Minimum Bias and Underlying Event Working Group
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ALICE $dN_{CH}/d\eta$ ANALYSIS FOR THE "COMMON PLOTS"

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Outline

- INEL > 0 analysis

- Results at 900 GeV

- Outlook and Conclusions

INEL>0

- Defined as a new class of events…

  - Selecting the events with at least one particle in $|\eta| < 0.8$ and $p_T > p_{T, cut}$

- …where the charged multiplicity pseudorapidity density is determined by the number of tracks in the same η and p_T range

  - Tracks in $|\eta| < 0.8$ and $p_T > p_{T, cut}$

- $p_{T, cut}$ set at 0.5, 1. GeV, for the common plots

- In addition, $p_{T, cut}$ at 0.15 GeV considered, as this is ALICE intrinsic $p_{T, cutoff}$

Previous Results from ALICE
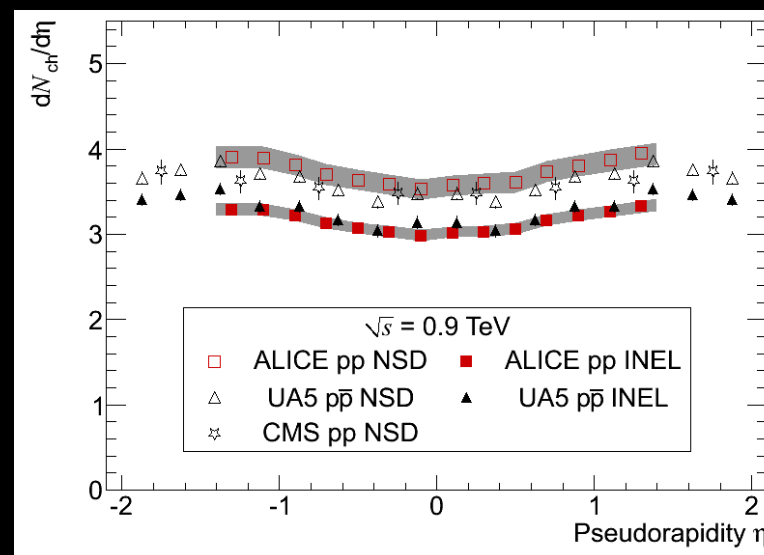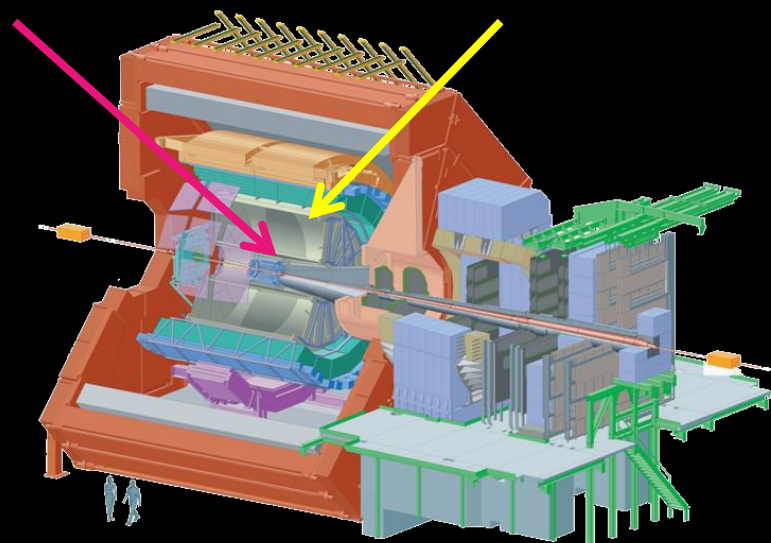
- So far: results obtained counting the tracklets reconstructed in the ITS (6 layer silicon detector)
  - Using the 2 layers of the SPD detector
  - No p_T measurement (intrinsic cut at about 50 MeV)
- Now: full tracking in ALICE required
  - Using ITS + TPC
  - p_T measurement from 0.15 GeV

