

Multivariate analysis techniques for neutral pileup suppression in Particle Flow

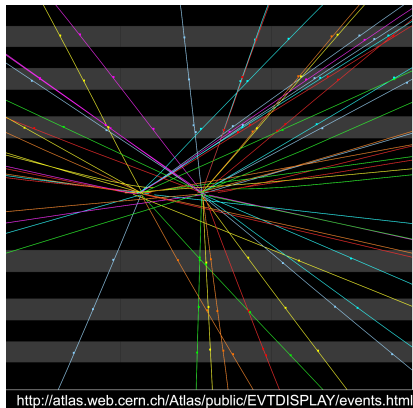
Melina Lüthi

CERN

8. August 2018

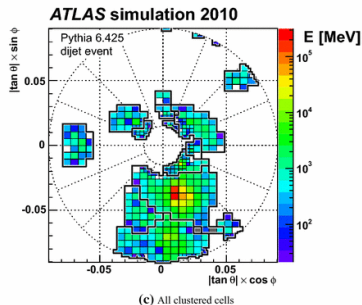


Pile Up



- ▶ μ = number of pp inelastic interactions per bunch crossing
- ▶ 2018: $\langle \mu \rangle = 38.3$
- ▶ only interested in the **hard scatter vertex**
- ▶ hard scatter vertex = most energetic vertex

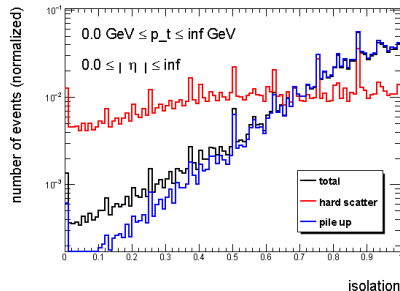
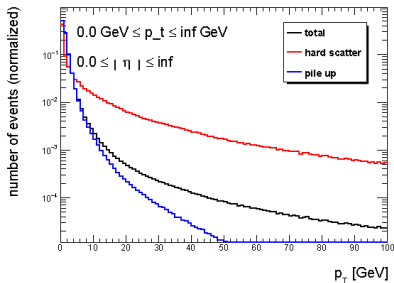
Clusters



- ▶ Cluster = collection of “connected” cells in the calorimeter
- ▶ only interested in the clusters coming from the **hard scatter vertex**
- ▶ How to discriminate the rest?
- ▶ charged clusters: tracks
→ easy
- ▶ neutral clusters: no tracks
→ difficult
- ▶ today @ATLAS: p_T cut

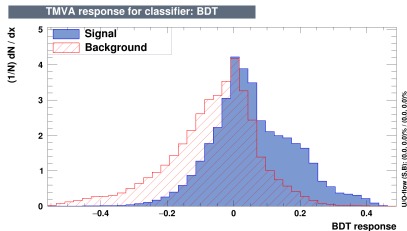
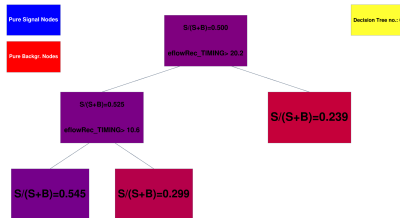
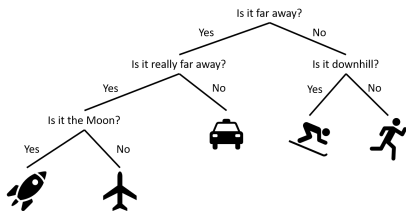
Multivariate Analysis Technique

feed cluster variables to a machine learning algorithm



Multivariate Analysis Technique

Boosted Decision Trees



Summary

- ▶ Pileup: several inelastic pp interactions per bunch crossing
- ▶ discriminate all clusters not coming from the hard scatter vertex
- ▶ charged clusters: tracks
- ▶ neutral clusters: only calorimeter information → multivariate analysis techniques