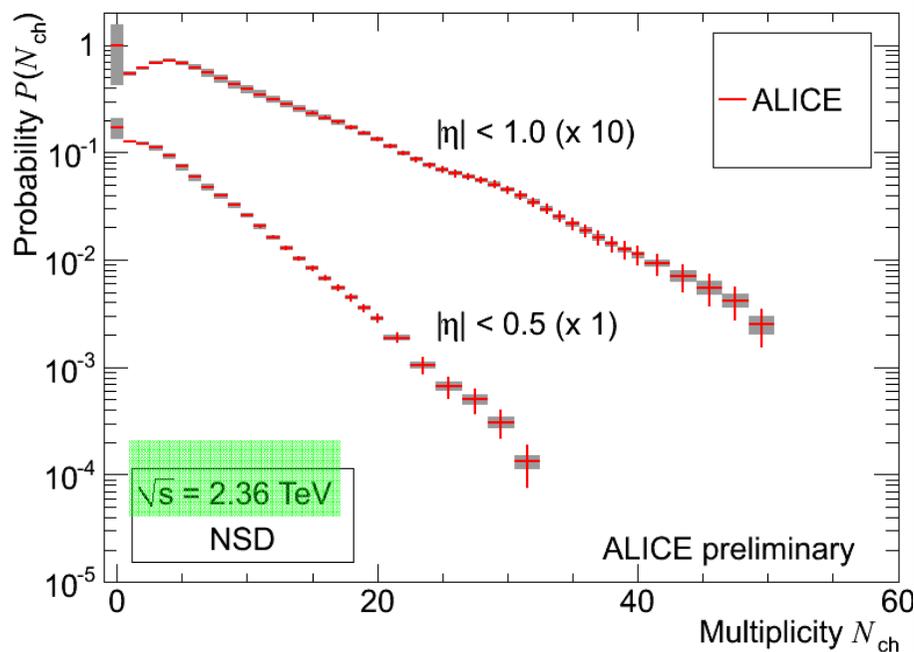
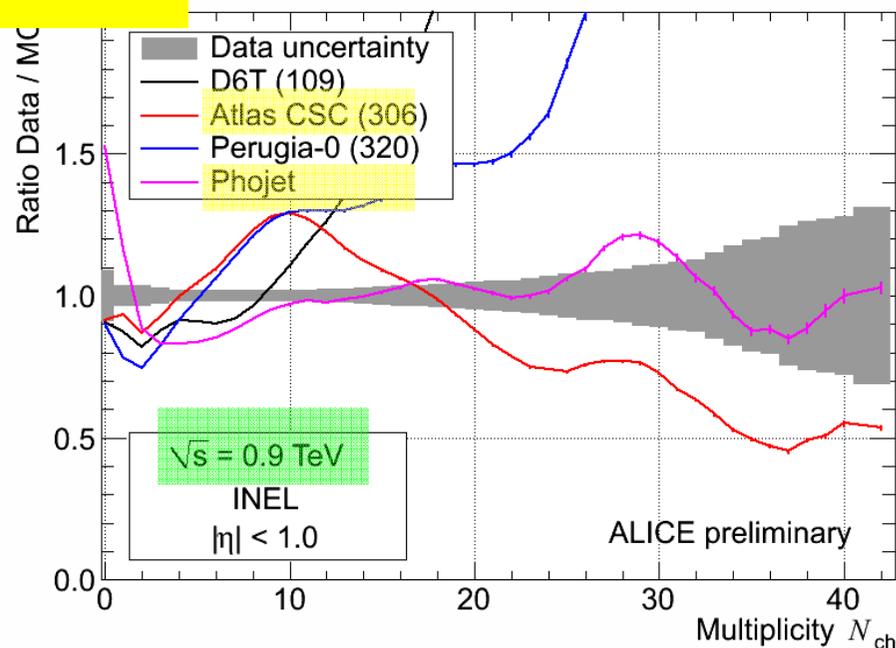
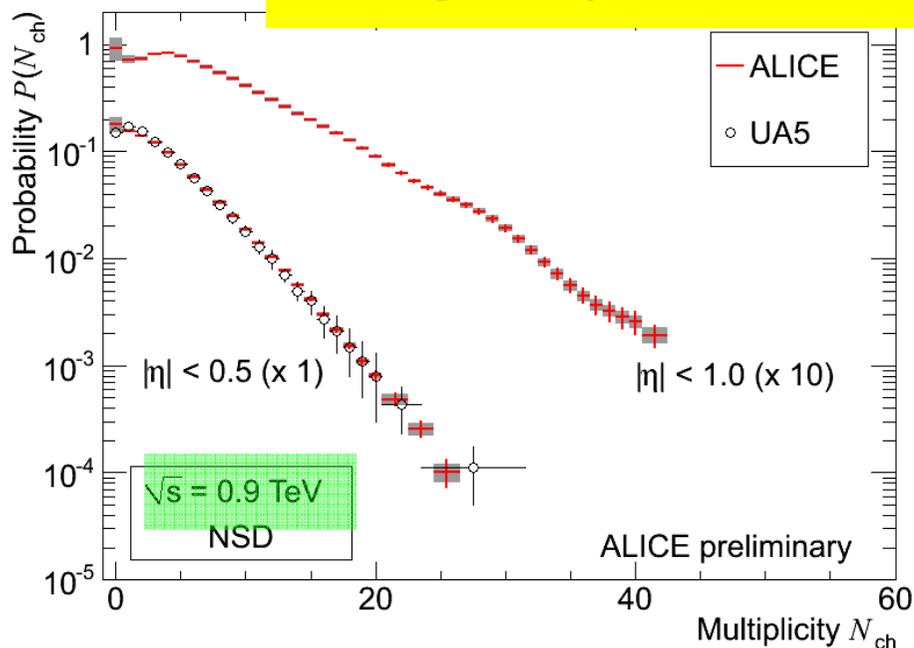
$dN_{ch}/d\eta$

Confronto con MC

Dipendenza da energia c.m.

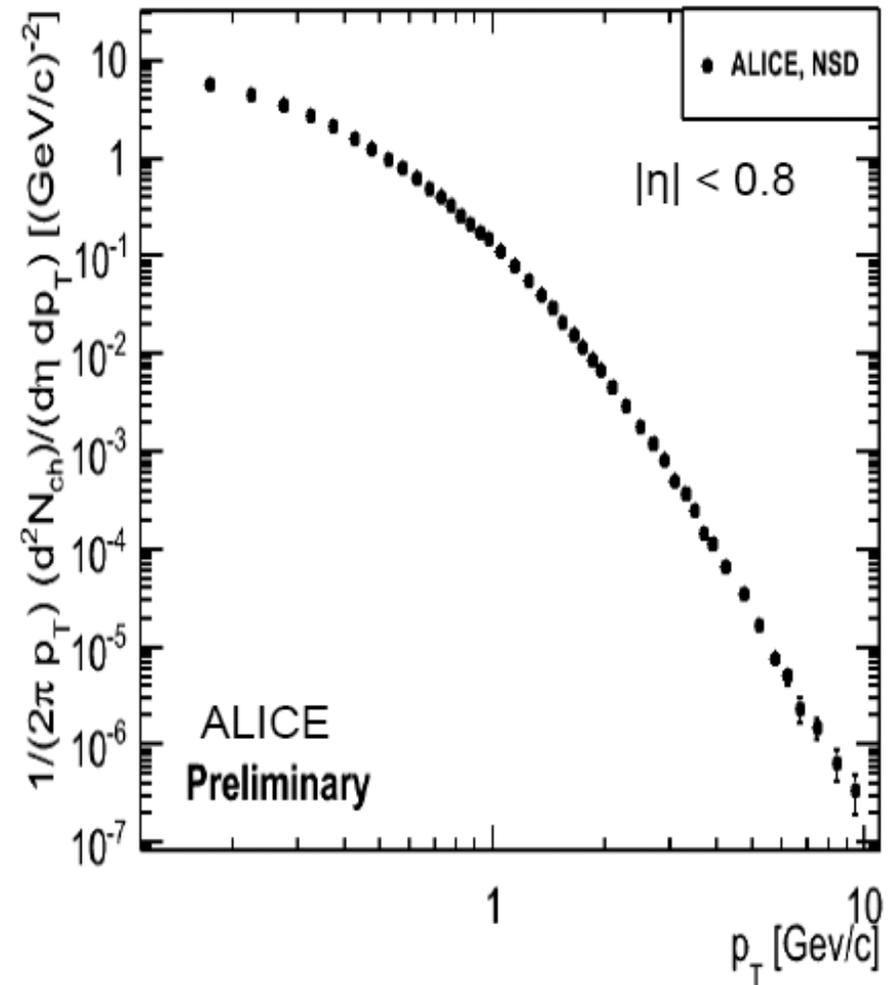
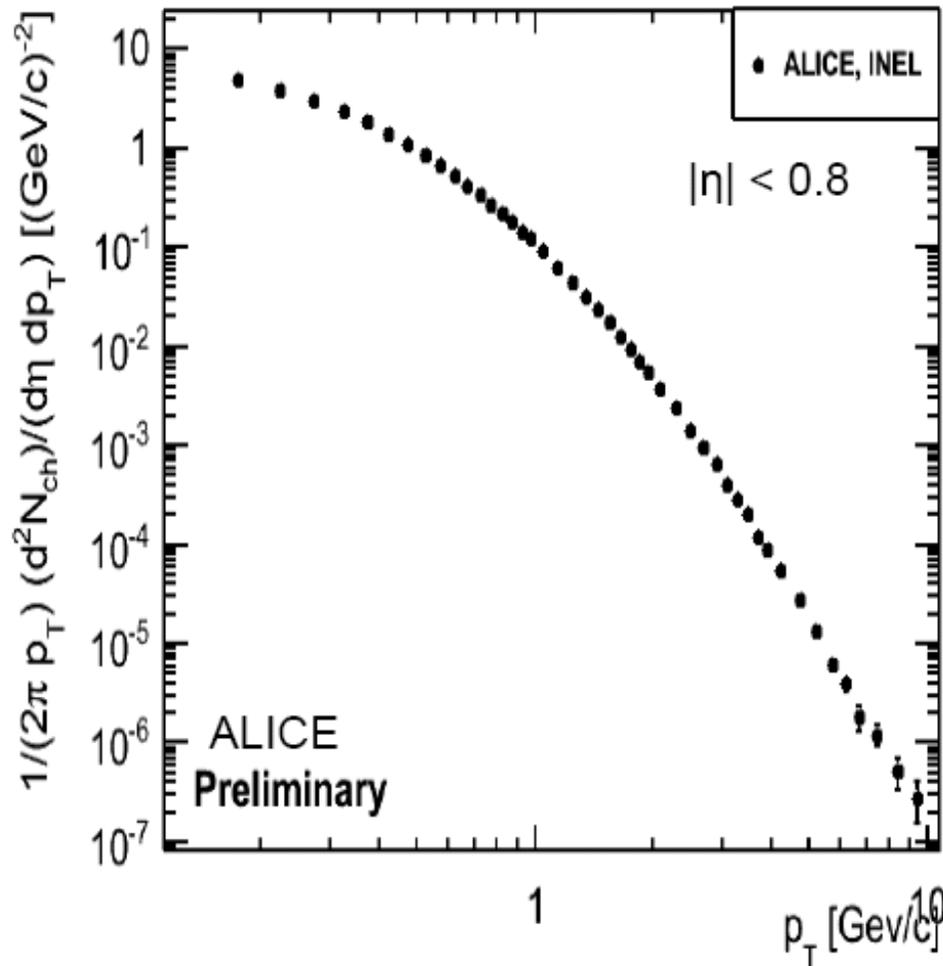


