FCC SW

G Ganis, C Helsens

FCC SW Meeting, 11 December 2020

~~Vidyo~~ Zoom meetings and connections

- Following CERN restrictions **and recommendations**, until further notice - this meeting will continue to be ~~Vidyo~~ Zoom only
- The meeting is open to everybody. However, to prevent abuse, the Zoom connection requires a password.
- Interested people connected **must make themself recognisable** by sending an email to

  Gerardo.Ganis@cern.ch or Clement.Helsens@cern.ch

  They will receive the required information to connect

What happened since last meeting

Key4hep / EDM4hep

- Work on restructuring / moving components continued
  - Integration with new Gaudi (v35r0) CMake infrastructure
- Discussion on Podio evolution for better support of EDM4hep
- Released EDM4hep v0.3
  - w/o Delphes standalone executables

Next meetings: Dec 15th (Key4hep), Jan 12th (EDM4hep)

- Register to egroups **hsf-edm4hep-wg** and/or **key4hep-sw**

Recent activities

- Restructuring and improvements in FCCAnalysis (next slide)
  - Following discussions for Optimal interplay with FCCeePhysicsPerformance
    - Will be presented in more details at next P&P meeting
- Progress in the integration of the BHLUMI Monte Carlo
  - Support for LHE provided M Chrzaszcz
  - BHLUMI (and KKMCee) will be integrated in the Spack stack
- Ongoing work/discussions
  - Realistic and reasonably fast LAr calo simulation for tau studies
    - M Dam et al, CH, B Francois
  - ...

Analysis Framework Upgrade (FCCAnalyses) - 1

- Set of tools to help processing the output of 'simulation'

  - Agnostic to the type of simulation but specific reader functions are required

  - Build a common set of utility functions, algorithms for common use

  - Still possible for users to test their algorithms locally before publishing them

- How was FCCAnalyses structured up to now (all in the same repository)

Analysis configuration
4 **python** scripts to configure:
1. Samples to run over (common production, EDM4Hep)
2. Functions/algorithm to call to produce variables of interests in a flat ntuple
3. Event selection and histograms definition using the flat ntuples
4. Plotting configuration

Common utility functions, algorithm, etc…
C++ library

Common interface code
Sample database,
RdataFrame, plotting
Python

Analysis Framework Upgrade (FCCAnalyses) - 2

- How will FCCAnalyses be structured (2 distincts repositories)

Analysis configuration
4 **python** scripts to configure:
1. Samples to run over (common production, EDM4Hep)
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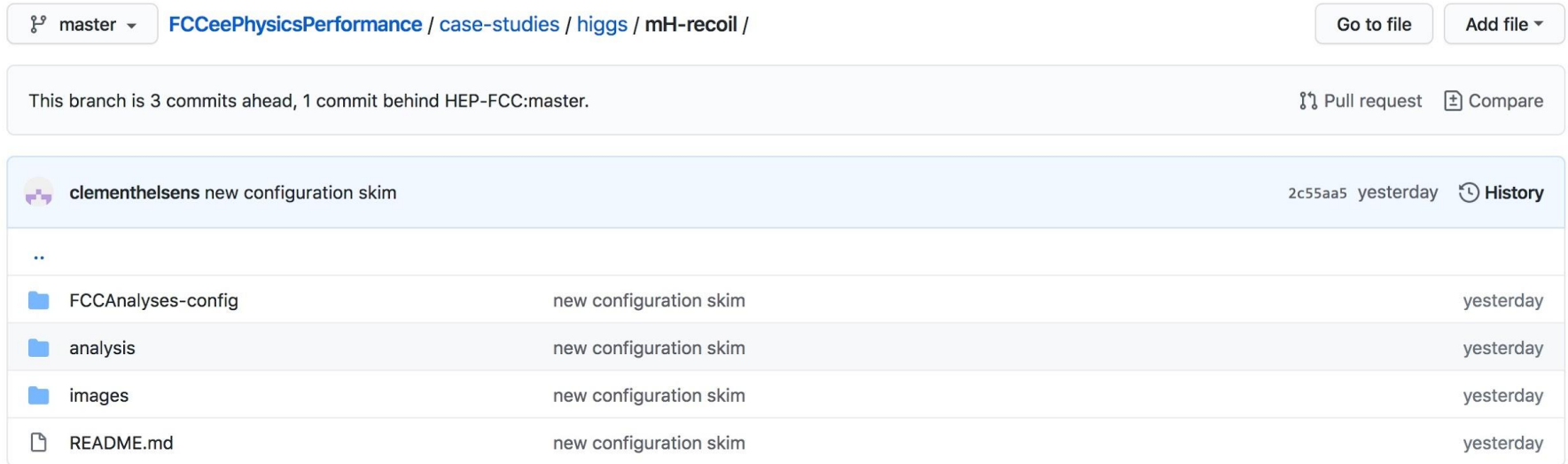In HEP-FCC/FCCeePhysicsPerformance, close to the case studies when it exists

