Underlying Event Observables in pp and p-Pb Collisions at $\sqrt{s_{NN}} = 5.02$ TeV.

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Compare the UE observables (number density and the summed transverse momentum in the towards, away and transverse sides) in pp and p-Pb collisions for similar event classes (same $p_T^{\text{leading}}$ and same $\sqrt{s_{\text{NN}}}$). paper proposal for publication.
Number density (NumDen) Transverse Region (TS, transverse side) for $p_T$ cut > 1.0, 0.5, 0.15 GeV/c for pp and p-Pb
Summary

* The UE observables in pp and p-Pb collisions at 5.02 TeV for different $p_T$ cut is compared. (paper proposal)
Backup
From Last presentation for paper proposal
Number density (NumDen) Transverse Region (TS) for $p_T$ cut $\geq 0.5$ GeV/c (Data vs MC)

$\rho_{T_S}$ for $|\eta| < 0.8$

- $pp$, $\sqrt{s} = 5.02$ TeV
- $p$-Pb, $\sqrt{s_{NN}} = 5.02$ TeV

Uncertainties: Stat.(vertical) Syst.(box)

ALICE Preliminary
Number density (NumDen) Towards Region (NS, near side) for $p_T$ cut $\geq 0.5$ GeV/c (Data vs MC)

$N_{ch}/N_{ev} \Delta \phi$ as a function of $p_T$ for different $|\eta| < 0.8$ in $pp$, $\sqrt{s} = 5.02$ TeV, compared to MC models like PYTHIA 8.244 (Monash) and EPOS LHC.

ALICE Preliminary

Uncertainties: Stat.(vertical) vs Syst.(box)

Data/MC comparison for different $p_T$ values.

ALI-PREL-366908 ALI-PREL-366958
Number density (NumDen) Away Region (AS, away side) for $p_T$ cut ≥ 0.5 GeV/c (Data vs MC)
Sum $p_T$ density ($SumPt$) Transverse Region (TS) for $p_T$ cut $\geq$ 0.5 GeV/c (Data vs MC)
**Sum \( p_T \) density (SumPt) Towards Region (NS, near side) for \( p_T \) cut \( \geq 0.5 \text{ GeV/c} \) (Data vs MC)**

**Near Side**

- Data/MC
- ALICE Preliminary
- ALICE Preliminary

**Uncertainties:**
- Stat.(vertical)
- Syst.(box)

**ALICE Preliminary**

- pp, \( \sqrt{s} = 5.02 \text{ TeV} \)
- p-Pb, \( \sqrt{s_{NN}} = 5.02 \text{ TeV} \)

**PYTHIA 8.244** (Monash) & (Angantyr)

**EPOS LHC**

**Near Side**
Sum $p_T$ density (SumPt) Away Region (AS, away side) for $p_T$ cut $\geq 0.5$ GeV/c (Data vs MC)
Comparison Number density NS-TS and AS-TS for $p_T \geq 0.5$ GeV/c for pp and p-Pb @ 5.02TeV (Data vs MC)
Comparison Sum $p_T$ density NS-TS and AS-TS for $p_T \geq 0.5$ GeV/c for pp and p-Pb @ 5.02TeV (Data vs MC)
Average $< p_T >$ for Near Side and Away Side for $p_T \geq 0.5$ GeV/c for pp and p-Pb @ 5.02TeV (Data vs MC)
Number density for Transverse, near and away Sides for $p_T \geq 0.5 \text{ GeV/c}$ for pp and p-Pb @ 5.02TeV

Histogram for paper publications
Number density for Transverse Sides for $p_T \geq 0.15 \text{ GeV/c}$ for all pp collisions @ 13, 7, 5.02 and 0.9 TeV

Histogram for paper publications
Number density (NumDen) Transverse Region (TS) for $p_T$ cut >0.15 GeV/c

$N_{cf}/N_{ev} \Delta \phi$

$|\eta| < 0.8$

ALICE Preliminary

$p_T > 0.15$ GeV/c

Transverse Side

Uncertainties: Stat.(vertical) Syts.(box)

$|\eta| = 0.8$

ALICE Preliminary

$p_T > 0.15$ GeV/c

Transverse Side

Uncertainties: Stat.(vertical) Syts.(box)