# Multiplicity distributions



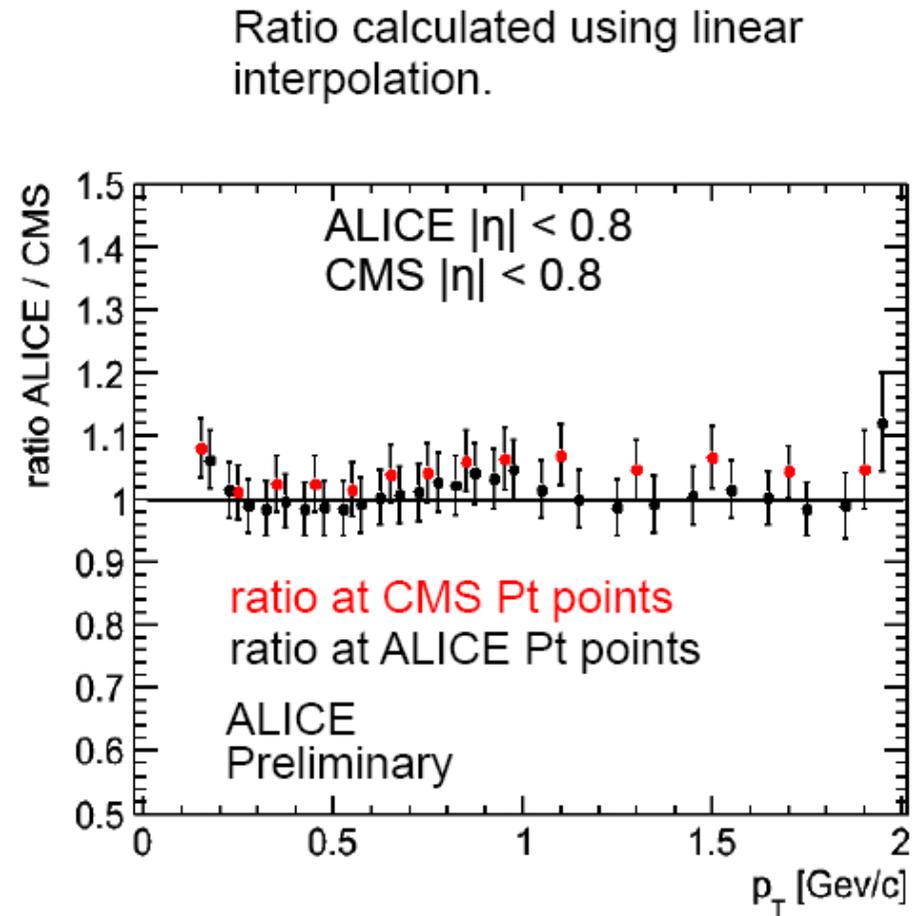
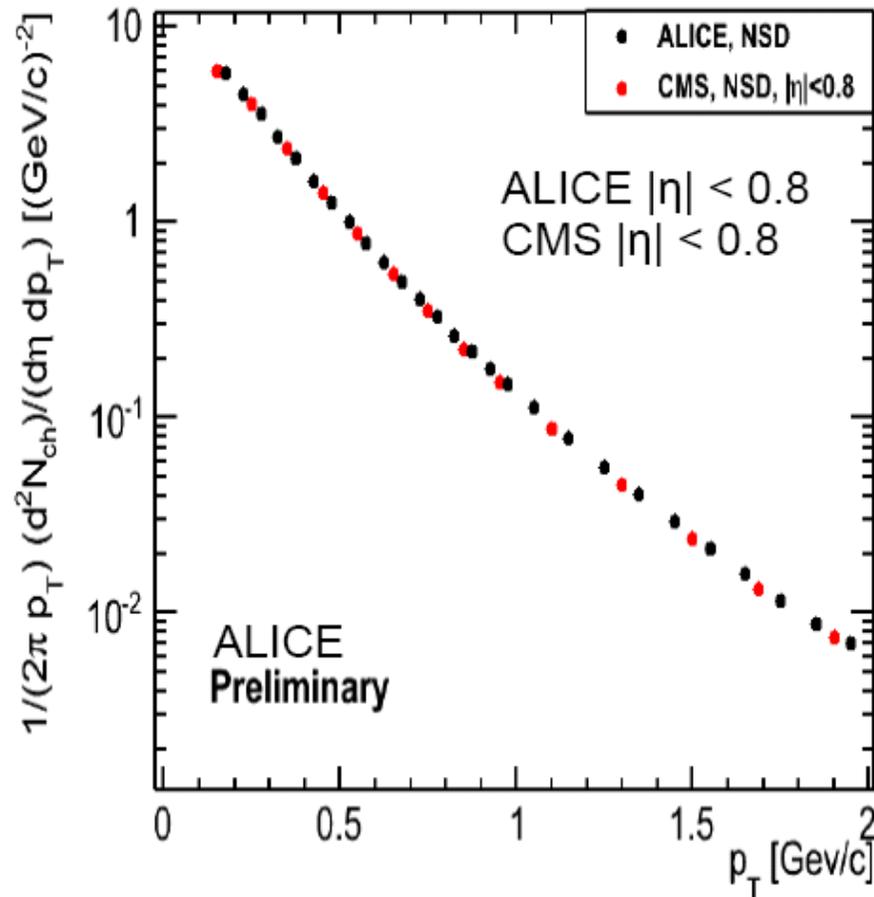
# Inclusive particle spectra I

