

Electron removal in $Z \rightarrow ee$ events using MissingET reconstruction on AOD

Giovanni Siragusa (siragusa@uni-mainz.de)
Johannes Gutenberg Universität (Mainz)

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Motivation

- In situ and data driven measurements of the MissingET performance in $W \rightarrow ev$ events can be performed using $Z \rightarrow ee$ events
 - At this stage is fundamental a proper technique to ignore (i.e. remove) one electron in the event
- The possibility to perform the removal directly at calorimeter level allows a better understanding of the detector and reconstruction response
 - Electrons are reconstructed using fixed-size cluster: our best knowledge of the EM calibration is at this level
 - The removal operates on the associated TopoCluster: our best knowledge at detector level is the TopoCluster
- The purpose of this work is to give a reliable tool for the calculation of the MissingET in case of electron removal

MET reconstruction from AOD

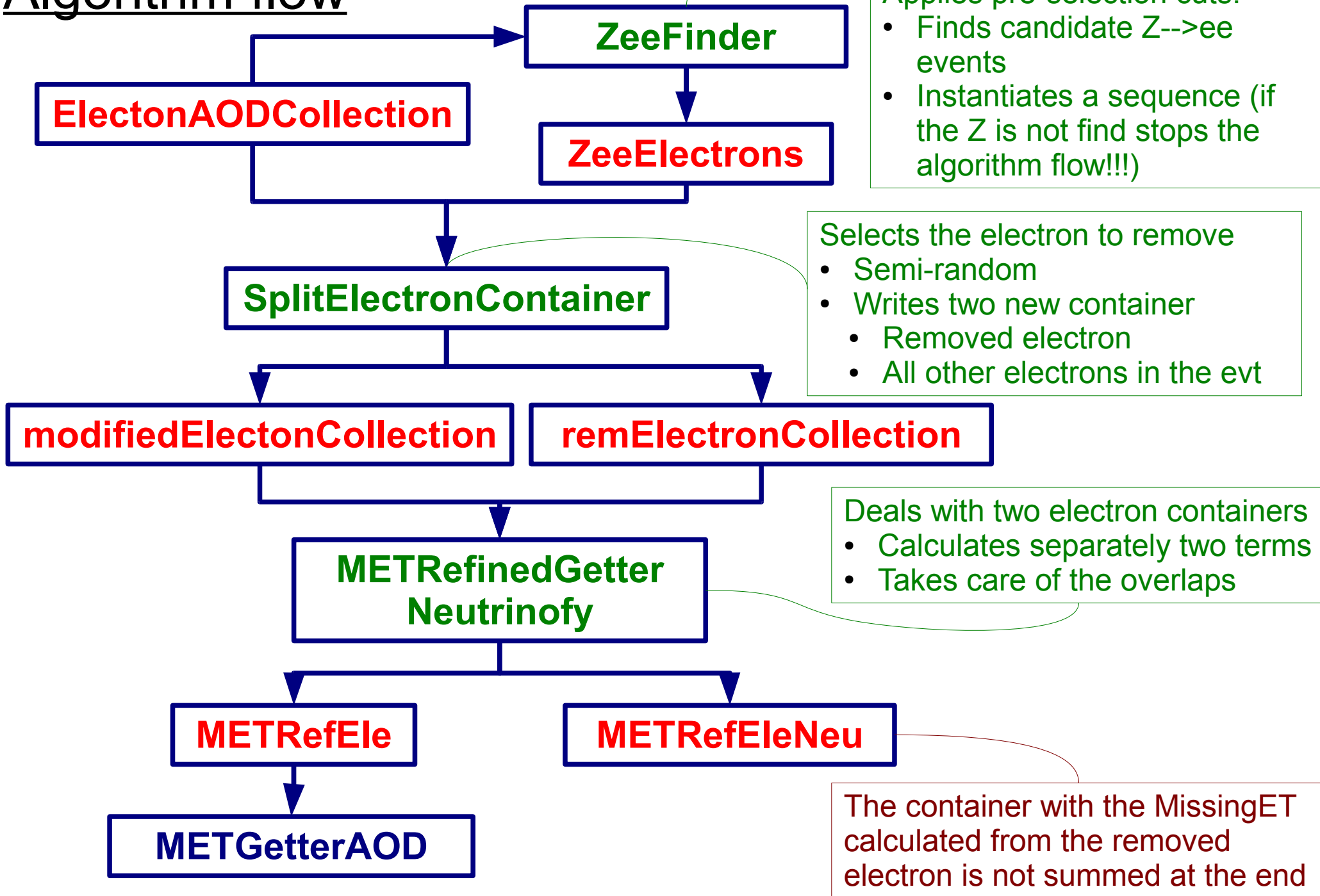
Features

- Recently introduced the possibility to re-run MissingET reconstruction on AODs
 - Allowed custom re-calculation (MET reconstruction itself is very flexible)
 - Key feature is the overlap check of different calorimeter objects
 - Mainly needed for electrons which are reconstructed and calibrated using fixed size clusters (not TopoClusters)

