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Procedure for rediscovering the Higgs Boson

**Produce** a root data input file from original data and MC files for one Higgs signal candidate and for the simulated Higgs signal with reduced statistics (for speed reasons) and reproduce the final output plot containing your own input using a root macro (~1 hour if Virtual machine is already installed, depending on internet connection and computer performance, up to ~few hours otherwise)

1. if not already done, follow instructions for steps 1 and 2 in [CMS 2011 Virtual Machines: How to install](http://opendata.cern.ch/docs/cms-virtual-machine-2011), including the installation of the demo analyzer
2. in the Demo/DemoAnalyzer/ directory, which is created following Step 2: How to test and validate, replace BuildFile.xml by [the version](http://opendata.cern.ch/record/5500/files/BuildFile.xml) downloaded from this record
3. download [HiggsDemoAnalyzer.cc](http://opendata.cern.ch/record/5500/files/HiggsDemoAnalyzer.cc) from this record to the Demo/Demoanalyzer/src subdirectory
4. in Demo/DemoAnalyzer/, recompile scram b
5. download [demoanalyzer\_cfg\_level3data.py](http://opendata.cern.ch/record/5500/files/demoanalyzer_cfg_level3data.py) (data example) and [demoanalyzer\_cfg\_level3MC.py](http://opendata.cern.ch/record/5500/files/demoanalyzer_cfg_level3MC.py) (Higgs simulation example)
6. create datasets directory mkdir datasets and change to this directory cd datasets
7. download the 2012 JSON validation file from [the corresponding record](http://opendata.cern.ch/record/1002) to this directory

Last Visit – 2020-12-15 Still do to is below this line:

1. if not yet done at level 2, create the directory rootfiles and download all the level 2 root files to this directory (see level 2)
2. run the two analysis jobs (one on data, one on MC, the input files are already predefined)
   * cmsRun demoanalyzer\_cfg\_level3data.py will produce output file DoubleMuParked2012C\_10000\_Higgs.root containing 1 Higgs candidate from the data
   * cmsRun demoanalyzer\_cfg\_level3MC.py will produce output file Higgs4L1file.root containing the Higgs signal distributions with reduced statistics
3. move the two .root files above to the rootfiles directory, together with the predefined files
   * mv DoubleMuParked2012C\_10000\_Higgs.root rootfiles/.
   * mv Higgs4L1file.root rootfiles/.
4. change directory cd rootfiles and download the macro [M4Lnormdatall\_lvl3.cc](http://opendata.cern.ch/record/5500/files/M4Lnormdatall_lvl3.cc) to this directory
5. on the linux prompt, type root -l M4Lnormdatall\_lvl3.cc
   * you will get the output plot on the screen; the magenta Higgs signal histogram will now be the one you produced, and the one data event which you have selected will be shown as a blue triangle. All other parts of the plot are the same as in 2.
6. either, on the ROOT canvas (picture) click file->Quit ROOT or, on the root [] prompt, type .q
   * you will exit ROOT and find the output plot in mass4l\_combined\_user3.pdf