ALICE Tracking Efficiency
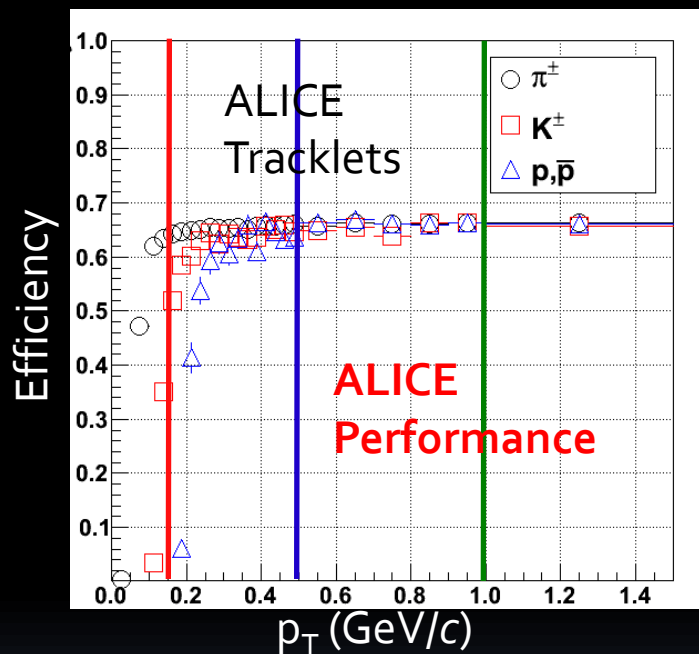
SPD physics efficiency for primaries (2009 configuration, 80% active)
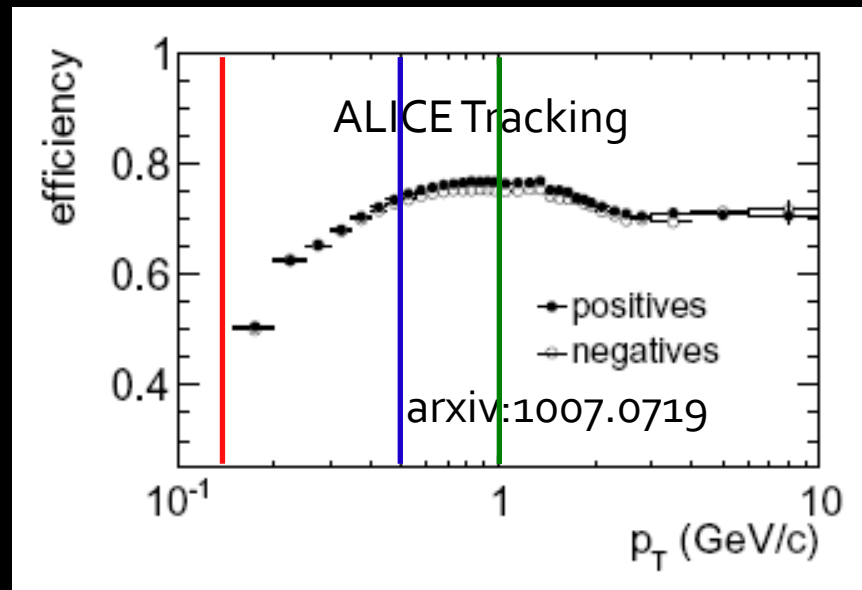
ALICE full tracking, intrinsic p_T cutoff at 0.15 GeV

Primary particles *= charged particles produced in the collision and their decay products excluding weak decays from strange particles*

