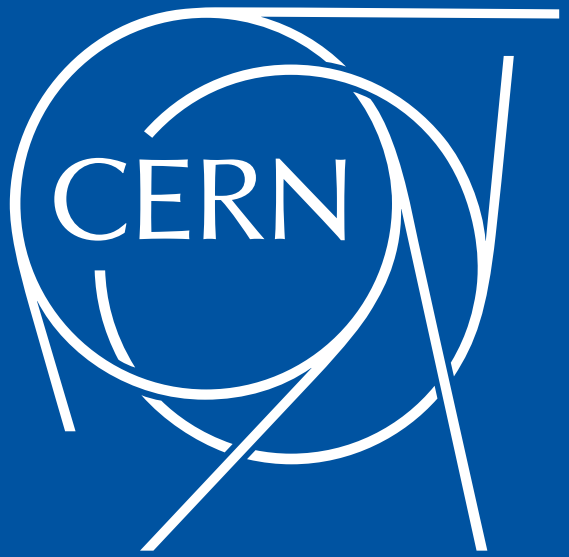

CERN

CMS examples for ReANA

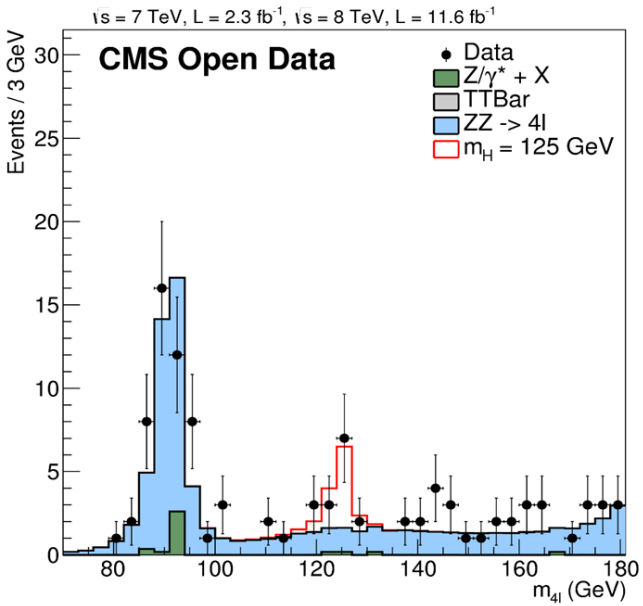
D. Delgado, F. Navarro, A. Lintuluoto

Validation and CMS Data Analysis School examples

- From the CERN Open Data Portal, the code for validation of the datasets is used with the CMS Open Data VM environment.
- Validation examples prove that a result (e.g. a plot from publication, or a simple distribution to compare) can be obtained with the legacy/open data tools.
- Our goal is to create this service as clear and organized for the user and contributor. Also, to build bridge between CAP and ReANA.
- Some examples require scalable resources because of the size of the datasets and the time needed for the analysis.

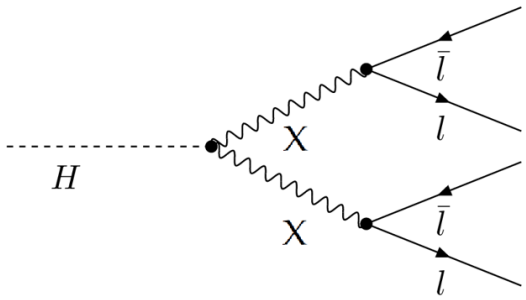
Higgs-to-four-lepton Analysis Example

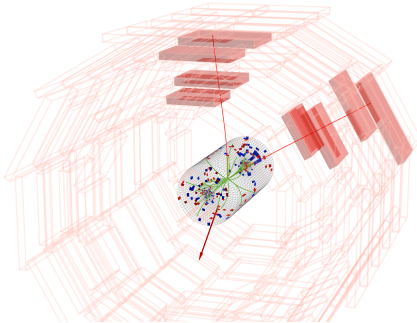
- This example guides the user to reproducing the discovery of the Higgs boson using the 2011 and 2012 datasets, made of both Monte-Carlo simulations and data used.
- It contains multiple levels of examples, from very simple to a full analysis, all with CMS Open Data using CMSSW environments.
- ReANA, captures the analysis workflow (e.g. Yadage, or CWL) and run the commands to obtain the output (i.e. final plot).