Common utility functions, algorithm, etc…
C++ library

Common interface code
Sample database, RdataFrame, plotting
Python

In HEP-FCC/FCCAnalyses and installed centrally on cvmfs

Analysis Framework Upgrade (FCCAnalyses) - 3

- How will FCCAnalyses be structured (2 distincts repositories)

- Each case study highly encouraged to have it's own FCCAnalyses-config

Analysis configuration
4 **python** scripts to configure:
1. Samples to run over (common production, EDM4Hep)
2. Functions/algorithm to call to produce variables of interests in a flat ntuple
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Analysis Framework Upgrade (FCCAnalyses) - 4

- How will FCCAnalyses be structured (2 distincts repositories)

- But still possible to build and use custom algorithm provided they are properly linked

Common and **user specific** utility functions, algorithm, etc…
C++ library

FCCAnalysis: available algorithms

- Available functionality (see [doxygen](#))
  - Thrust axis and thrust value
  - Sphericity axis and value
  - cos(theta) between an axis and particles
  - Weighted charge of all particles with cos(theta) axis > or <0
  - Preliminary jet clustering
  - Truth history from any MC particle of a given status
  - Tagging 2 body MC decays (for example H->gg, Z->bb)
- Planned functionalities for the common analysers
  - Acceptance efficiencies
  - Parametric PID
  - Pi0 identification
- Planning to have a dedicated uproot/awkward structure to easily run flavour exclusive decays, etc, etc...

Today's meeting

- IDEA Drift Chamber software (N De Filippis)

Next meetings
- Jan 15th (SiPM Digitization studies; TBC)
- Following tenative dates: Jan 29th, Feb 12th, Feb 26th

- Suggestion for discussion topics for next meetings are welcome

Reminders

Status of pre-Key4hep FCCSW

- Latest Pre-Key4hep tag: v0.16
  - Available in two forms
    - In the LCG stacks

      ```
      $ source /cvmfs/fcc.cern.ch/sw/latest/setup-lcg.sh
      ```

      - for CentOS7 and Ubuntu20.04 on CVMFS
      - Native Mac OS version in preparation
    - As full Spack build, for centos7

      ```
      $ source /cvmfs/fcc.cern.ch/sw/latest/setup.sh
      ```

- Includes last version of several key packages
  - Delphes 3.4.3pre05, DD4hep 01-14-01, Podio 0.12, Geant4 10.06.p02
  - EDM4hep 00-02-01, k4FWCore 00-01-01

FCCSW to Key4hep/EDM4hep migration

- Significant progress: thanks Valentin!
- Many relevant components
  - Migrated to EDM4hep
  - Separated out in view of move to key4hep
    - k4Gen
      - MC steering and readers; was FCCSW/Generation
    - k4SimGeant4
      - Fast/Full interface to Geant4; was FCCSW/SimG4xxx
    - k4RecTracker
      - Tracker reconstruction; was FCCSW/RecTracker
    - k4RecCalorimeter
      - Calorimeter reconstruction; was FCCSW/RecCalorimeter
- New repository for the detector description
  - HEP-FCC/FCCDetectors
    - DD4hep files of the detectors components of interest
- These will go in FCCSW v1.00