ElectronTagAndProbeFrame general changes for low mu

- Pileup reweighting off
- m_egammaCalibrationTool->setProperty("randomRunNumber",1) : must be fixed since PRW is off
- m_egammaCalibrationTool->setProperty("doSmearing",0)
- m_egammaCalibrationTool->setProperty("doScaleCorrection",0)
- Low mu momentum corrections to replace smearing and scale from here: /eos/atlas/atlascerngroupdisk/phys-sm/LowMu2017WZ/corrections/2020_v03/ElecCalib_2018_13TeV.root (or more recent versions) have been added into framework: MomentumCorrection.cxx and MomentumCorrection.h
- Recoil calculation...put on hold for now?
- Find MET in T&P frame here: https://gitlab.cern.ch/ATLAS-EGamma/Software/ElectronID/TagAndProbeFrame/-/blob/Ben_W_lowMu/TagA and https://gitlab.cern.ch/ATLAS-EGamma/Software/ElectronID/TagAndProbeFrame/-/blob/Ben_W_lowMu/TagA
- WIsoRun.py using MET from recoil as tag

W T&P Implementation

Adding a new Event Selection cut

- Add cut in EventSelectionW.cxx
  - If based on a variable like pT or mTW, include it at the top of the code in addition to the main part of the code as a WCuts addition
  - If this is the case, also include the variable in EventSelectionW.h (an example is m_minMET)
- Add the cut in EventSelectionBase.h inside the WCuts namespace
- Add the cut in EventSelectionBase.cxx inside the WCuts namespace

Steps to implement

- copy MomentumCorrection.cxx to /TagAndProbeFrame/Root/
- copy MomentumCorrection.h to /TagAndProbeFrame/TagAndProbeFrame/
- copy calibration file ElecCalib _2018_13TeV.root to TagAndProbeFrame /data/lowMu_corrections/ (new folder)
- CMakeLists.txt:
  - add TagAndProbeFrame /MomentumCorrection.h to atlas_add_root_dictionary( )
  - add data/lowMu_corrections (folder with calibration file) to atlas_install_data( )
- TagAndProbeFrame /Root/LinkDef.h :
  - #include <TagAndProbeFrame/MomentumCorrection.h>
  - #pragma link C++ class MomentumCorrection +;
- TagAndProbeFrame /TagAndProbeFrame/xAODHelper.h:
  - #include "TagAndProbeFrame/MomentumCorrection.h"
  - void SetDoMomentumCorrection (bool b) {m_doMomentumCorrection = b;}
  - bool m_doMomentumCorrection;
  - MomentumCorrection* m_momcorr; //!
- TagAndProbeFrame /Root/xAODHelper.cxx:
  - m_doMomentumCorrection(true) in both initial constructors
  - implement correction itself: https://gitlab.cern.ch/ATLAS-EGamma/Software/ElectronID/TagAndProbeFrame/-/blob/Ben_W_lowl
  - initialize MomentumCorrection: https://gitlab.cern.ch/ATLAS-EGamma/Software/ElectronID/TagAndProbeFrame/-/blob/Ben_W_lowl
  - use PathResolverFindCalibFile () to get low mu correction file from local folder

Low mu information

- Main dataset: Data18_13TeV - Periods G4 and select runs in J. 146.6 pb^-1. See LowMuWZAnalyses
- Important triggers:
    - HLT_e15_lhloose_nod0_L1EM12 (electron trigger)
    - HLT_xe35, HLT_xe35_tc_lcw (MET triggers)
    - HLT_e15_etcut_trkcut_xe30noL1 (WTP trigger, only in Data)

Grid commands

Running on grid:

python ZIsoRun.py --dir grid_Data18Zee_13TeV --datasetfile SFGridFiles --datasets Rel21_EGAM5_2018_lowmu_Zee --config-file ZIsoConfigs --configs Ben_data18_mc16_EGAM5 -c TagAndProbeFrame /config/lowMu.config --overwrite --selection --grid --gridSuffix ${date}_Zee_data18_13TeV

To rerun a failed job, rerun the grid command with the same grid suffix but with a different T&P submission directory

Rerunning/killing failed grid jobs with pBook:

>> pbook

>> retry(jobID)

>> kill(jobID)

Downloading from the grid:

- $ setupATLAS
- $ localSetupRucioClients
- $ voms-proxy-init -voms atlas
- $ rucio download filename.gridsuffix_hist/ (in Output containters on bigpanda.cern.ch) --> downloads folder of same name containing all raw rootfiles from the job

Working with raw rootfiles

After downloading from the grid:

1. Sum all the data files into "hist-data*.root". Do the same for all the mc files "hist-mc*.root". Sum with "hadd outputfiles.root inputfile1.root inputfile2.root ..."
2. Rerun the same python ZIsoRun.py command (or WIsoRun.py) except remove all the grid flags and replace --selection with --calculate (& --ctlplots & --eff & --TemplateFit). This creates merged-hist*.root files from the hist*.root rootfiles, and also makes the scalefactors.root file inside the output/ directory.
3. Get 1D projections from the 2D histograms in scalefactors.root by using Xiaowen's projection code: python ProjectZiso _Xiaowen.py -i /your/scalefactors.root -o projections.root . (For WIso, use $ ProjectWiso.py -i /your/scalefactors.root -o projections.root)
4. Get Control Plots from scalefactors.root file, efficiencies and SFs from projections.root file.
5. Use custom code inside WTP/Plotting to make nice CPs, SF plots and efficiency plots.

-- BenjaminRichardDavisPurcell - 2020-01-24

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