Requirements

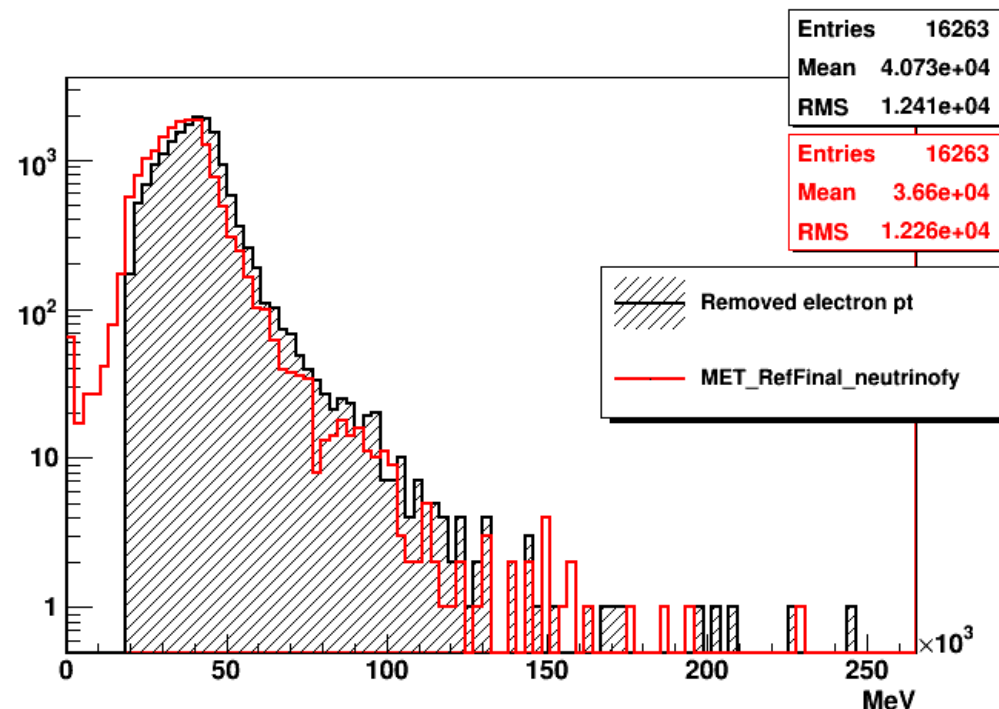
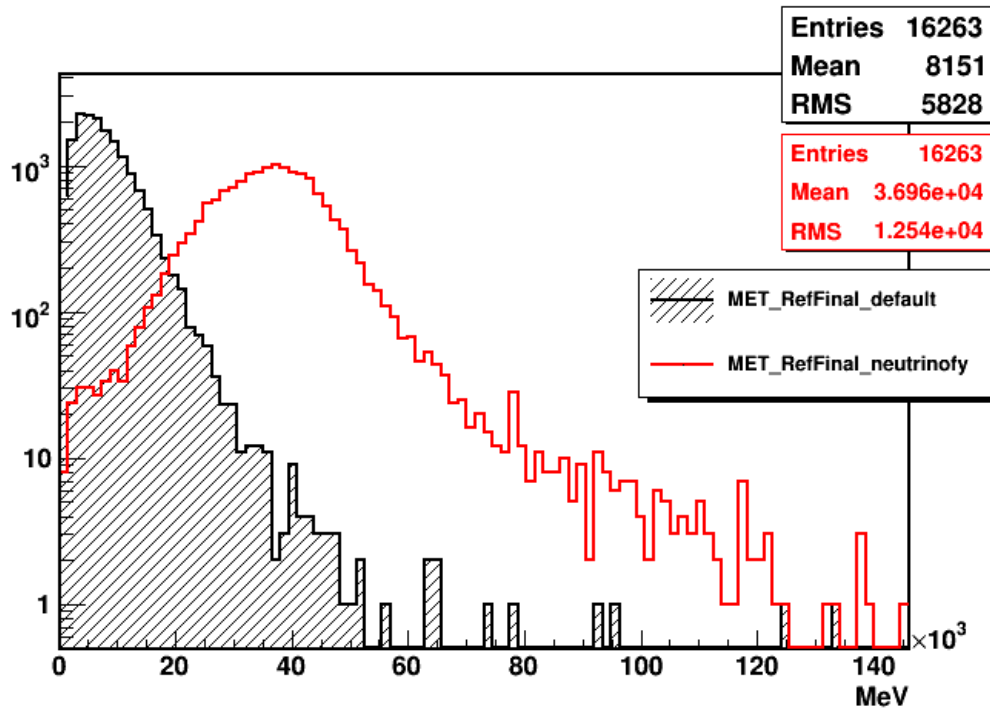
- To perform the MissingET reconstruction on AOD needed:
 - **TopoCluster as reconstructed in release 15** (in release 14 not all the needed information are available)
 - Jets calibrated with **Local Hadron Calibration** (not present in the AOD)
- To reconstruct **TopoClusters** need to access the **ESD**
- **Jet finding** possible “on the fly” directly from **AOD**