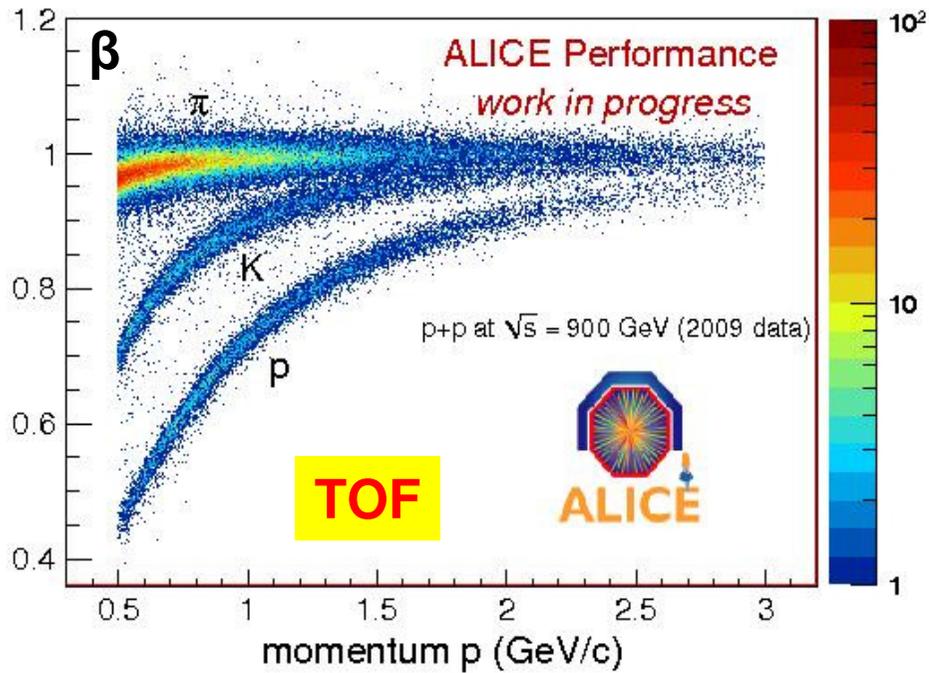
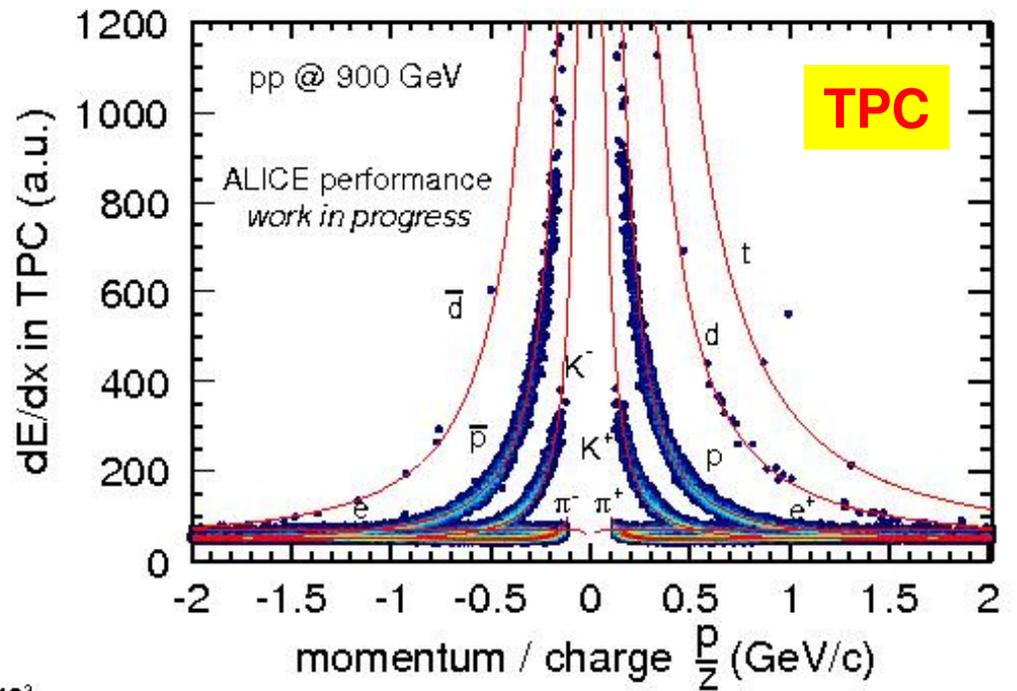
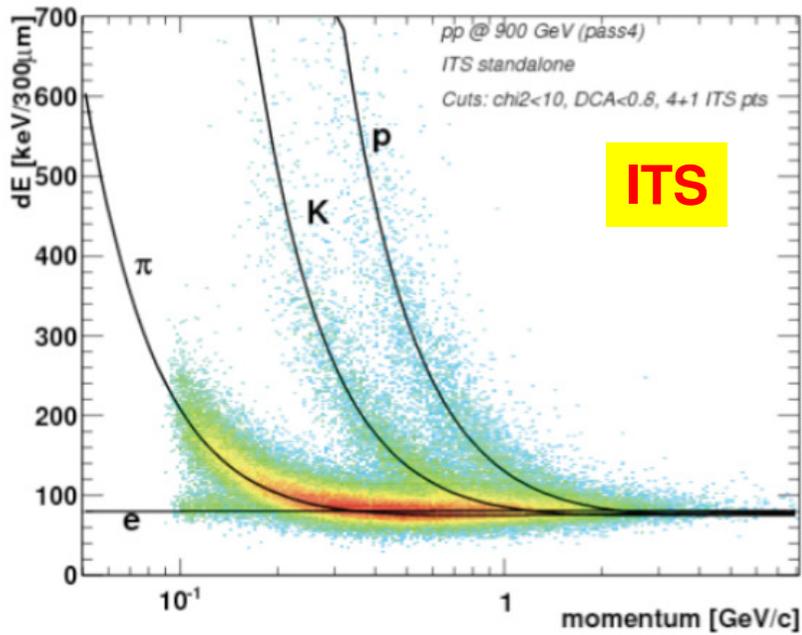
Only statistical errors!



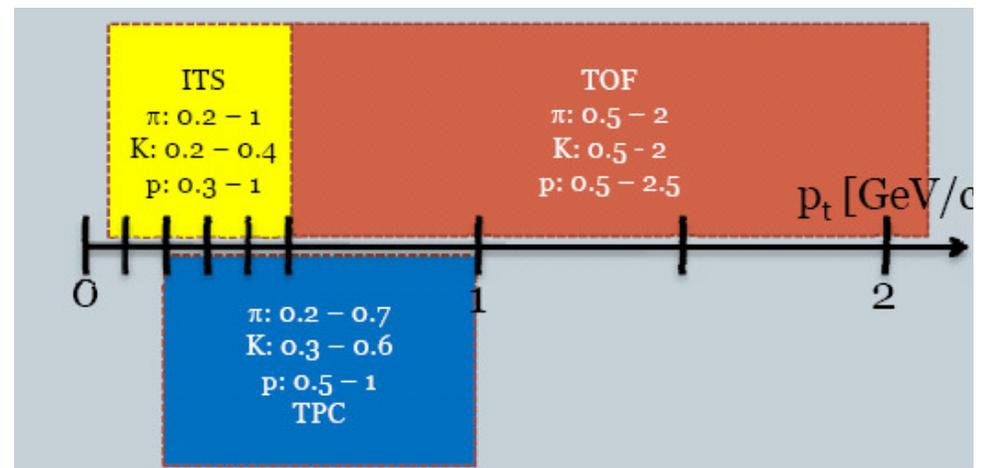
# Inclusive particle spectra II

CMS data: arXiv:1002.0621v1 [hep-ex]



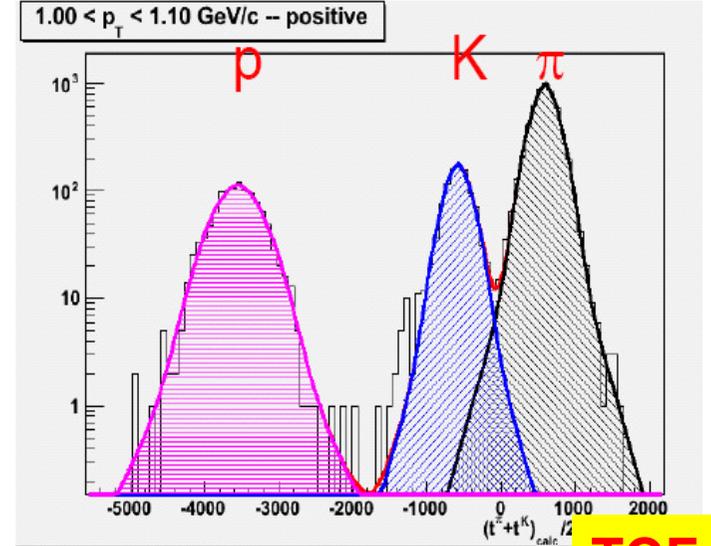
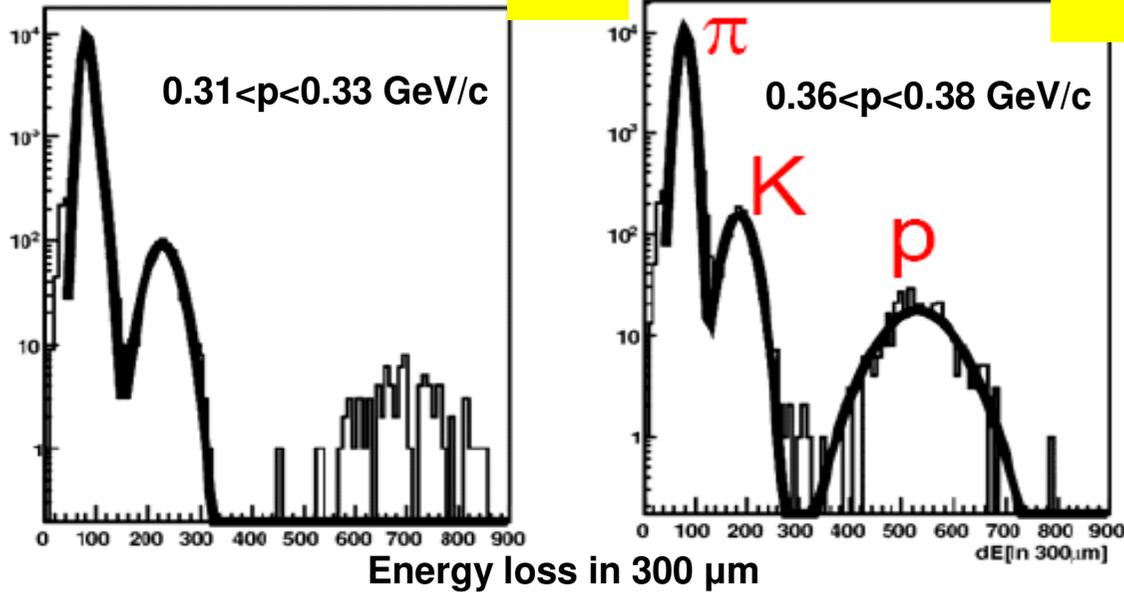


# ALICE Part. Ident. I



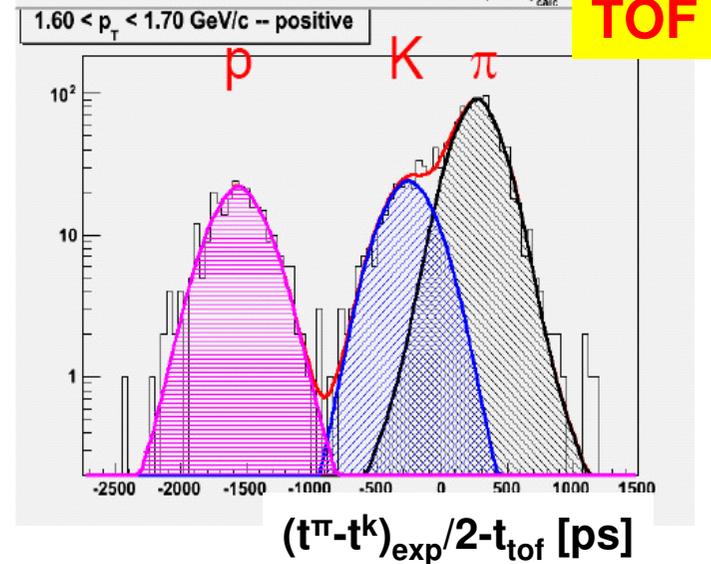
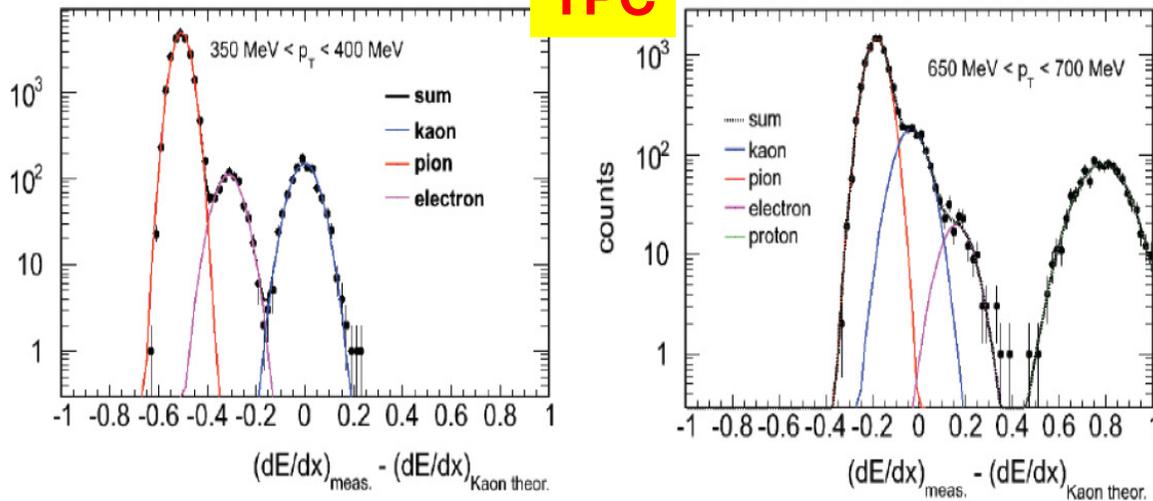
# ALICE Part. Ident. II