The Analysis
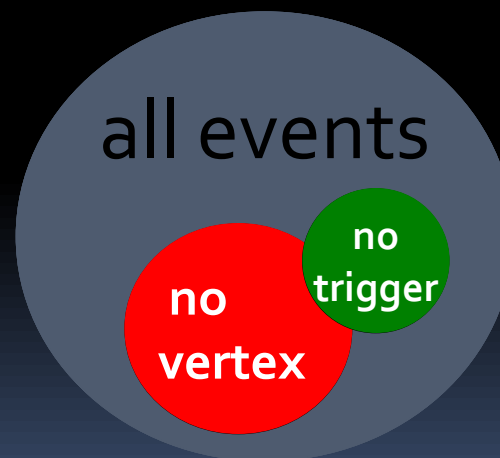
- Following the same method used for the previous $dN_{ch}/d\eta$ measurements

- Basically: $$\frac{dN_{ch}}{d\eta} = \frac{Tracks}{Events}$$

to which

- □ Track-to-particle correction
  - ▪ Track level
- □ Vertex reconstruction correction
  - ▪ Track and event level
- □ Trigger bias correction
  - ▪ Track and event level

have to be applied

From J.F. Grosse-Oetringhaus,
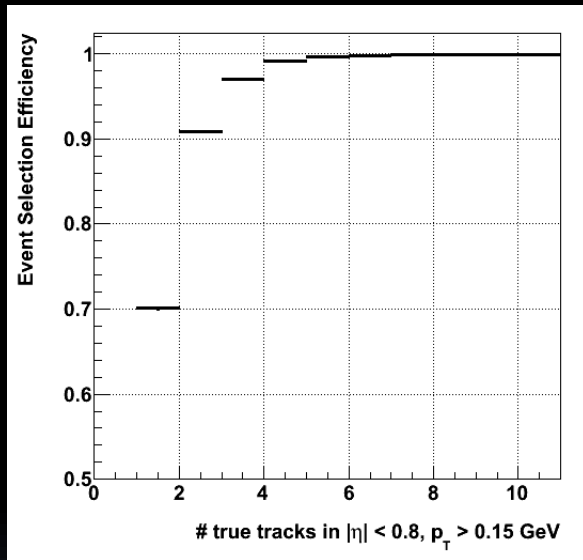*Rencontres de Moriond, 14. – 19. March 2010*

Some Numbers

- Number of Events:

N. of events	$p_T > 0.15$ GeV	$p_T > 0.5$ GeV	$p_T > 1.0$ GeV
Total: ~70 K	~50 K	~37 K	~16 K

- Correction Factors:

Average correction factor	$p_T > 0.15$ GeV	$p_T > 0.5$ GeV	$p_T > 1.0$ GeV
Track correction	1.389	1.301	1.317
Event correction	1.071	1.122	1.204