Algorithm flow



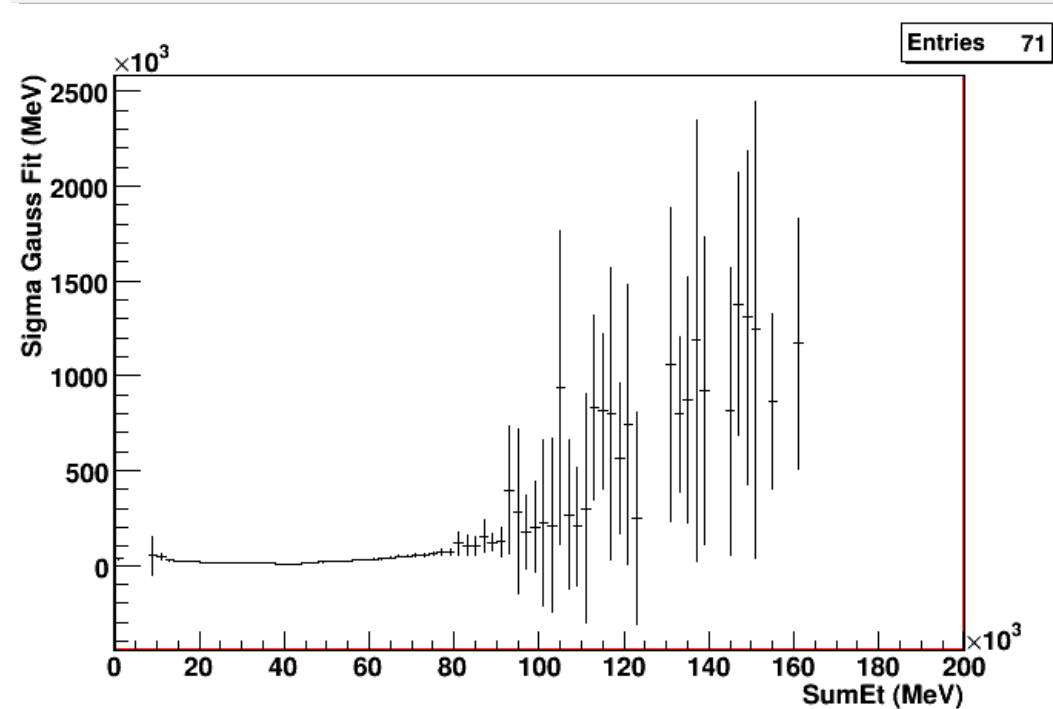
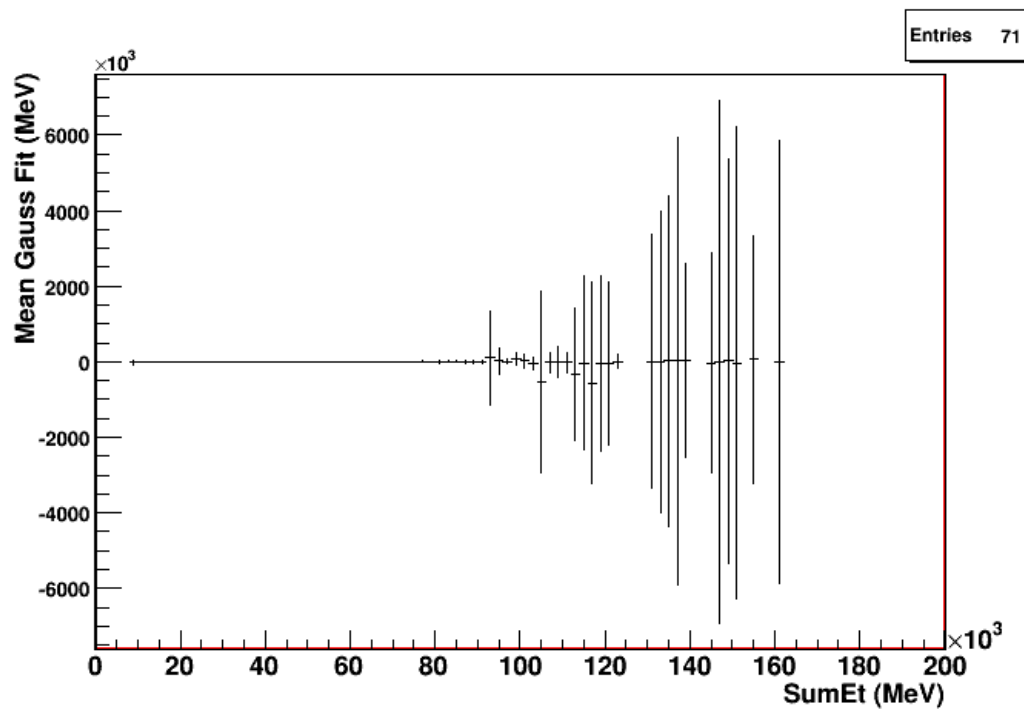
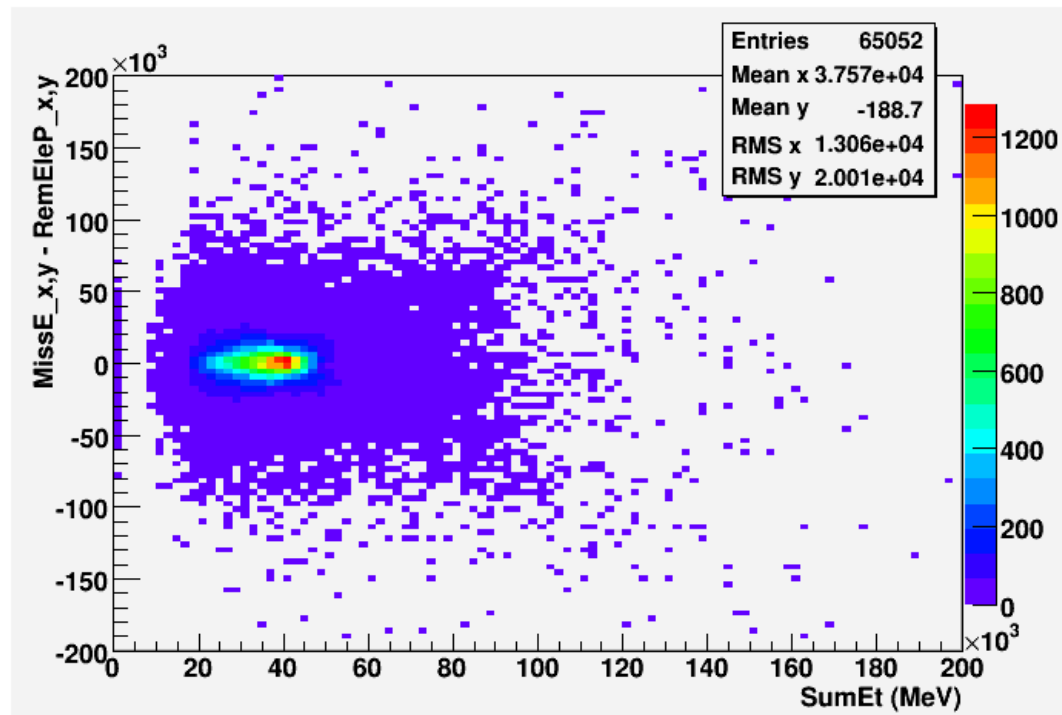
First validation

- Comparison with MissingET in “normal” $Z \rightarrow ee$ decays
 - The peak position is placed correctly
- Comparison with (offline) removed electron
 - Shape compatible
 - Small overall underestimation of the MissingET
- High MissingET tails are physical
 - Not present in “normal” $Z \rightarrow ee$ decays
 - Same behaviour as removed electron p_T



MET Performance

- Studied the resolution along the x and y axis (which are equivalent)
 - Increase the statistics to better constrain the fit at high SumEt values
 - Move to transverse and perpendicular axis (defined by the Z direction)



Summary and Outlook

- Implemented MissingET recalculation after electron removal in $Z \rightarrow ee$ events
 - Quite flexible implementation: can be used to deal with other objects
 - First results encouraging
- Integrated in the MissingETPerformance package
- Possibility to extend to forward calorimeter regions
 - Z search by matching electron + TopoCluster?
- Perform a high statistics analysis on full MC $Z \rightarrow ee$ sample
- Use for acceptance/resolution studies

More details can be found at:

<http://indico.cern.ch/getFile.py/access?contribId=13&resId=0&materialId=slides&confId=59354>