ITS



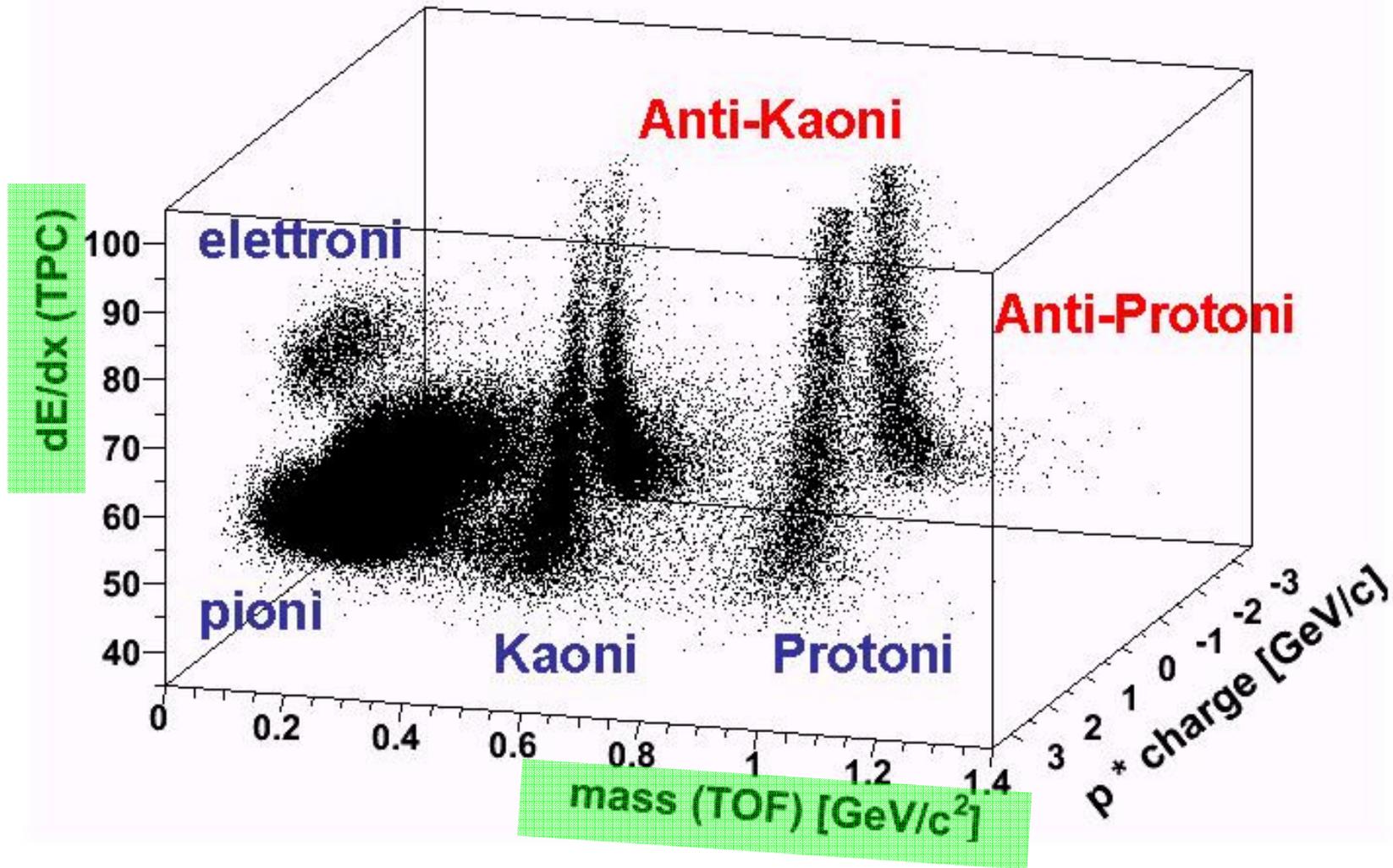
TOF

TPC

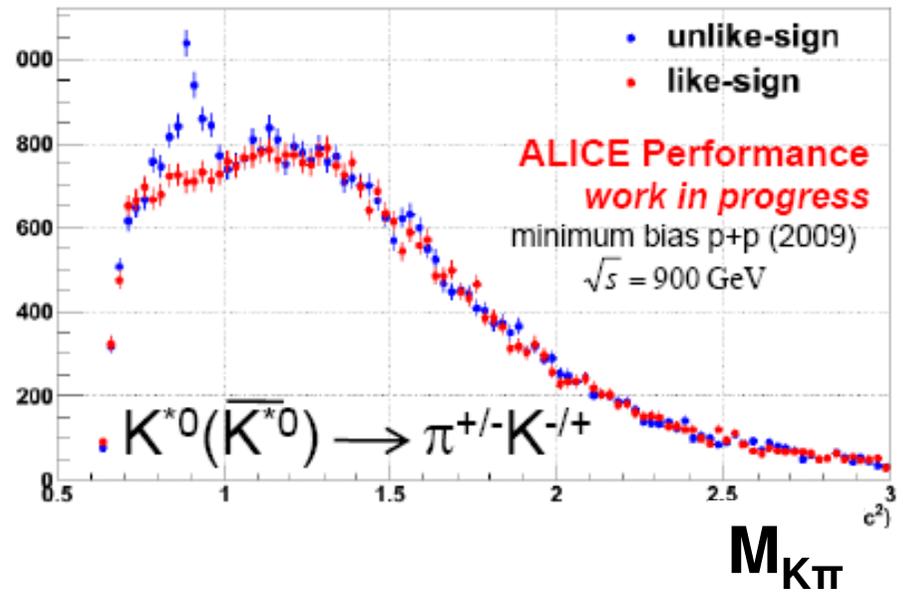
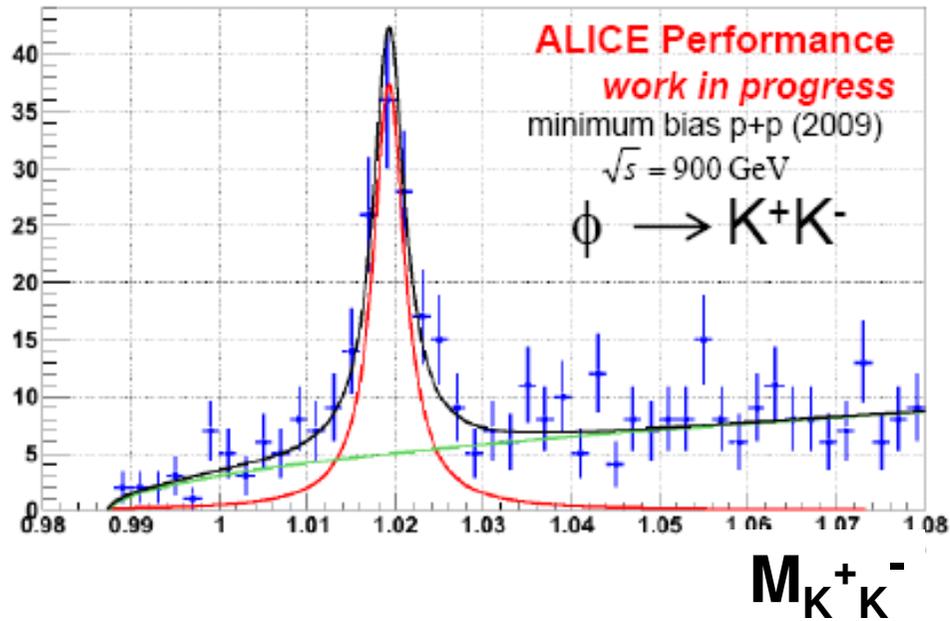


$(t^\pi - t^K)_{\text{exp}} / 2 - t_{\text{tof}}$  [ps]

