

# Muon Isolation Efficiency vs Pileup

Figures 8.6 & 8.7 of the Muon Isolation Note

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- 1 Methodology
- 2 Datasets
- 3 Track-Based Isolation (Loose & Tight)
- 4 PFlow-Based Isolation (PflowLoose & PflowTight)

**Goal:** Measure muon isolation efficiency as a function of pileup ( $\langle\mu\rangle$ ) for four working points.

**Tag & Probe selection:**

- Exactly 2 opposite-sign muons
- $80 < m_{\mu\mu} < 100$  GeV (Z peak)

**Four isolation working points:**

WP	Variables
Loose_VarRad	Track + Calo
Tight_VarRad	Track + Calo
PflowLoose_VarRad	Track + PFlow
PflowTight_VarRad	Track + PFlow

# Technical details and Datasets

- Software: AnalysisBase,25.2.89
- ROOT Version: 6.36.04
- Package: [fastMuonChecker\\_modified.py](#)

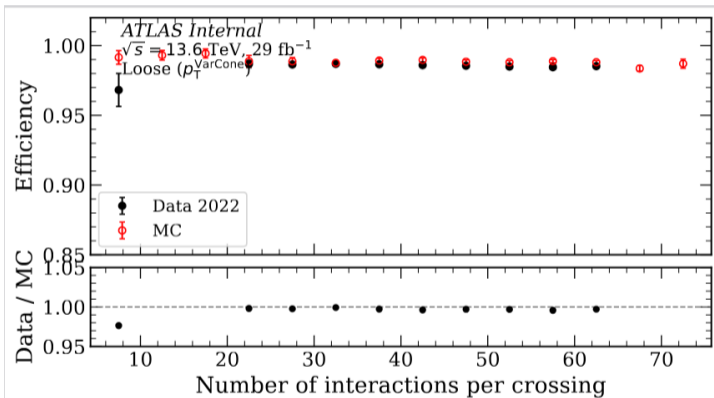
## Data 2023 – $\sqrt{s} = 13.6$ TeV

- Runs: **451094, 455924, 455975, 456749**
- Derivation: DAOD\_PHYS + physics\_Main

## Monte Carlo – Powheg+Pythia 8 $Z \rightarrow \mu^+ \mu^-$

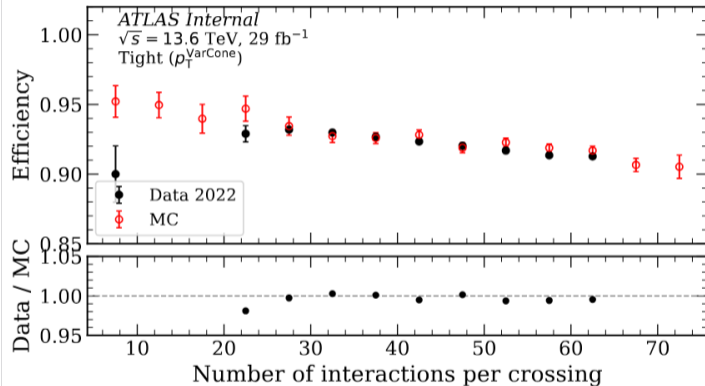
- DSID: **601190** (PhPy8EG\_AZNLO\_Zmumu)
- Campaign: mc23\_13p6TeV
- Derivation: DAOD\_PHYS
- SubCampaign: MC23d

# Isolation Efficiency vs Pileup – Loose\_VarRad



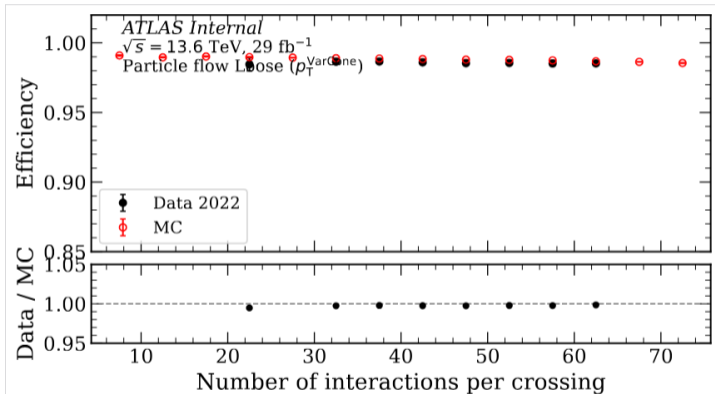
**Working Point:**  
Loose\_VarRad

# Isolation Efficiency vs Pileup – Tight\_VarRad



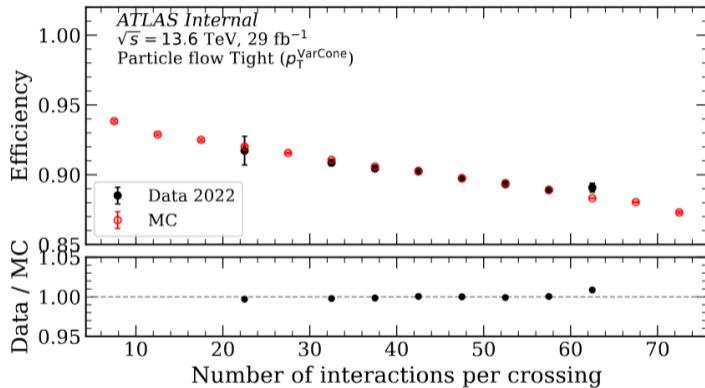
**Working Point:**  
Tight\_VarRad

# Isolation Efficiency vs Pileup – PflowLoose\_VarRad



**Working Point:**  
PflowLoose\_VarRad

# Isolation Efficiency vs Pileup – PflowTight\_VarRad



**Working Point:**  
PflowTight\_VarRad

**Back Up**

```
Message from root@lxplus956.cern.ch on <no tty> at 16:23 ...
Dear LxPlus User melallam

The process (python) has been killed as the CGroup of all
your processes has reached your memory allocation.

Memory cgroup out of memory: Killed process 2196655 (python) total-vn:63087636kB, anon-rss:35870920kB, file-rss:9720kB, shmem-rss:0kB, UID:191311 pgtables:75884kB oom_score_adj:0

To check your memory limits of your CGroup and current usage:

systemctl status user-0.slice
EOF
Killed
```

Figure: Out-of-memory termination of the plotting process on lxplus due to CGroup memory limits.