$|\eta| = 0.8$

ALICE Preliminary

$p_T > 0.15$ GeV/c

Transverse Side

Uncertainties: Stat.(vertical) Syts.(box)

$|\eta| = 0.8$

ALICE Preliminary

$p_T > 0.15$ GeV/c

Transverse Side

Uncertainties: Stat.(vertical) Syts.(box)
Number density (NumDen) Towards Region (NS, near side) for $p_T$ cut $>0.15$ GeV/c

$N_{cl}/N_{ev} \Delta \eta \Delta \phi$

$N_{cl}/N_{ev} \Delta \eta \Delta \phi$

$\Delta p_T >0.15$ GeV/c, $|\eta| < 0.8$

ALICE Preliminary

Near Side

Uncertainties: Stat.(vertical) Syts.(box)

$\Delta p_T >0.6$ GeV/c, $|\eta| < 0.8$

ALICE Preliminary

Near Side

Uncertainties: Stat.(vertical) Syts.(box)
Number density (NumDen) Away Region (AS, away side) for \( p_T \) cut >0.15 GeV/c
Sum $p_T$ density (SumPt) Transverse Region (TS) for $p_T$ cut $>0.15$ GeV/c

**Data/MC**

**Transverse Side**

**Uncertainties: Stat.(vertical) Syts.(box)**

**ALICE Preliminary**

- $p_T > 0.15$ GeV/c, $|\eta| < 0.8$
- pp, $\sqrt{s} = 5.02$ TeV
- PYTHIA 8.244 (Monash)
- EPOS LHC

**EPOS_LHC**

- p-Pb, $\sqrt{s_{NN}} = 5.02$ TeV

- Transverse Side

- Uncertainties: Stat.(vertical) Syts.(box)
Sum $p_T$ density (SumPt) Towards Region (NS, near side) for $p_T$ cut > 0.15 GeV/c

$\sum p_T/|N_{ch}|\Delta\phi$ (GeV/c)

- ALICE Preliminary
- $p_T$ > 0.15 GeV/c, $|\eta| < 0.8$
- Near Side
- Uncertainties: Stat.(vertical) Syts.(box)

$\sum p_T/|N_{ch}|\Delta\phi$ (GeV/c)

- ALICE Preliminary
- $p_T$ > 0.15 GeV/c, $|\eta| < 0.8$
- Data/MC
**Sum** $p_T$ **density ( SumPt ) Away Region( AS, away side ) for**

$p_T$ **cut >0.15 GeV/c**

[Graphs showing data and comparisons between different models for the sum $p_T$ density.]

**Uncertainties:** Stat.(vertical) Syts.(box)

**Away Side**

**Data/MC**
Number density (NumDen) Transverse Region (TS) for $p_T$ cut $>1.0$ GeV/c
Number density (NumDen) Towards Region (NS, near side) for $p_T$ cut >1.0 GeV/c
Number density (NumDen) Away Region (AS, away side) for $p_T$ cut $>1.0$ GeV/c

$p_T \geq 1.0$ GeV/c, $|\eta| < 0.8$

**ALICE Preliminary**

- **pp, $\sqrt{s} = 5.02$ TeV**
  - PYTHIA 8.244 (Monash)
  - EPOS LHC

**Away Side Uncertainties:** Stat.(vertical) Syts.(box)

$p_T \geq 1.0$ GeV/c, $|\eta| < 0.8$

**ALICE Preliminary**

- **p-Pb, $\sqrt{s_{NN}} = 5.02$ TeV**
  - PYTHIA 8.244 (Angantyr)
  - EPOS_LHC

**Away Side Uncertainties:** Stat.(vertical) Syts.(box)
Sum $p_T$ density ($\text{SumPt}$) Transverse Region (TS) for $p_T$ cut >1.0 GeV/c
**Sum $p_T$ density ($\text{SumPt}$) Towards Region (NS, near side) for $p_T$ cut $>1.0$ GeV/c**

![Graphs showing the distribution of $p_T$ density towards the near side with different models and their uncertainties.](image-url)
Sum $p_T$ density (SumPt) Away Region (AS, away side) for $p_T$ cut >1.0 GeV/c