# Combined Part. Ident. !!! in 3D !!!

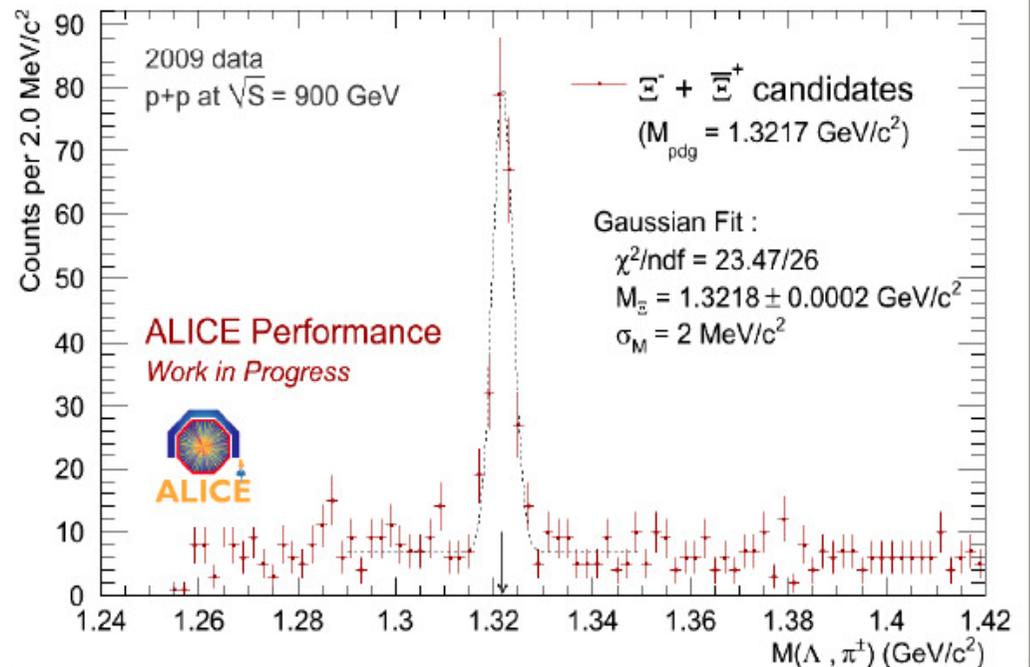
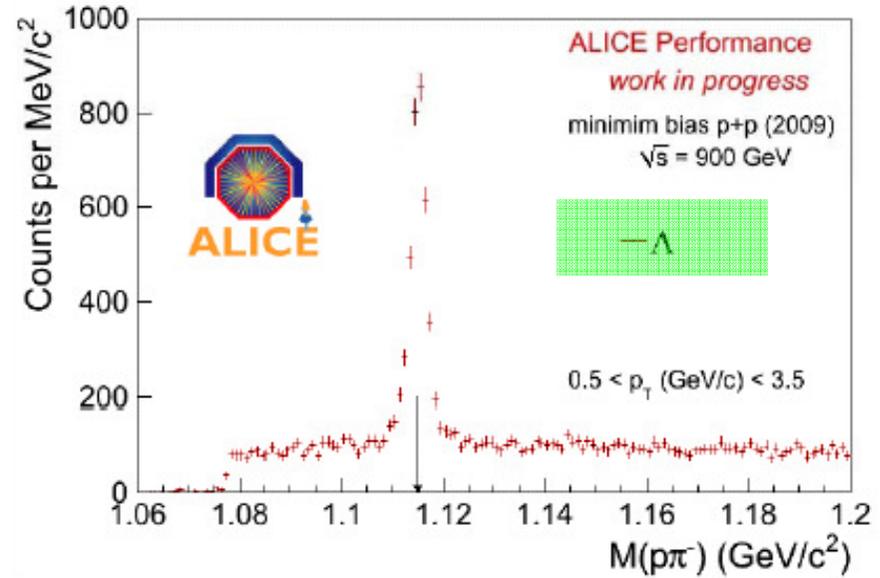
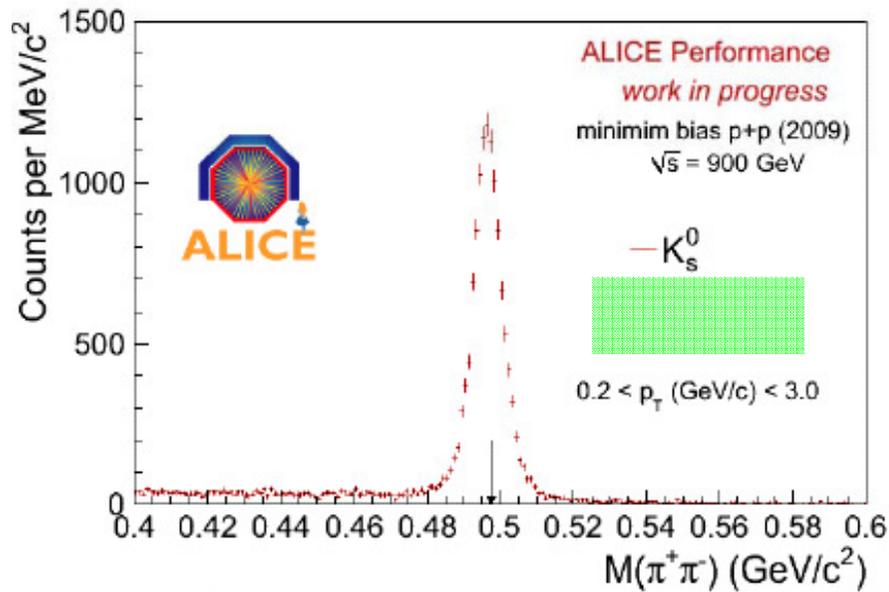


# ALICE Part. Ident. III

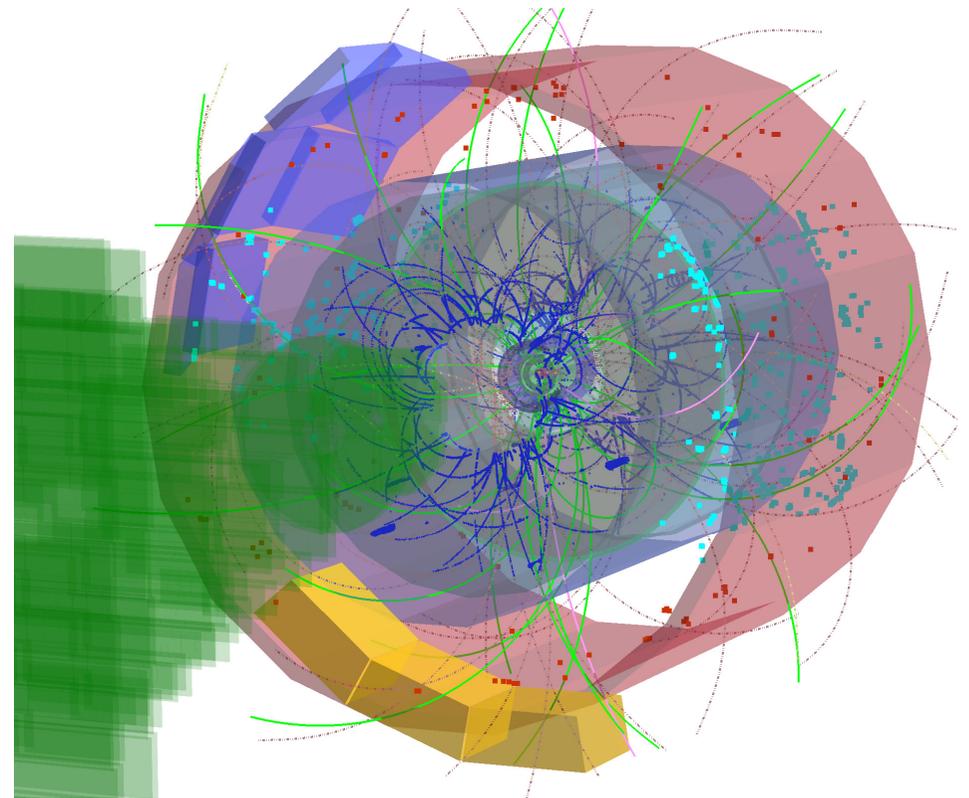
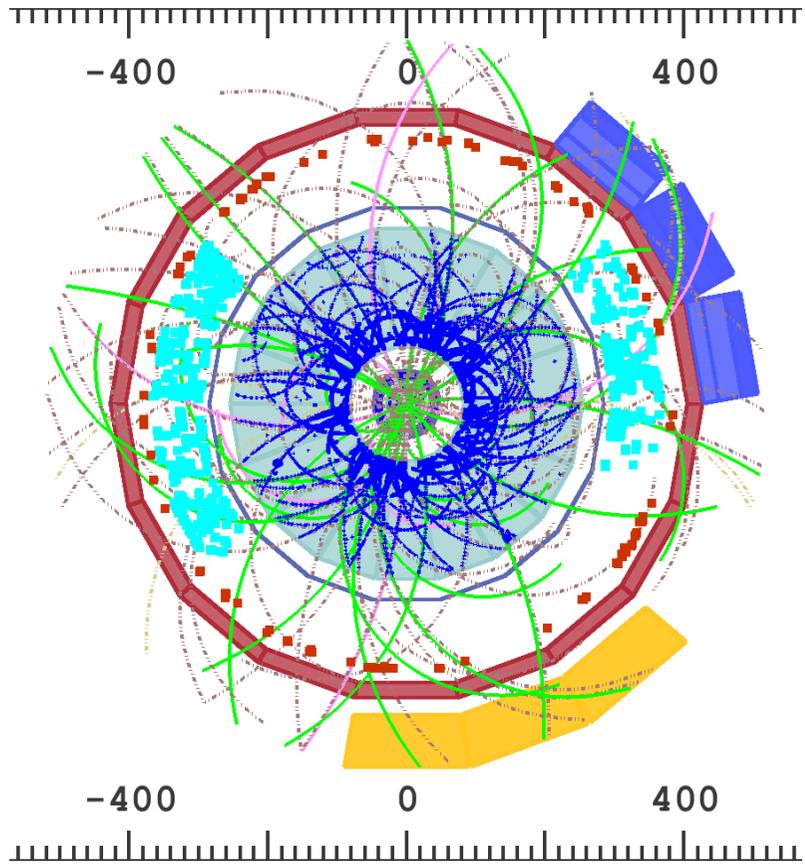


