Summary of Data Validation

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Things done and Problems I Encountered

- Goal: Comparison of plots of Pt, Met, etc. for both new and old
- Problem: Disagreement of the ratios of Luminosity over Entries
- Crux: Trigger changes for data of diff. periods—some periods require 10GeV jets
- Solution: In our codes, require 1 tightjet($E_T \geq 15\text{GeV}$)
- Results: Ratios fit well, but a little difference in plots fitting
- Assumption: New data with Higher Luminosity $\Rightarrow$ More vertices in one collision
- Solution: Require 1 vertex in codes
Initial Comparison without realizing trigger difference

Comparison of CEM, CMUP and CMX between New and Old data

Require at least 1 tightjet($E_T \geq 15\text{GeV}, |\eta| < 2.0$)

Still some disconformity – check each period

CEM
CMUP
CMX

Trigger Information

Require at least 1 tightjet($E_T \geq 15\text{GeV}, |\eta| < 2.0$)

Both Leptons $\geq 1$ tightjet
CEM $\geq 1$ tightjet
CMUP $\geq 1$ tightjet
CMX $\geq 1$ tightjet

Still some disconformity – check each period
CEM check
CMUP check
CMX check

Extra Amendment – 1 vertex requirement

Next Step
Summary of Data Validation

Figure: \( \frac{Lumi_{\text{new}}}{Lumi_{\text{old}}} = 0.395, \ \frac{Entri_{\text{new}}}{Entri_{\text{old}}} = 0.355 \pm 0.0004 \)
Outline

Initial Comparison without realizing trigger difference
Comparison of CEM, CMUP and CMX between New and Old data
Require at least 1 tightjet($E_T \geq 15\text{GeV}, |\eta| < 2.0$)
Still some disconformity –check each period

**Figure:**

$$\frac{\text{Lumi}_{\text{new}}}{\text{Lumi}_{\text{old}}} = 0.397, \quad \frac{\text{Entri}_{\text{new}}}{\text{Entri}_{\text{old}}} = 0.375 \pm 0.0006$$

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Summary of Data Validation
Initial Comparison without realizing trigger difference
Comparison of CEM, CMUP and CMX between New and Old data
Require at least 1 tightjet ($E_T \geq 15$ GeV, $|\eta| < 2.0$)
Still some disconformity – check each period

Figure: $\frac{Lumi_{\text{new}}}{Lumi_{\text{old}}} = 0.397$, $\frac{Entri_{\text{new}}}{Entri_{\text{old}}} = 0.353 \pm 0.0006$

Summary of Data Validation
Outline
Initial Comparison without realizing trigger difference
Comparison of CEM, CMUP and CMX between New and Old data
Require at least 1 tightjet($E_T \geq 15\text{GeV}, |\eta| < 2.0$)
Still some disconformity – check each period

Figure: $\frac{Lumi_{\text{new}}}{Lumi_{\text{old}}}$ = 0.392, $\frac{\text{Entri}_{\text{new}}}{\text{Entri}_{\text{old}}}$ = 0.269 ± 0.001

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Summary of Data Validation
Outline

Initial Comparison without realizing trigger difference
Comparison of CEM, CMUP and CMX between New and Old data
Require at least 1 tightjet($E_T \geq 15\text{GeV}, |\eta| < 2.0$)
Still some disconformity –check each period

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<th>Trigger Information</th>
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<td>MUON_CMX18_V</td>
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<td>MUON_CMX18_L2_PT15_V</td>
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Summary of Data Validation
Initial Comparison without realizing trigger difference

Comparison of CEM, CMUP and CMX between New and Old data

Require at least 1 tightjet ($E_T \geq 15\text{GeV}, |\eta| < 2.0$)

Still some disconformity – check each period

Both Leptons ≥ 1 tightjet
CEM ≥ 1 tightjet
CMUP ≥ 1 tightjet
CMX ≥ 1 tightjet

Figure: $\frac{\text{Lumi}_{\text{new}}}{\text{Lumi}_{\text{old}}} = 0.395$, $\frac{\text{Entri}_{\text{new}}}{\text{Entri}_{\text{old}}} = 0.387 \pm 0.001$