# Event Selection Efficiency

p_T > 0.15 GeV
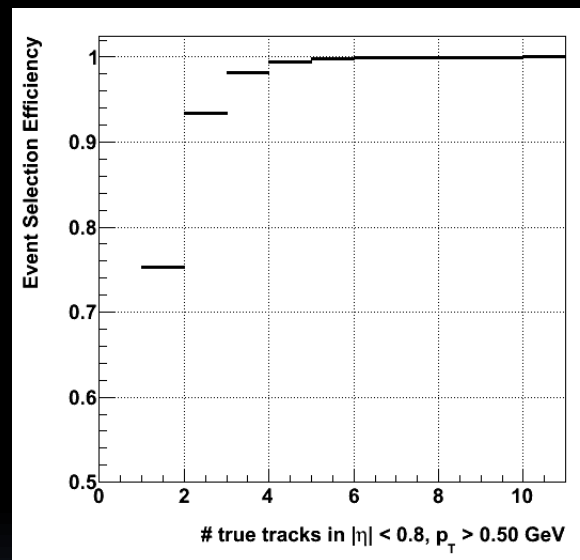
p_T > 0.5 GeV
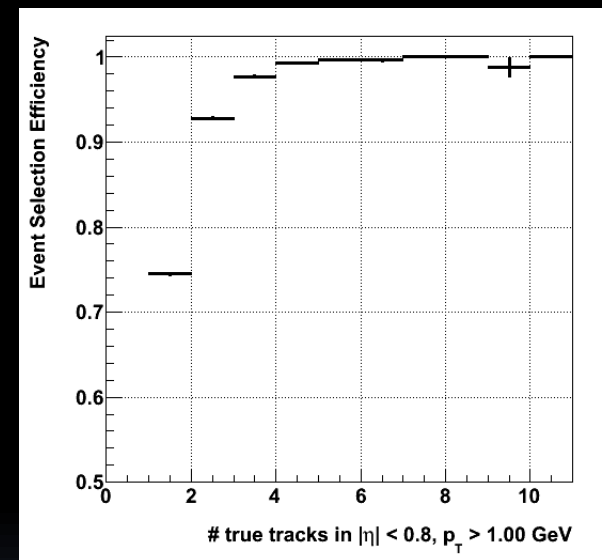
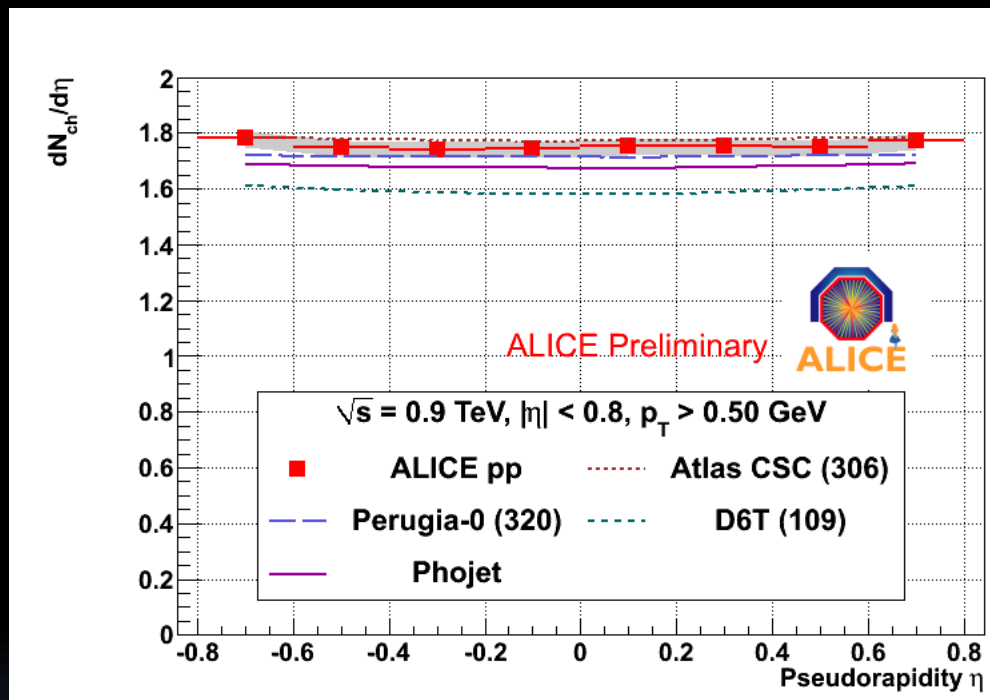p_T > 1.0 GeV

Systematic Uncertainties

Uncertainty	p_T cut		
	0.15 GeV	0.5 GeV	1.0 GeV
MC Generator	-1.8%	-1.2%	+0.6%
Track Selection Cuts	1.5%	0.9%	0.8%
Particle Composition	1%	0.8%	0.5%
Process Types	0.7%	0.3%	Negl.
ITS Efficiency	0.3%	Negl.	Negl.
TPC Efficiency	1.5%	0.6%	0.4%
Secondary Particle Rejection	0.8%	0.5%	Negl.
Detector Misalignment	Negl.	Negl.	Negl.
Beam-gas events	Negl.	Negl.	Negl.
Pile-Up events	Negl.	Negl.	Negl.
Total	+2.6% -3.1%	+1.4% -1.9%	+1.3% -1.1%