# $K_s^0$ e $\Lambda$

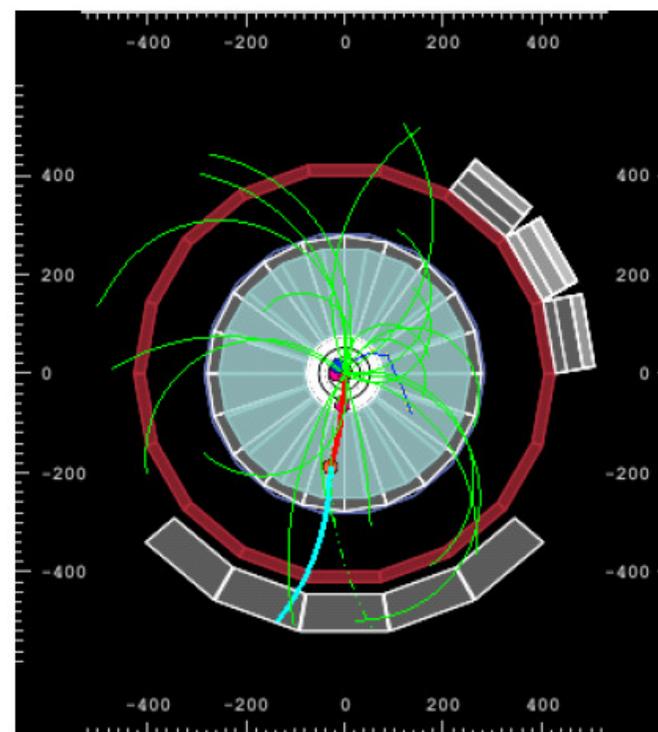
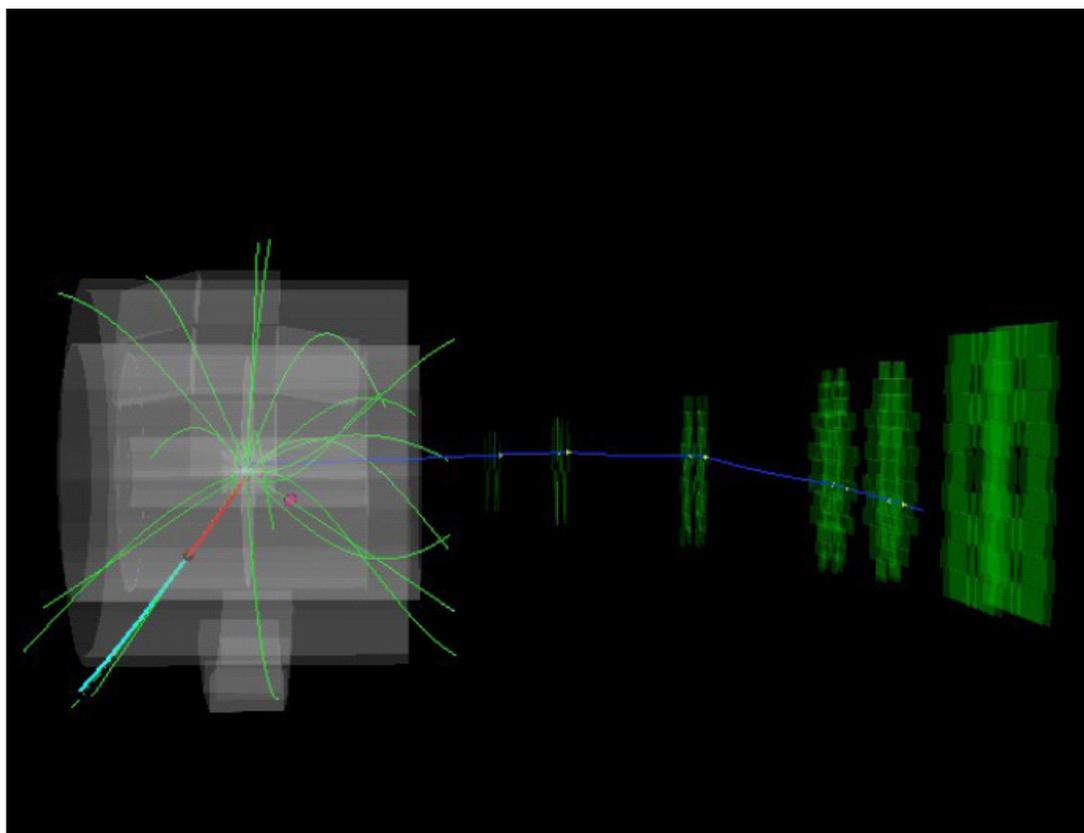
## usando vertici dai Pixel



# ALICE : 7 TeV event



# ALICE : 7 TeV event with muon





# Upgrades (future)

P. Giubellino  
CERN Feb 2010

Upgrade ideas for > 2010. Objectives:

Extend the Physics reach (independent on L)

Improve the rate capability (in view of higher PbPb L)

- High rate upgrade:
  - increase rate capability of TPC (faster gas, increased R/O speed)
  - rare hard probes ( $Y$ ,  $\gamma$ -jet, ...)
- DAQ & HLT upgrades:
  - more bandwidth, more sophisticated and selective triggers

- Particle id upgrade:
  - extend to  $p_T$  range for track-by-track identification to  $O(20)$  GeV/c
  - new physics interest, based on RHIC results

- Forward upgrades:
  - new detectors for forward physics (tracking & calorimetry)
  - low-x in pA, AA
  - Extend ALICE coverage for diffractive Physics

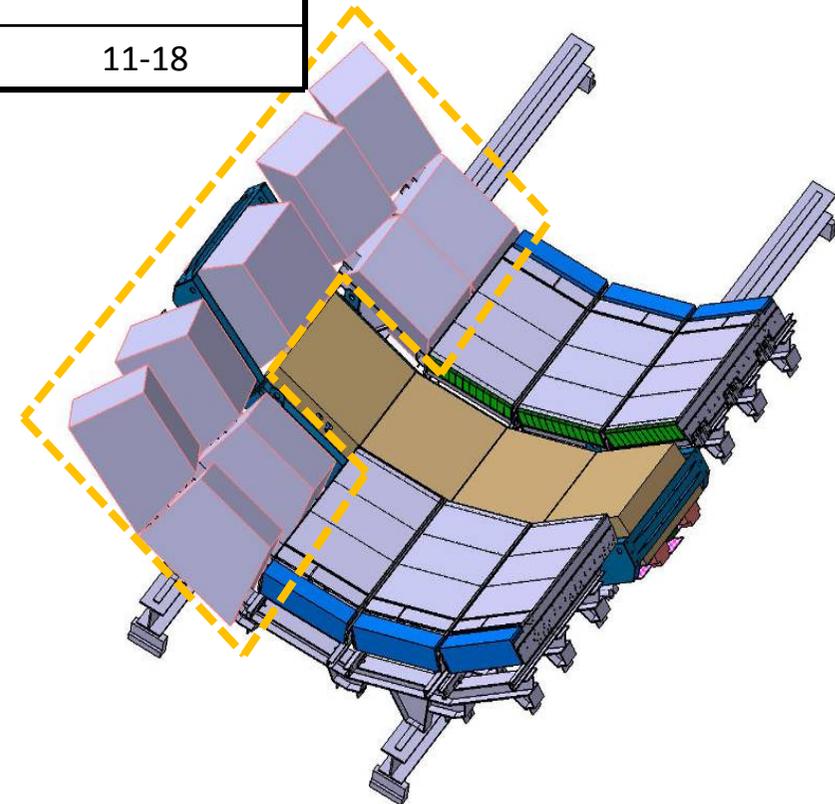
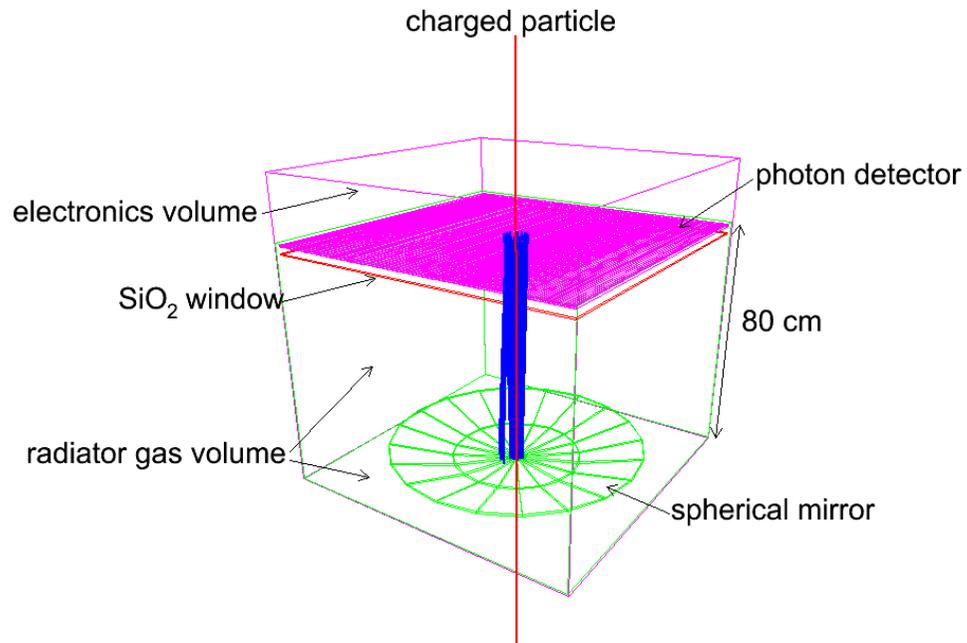
- Vertex upgrade:
  - 2<sup>nd</sup> generation vertex detector (closer to beams)
  - heavy flavour baryons, fully reconstructed B, ...