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Summary of Data Validation
Outline

Initial Comparison without realizing trigger difference
Comparison of CEM, CMUP and CMX between New and Old data
Require at least 1 tightjet \((E_T \geq 15\text{GeV}, |\eta| < 2.0)\)
Still some disconformity – check each period

Both Leptons \(\geq 1\) tightjet
CEM \(\geq 1\) tightjet
CMUP \(\geq 1\) tightjet
CMX \(\geq 1\) tightjet

Figure:

\[
\frac{Lumi_{new}}{Lumi_{old}} = 0.397, \quad \frac{Entri_{new}}{Entri_{old}} = 0.394 \pm 0.002
\]
Outline

- Initial Comparison without realizing trigger difference
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- Require at least 1 tightjet ($E_T \geq 15\text{GeV}, |\eta| < 2.0$)
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Both Leptons $\geq 1\text{tight jet}$
- CEM $\geq 1\text{tight jet}$
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Summary of Data Validation

Figure: $\frac{\text{Lumi}_{\text{new}}}{\text{Lumi}_{\text{old}}} = 0.397$, $\frac{\text{Entri}_{\text{new}}}{\text{Entri}_{\text{old}}} = 0.364 \pm 0.002$

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Both Leptons \( \geq 1 \) tightjet
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CMX \( \geq 1 \) tightjet

Figure:
\[
\frac{Lumi_{\text{new}}}{Lumi_{\text{old}}} = 0.392, \quad \frac{Entri_{\text{new}}}{Entri_{\text{old}}} = 0.397 \pm 0.003
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Require at least 1 tightjet \( E_T \geq 15 \text{GeV}, |\eta| < 2.0 \)
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CEM check
CMUP check
CMX check
Extra Amendment–1 vertex requirement
Next Step

\[
\frac{N_{\text{entries}}}{L_{\text{luminosity}}} \propto \varepsilon_{\text{trigger efficiency}}
\]

CEM, CMUP and CMX-with 0, 1, 2, 3, 4 tightjets requirement.
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Require at least 1 tight jet \( E_T \geq 15 \, \text{GeV}, |\eta| < 2.0 \)
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Next Step

## CEM with jet requirement

<table>
<thead>
<tr>
<th>Entries/Luminosity(pb)</th>
<th>Diff Periods &amp; Diff Jet Requirements</th>
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Comparison of CEM, CMUP and CMX between New and Old data
Require at least 1 tightjet ($E_T \geq 15\text{GeV}$, $|\eta| < 2.0$)
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CMUP with jet requirement

- p0
- p1-p4
- p5-p7
- p8
- p9
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CMUP with jet requirement

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CMX_W+L+MET with jet requirement

Entries/Luminosity(pb)

Diff Periods & Diff Jet Requirements

Summary of Data Validation
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**CMX_W+L+MET with jet requirement (1-4 jets)**

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Still some disconformity – check each period

Outline
- CEM check
- CMUP check
- CMX check
- Extra Amendment – 1 vertex requirement
- Next Step

CMX_W+L+MET with jet requirement (3-4 jets)

Summary of Data Validation
Outline
Initial Comparison without realizing trigger difference
Comparison of CEM, CMUP and CMX between New and Old data
Require at least 1 tight jet ($E_T \geq 15 \text{GeV}, \mid \eta \mid < 2.0$)
Still some disconformity – check each period

- CEM check
- CMUP check
- CMX check
Extra Amendment – 1 vertex requirement
Next Step

Summary of Data Validation

CMX_W+L+MET with jet requirement (4jets)
Higher Lumi in New data $\rightarrow$ more soft events per collision $\rightarrow$ unfair comparison of Met between old and new data
Outline
Initial Comparison without realizing trigger difference
Comparison of CEM, CMUP and CMX between New and Old data
Require at least 1 tightjet ($E_T \geq 15$ GeV, $|\eta| < 2.0$)
Still some disconformity — check each period

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Summary of Data Validation
Things to be done in the next few weeks

- Pseudoexperiment
- KDE