dN$_{ch}$/dη, |η|<0.8, p$_T$>0.15 GeV
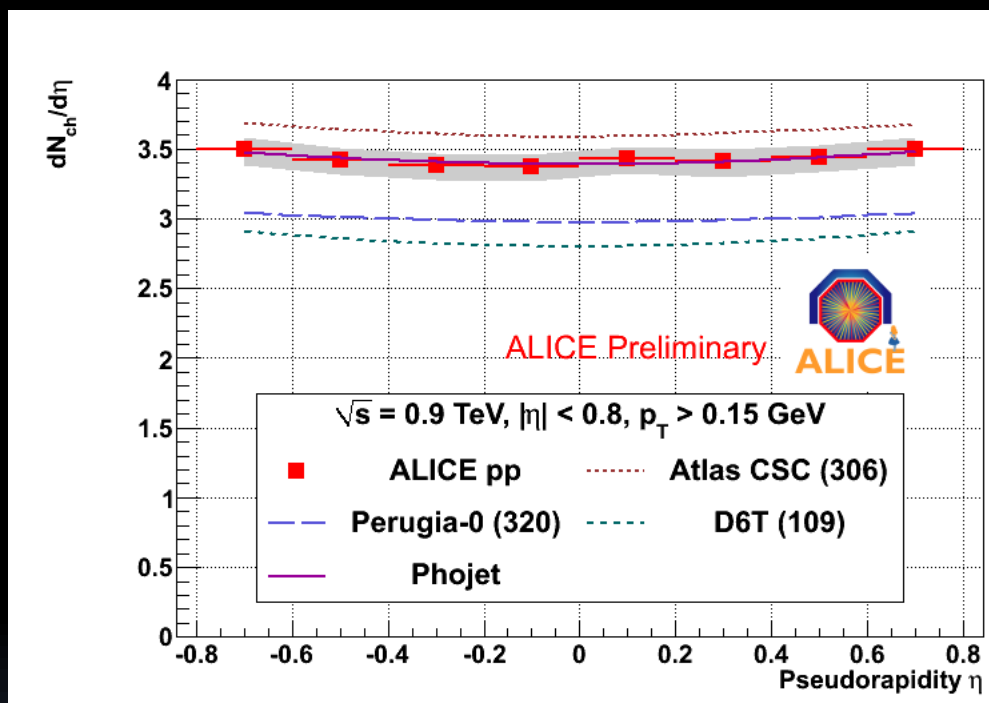
	ALICE		Pythia			Phojet
	stat	syst	Perugia 0	ATLAS CSC	D6T	
3.43	± 0.01	+ 0.08 - 0.11	3.01 ± 0.01	3.63 ± 0.01	2.85 ± 0.02	3.43 ± 0.01

$dN_{ch}/d\eta$, $|\eta|<0.8$, $p_T>0.5$ GeV

	ALICE		Pythia			Phojet
	stat	syst	Perugia 0	ATLAS CSC	D6T	
1.76	± 0.01	+ 0.02 - 0.03	1.72	1.78	1.60	1.68