*Impact  
on the  
beampipe*

# The VHMPID upgrade project

The VHMPID (Very High Momentum PID) detector will extend the track-by-track identification capabilities of ALICE up to  $\sim 30$  GeV/c

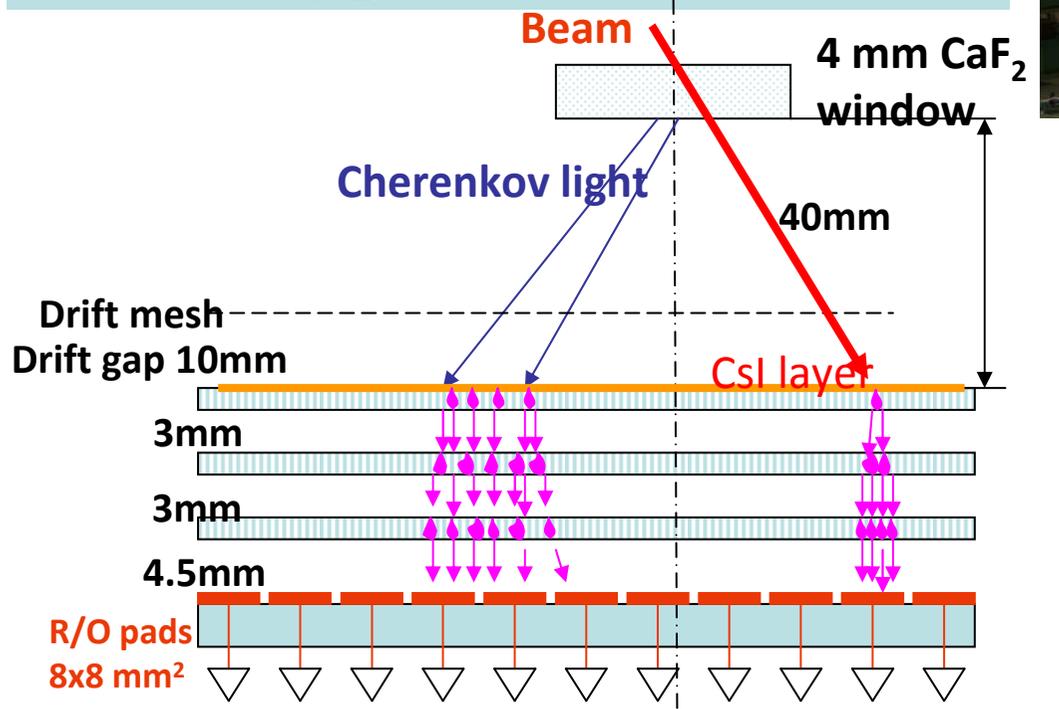
|       | Signal<br>(GeV/c) | Absence of signal<br>(GeV/c) |
|-------|-------------------|------------------------------|
| $\pi$ | 4-16              |                              |
| K     | 11-16             |                              |
| p     | 18-30             | 11-18                        |



# The VHMPID upgrade project

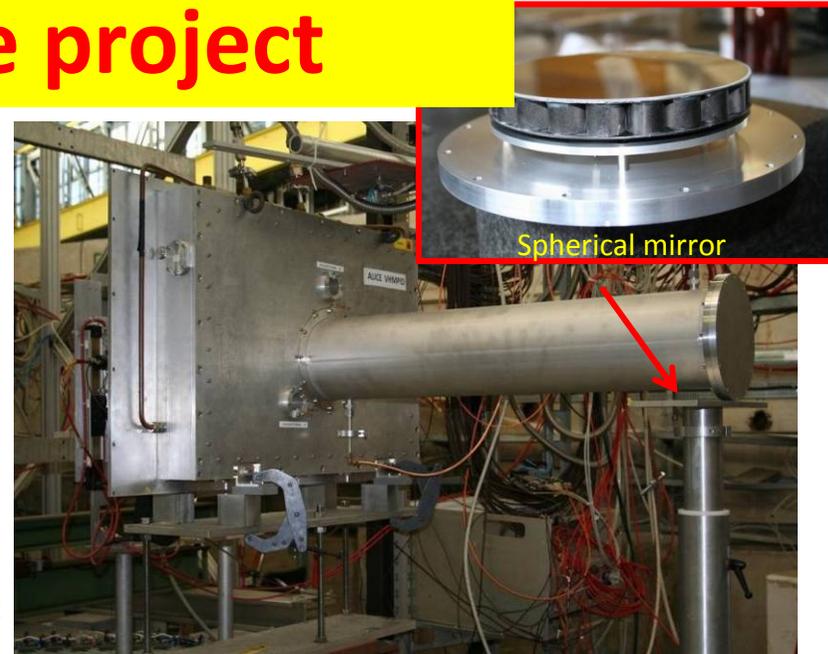
## Goal of the beam tests:

- Prove working principle of  $C_4F_{10}$  gaseous radiator + mirror + CsI PC/MWPC
- Check quality of spherical mirror (Al-MgF<sub>2</sub> coating on composite substrate)
- Check raw  $C_4F_{10}$  quality (transparency)



Front end electronics

(Gassiplex + ALICE HMPID R/O + DATE + AMORE)

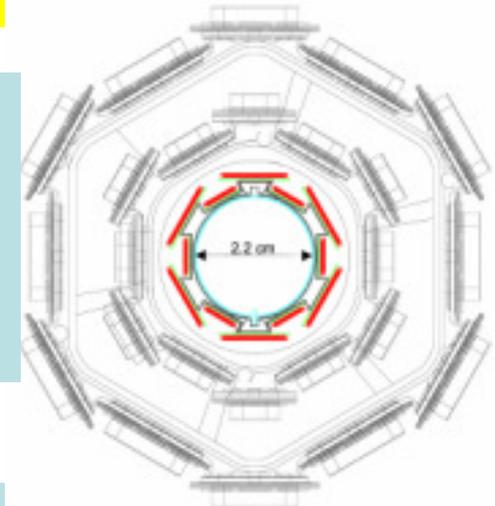


-Test TGEM prototype

# The ITS upgrade project

## Goals:

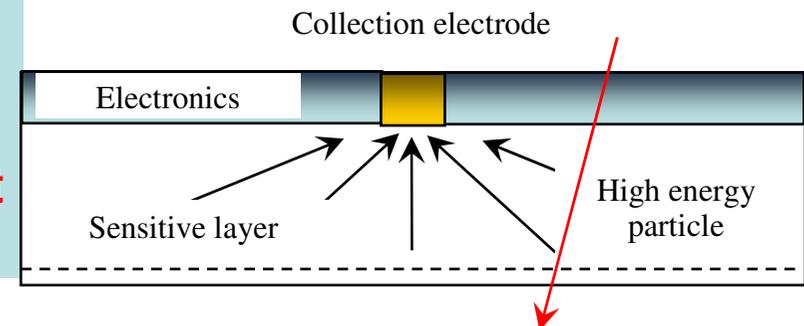
- impact parameter resolution improved by a factor 2
- Increase sensitivity to charm by factor 100
- Charmed baryons physics
- Exclusive B decays



- 7 cylindrical layers ( now 2+2+2): as CDF
- First layer as close as possible to the interaction point (smaller and thinner beam pipe < 29/08 mm)
- Extend use of pixel to outer layers; strips where no affordable
- Re-use of exiting pixel/strip ?
- Reduce material budget - trigger capability – granularity – fast readout

## Two options:

- Hybrid pixel detectors
- Monolithic pixel detectors: **LePix project**



## **ALICE nel run 2010-2011...**

**Siamo pronti con i rivelatori , trigger , acquisizione dati e ricostruzione offline.**

**I primi risultati confermano le ottime prestazioni dei rivelatori, specie per l'identificazione delle particelle.**

**I dati pp danno già indicazioni sui parametri dei MC**

**Attendiamo con fiducia Pb-Pb a fine anno.**

## **... e dopo**

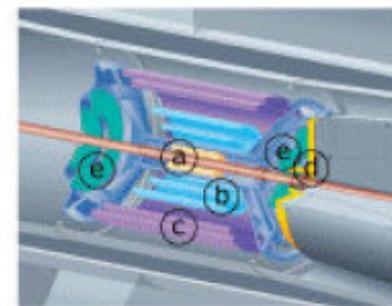
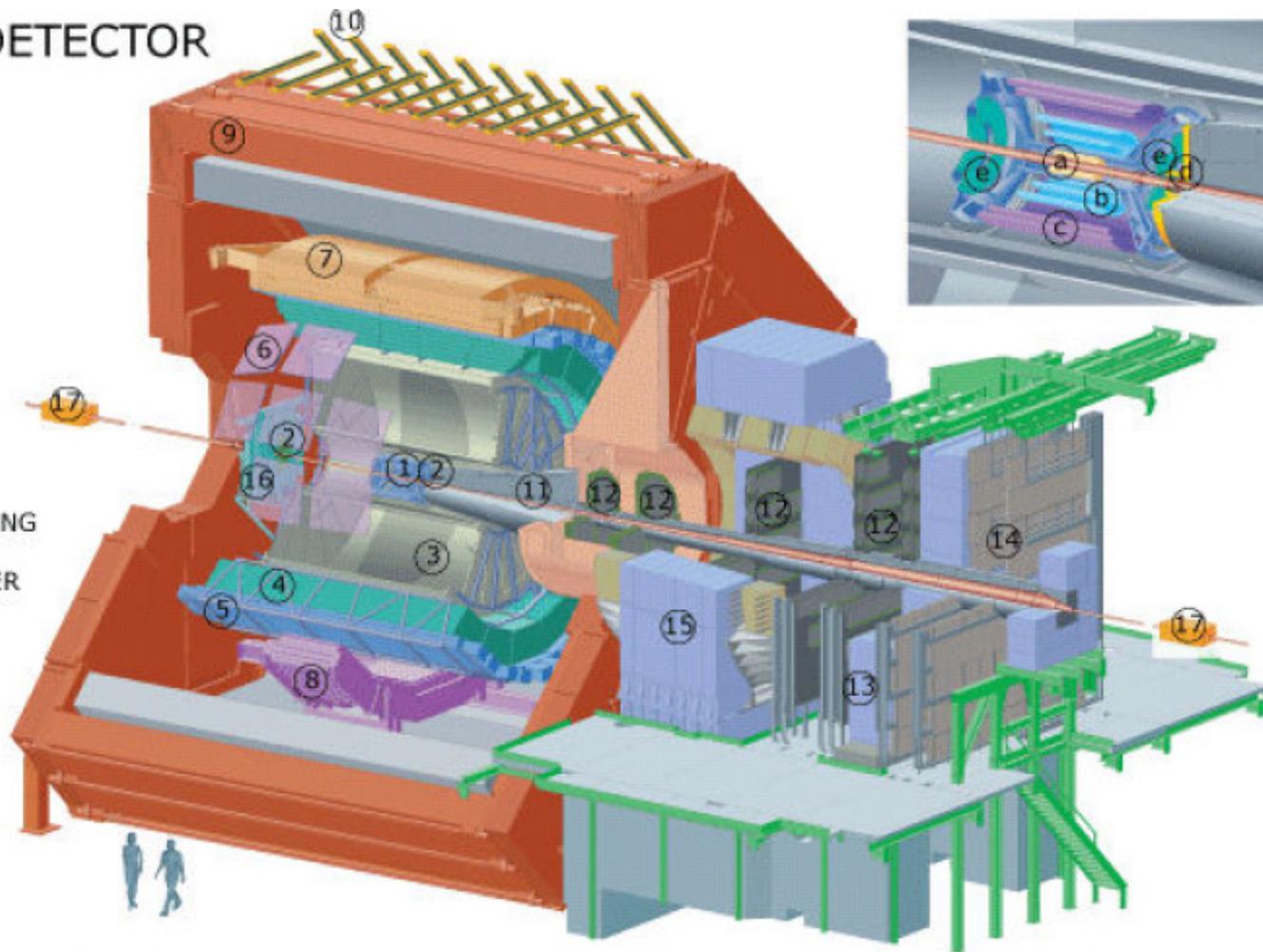
**ALICE punta ad un aumento delle opportunità di misura più che ad un aumento della luminosità**