Montecarlo Generation

$$H^0 \rightarrow 2X, X \rightarrow l^+ l^-$$





- Process divided in three steps: event generation, simulation and reconstruction (for MC and raw data file)
- As in CMS Open Data VM, condition data is read from /cvmfs
- Run within Docker container

Inclusive Jet Cross Section

- 2011 on Open Data
- 2012 on ReANA
- Reuse workflow for future data

(1) **Produce ntuples**

- Open Data 2011 Jet AOD files as input

(2) **Analysis**

- Unfold spectrum and draw plots of raw spectra with a fit of theory

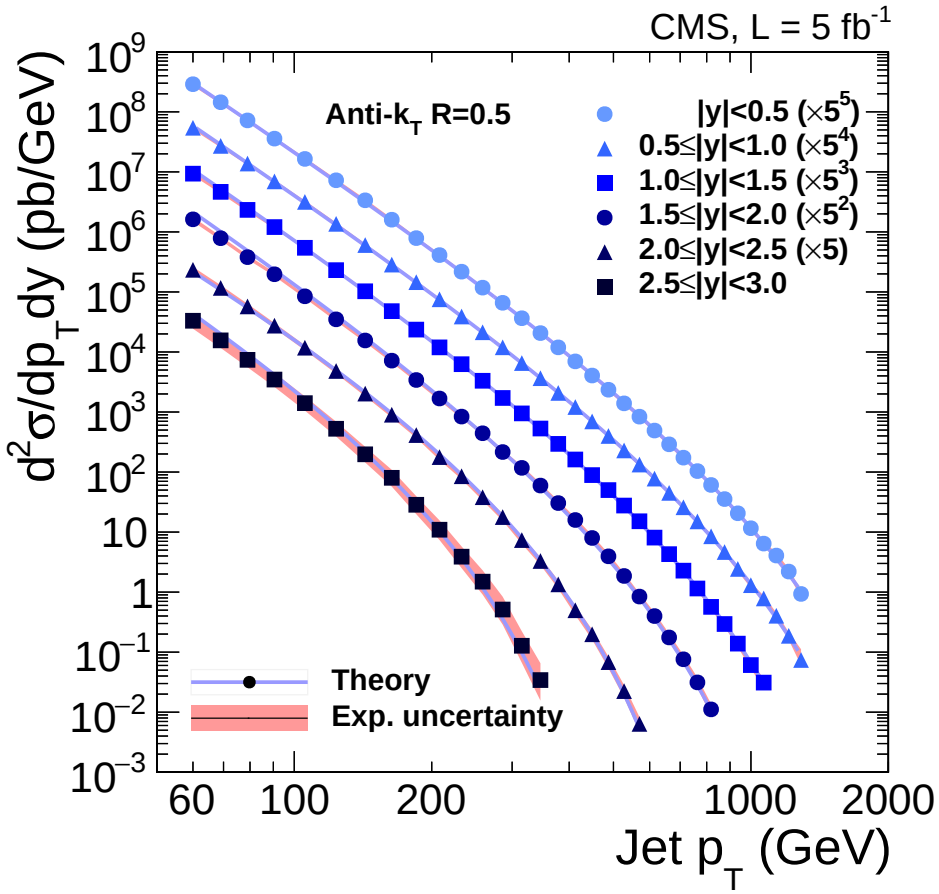


Figure: Unfolded inclusive jet cross section with anti-k_T R = 0.5

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