dN$_{ch}$/dη, |η|<0.8, p$_T$>1.0 GeV
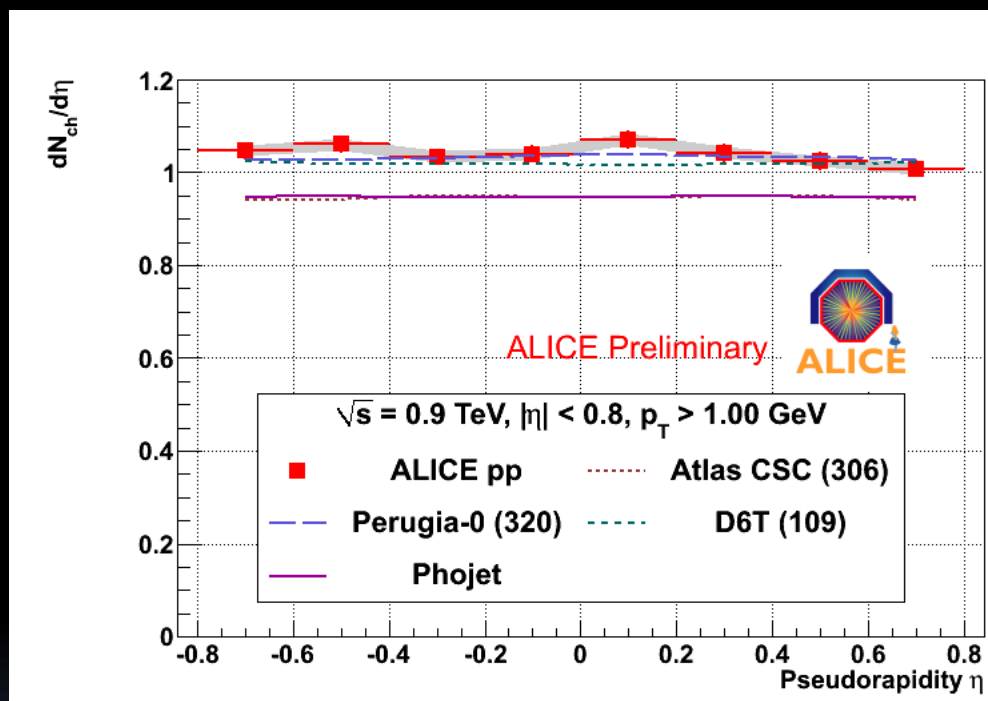
	ALICE		Pythia			Phojet
	stat	syst	Perugia 0	ATLAS CSC	D6T	
1.04	± 0.01	+ 0.01 - 0.01	1.03	0.95	1.02	0.95