**Studi per possibili up-grades nei rivelatori sono già iniziati e si concretizzeranno nei prossimi anni.**

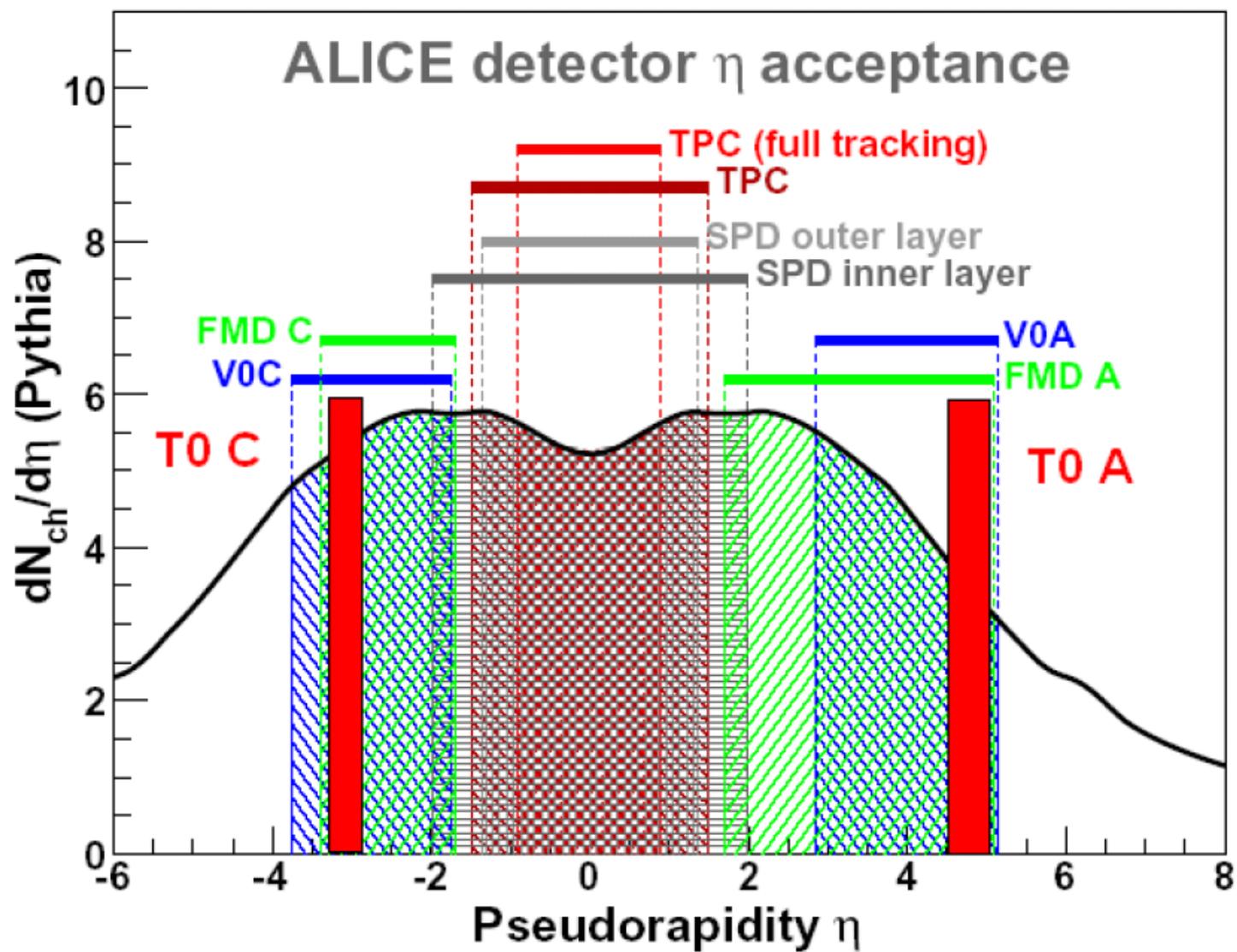
Riserve

# THE ALICE DETECTOR

1. ITS
2. FMD , T0, V0
3. TPC
4. TRD
5. TOF
6. HMPID
7. EMCAL
8. PHOS CPV
9. MAGNET
10. ACORDE
11. ABSORBER
12. MUON TRACKING
13. MUON WALL
14. MUON TRIGGER
15. DIPOLE
16. PMD
17. ZDC



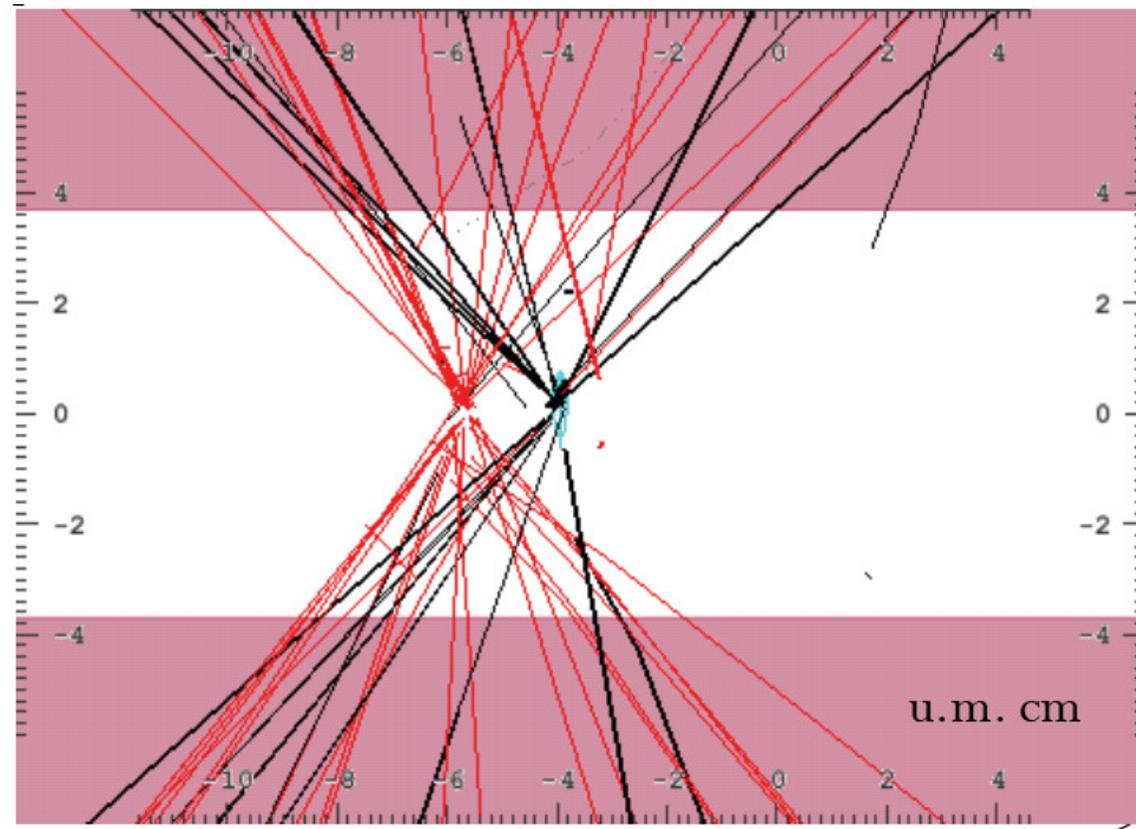
- a. ITS SPD Pixel
- b. ITS SDD Drift
- c. ITS SSD Strip
- d. V0 and T0
- e. FMD



# ALICE ITS

|                                     | SPD                                             | SDD                                            | SSD                                             |
|-------------------------------------|-------------------------------------------------|------------------------------------------------|-------------------------------------------------|
| # of layers                         | 2                                               | 2                                              | 2                                               |
| radius (cm)                         | 3.9 & 7.6                                       | 15 & 24                                        | 38 & 43                                         |
| spatial precision ( $\mu\text{m}$ ) | $r\phi = 12\mu\text{m}$<br>$z = 100\mu\text{m}$ | $r\phi = 35\mu\text{m}$<br>$z = 25\mu\text{m}$ | $r\phi = 20\mu\text{m}$<br>$z = 830\mu\text{m}$ |
| readout time ( $\mu\text{s}$ )      | $\approx 300$                                   | $\approx 1023 \div 2110$                       | $\approx 300$                                   |
| readout                             | digital                                         | analog                                         | analog                                          |

# Pile-up events in ALICE



Presently at  $10^{-3}$  level