Results' Comparison
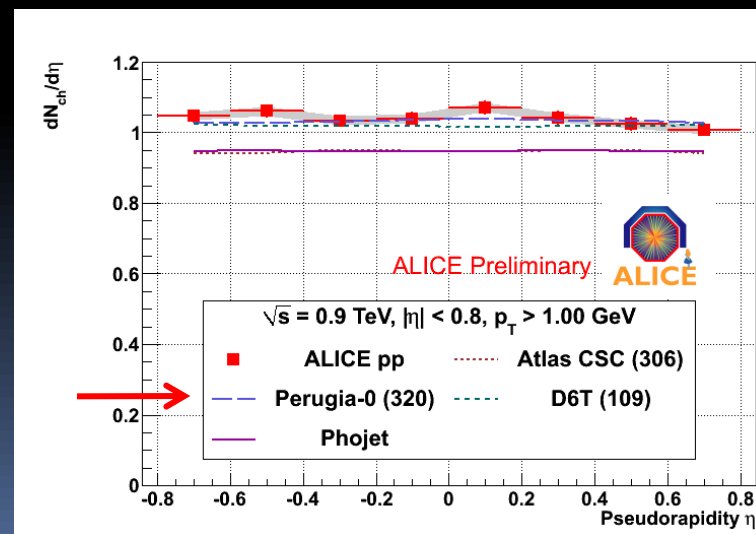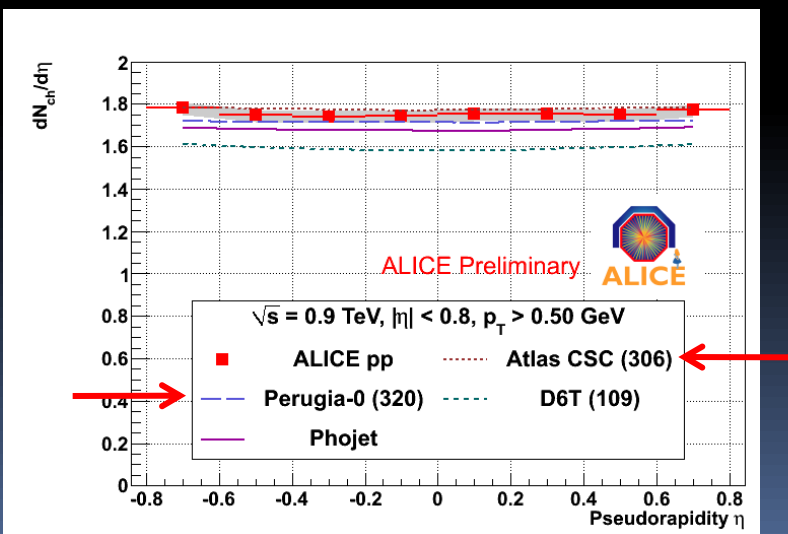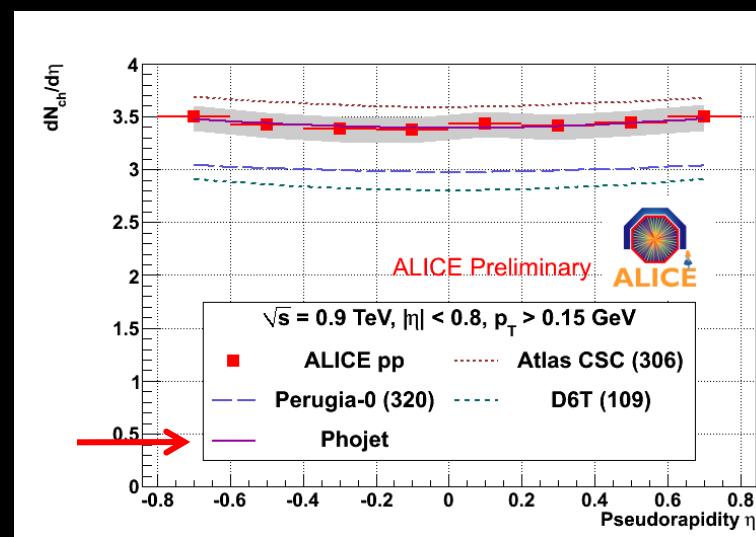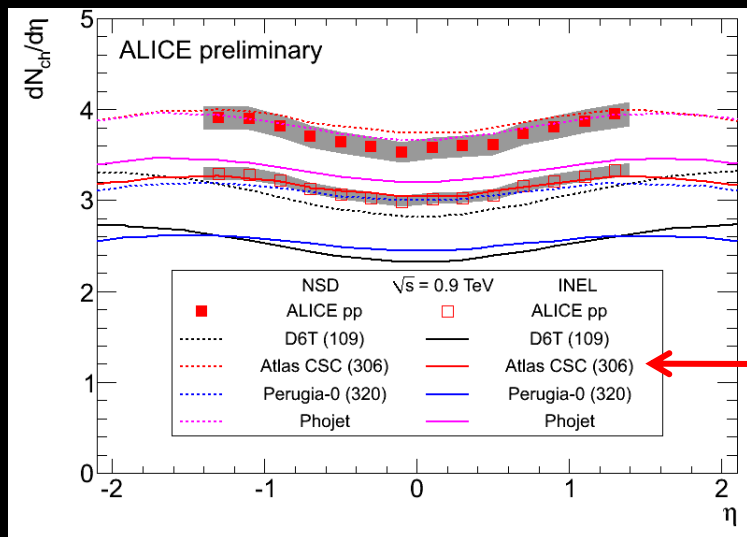
Summary and Conclusions

- A new event class definition has been introduced and studied
  - Event class: $INEL>0_{|\eta|<0.8,\ p_T > 0.15,\ 0.5,\ 1.0\ GeV}$
  - Tracks: $|\eta|<0.8$, $p_T > 0.15$, 0.5, 1.0 GeV
- The analysis has been performed in ALICE at $\sqrt{s} = 0.9$ TeV
  - Analysis at $\sqrt{s} = 7$ TeV not yet approved
- Different MC seem to agree better with the data at different p_T cuts

Thanks to...

- H. Appelshaeuser
- A. Dainese
- M. Floris
- J.F. Grosse-Oetringhaus
- J. Otwinowski
- F. Noferini
- ...and many more...