FCC SW

G Ganis, C Helsens

FCC SW Meeting, 27 November 2020

What happened since last meeting

Key4hep / EDM4hep

- Work on restructuring / moving components continued
  - k4SimDelphes
    - Includes standalone executables
  - k4LCIOReader, k4MarlinWrapper, k4Pandora
- In preparation
  - k4FWCore: v0.2, based on Gaudi v35r0
  - EDM4hep: v0.3, w/o Delphes standalone executables

Next meetings: Dec 1st (Key4hep), Dec 8th (EDM4hep)

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

Recent activities

- Physics Workshop
  - Several talks using software
    - [Use cases for an extreme electromagnetic resolution](#), R Aleksan
    - [Higgs coupling to charm and flavour tagging](#), L Gouskos, M Selvaggi   **FCCSW**
    - [Tau-identification in the Dual readout calorimeter](#), S Giagu
    - [First steps with flavour physics studies at FCC-ee](#), D Hill   **FCCSW**
    - [Activities at NBI](#), JB Hansen, M Dams   **FCCSW**
    - [ttbar studies at FCC-ee](#), J Andrea
  - Some are follows-up of work presented in this meeting
- Several improvements in FCCAnalysis (next slide)
- First implementation of the BHLUMI Monte Carlo
  - Thanks to M Chrzaszcz; needs integration in the stack
- Ongoing work/discussions
  - Optimal interplay with FCCeePhysicsPerformance
  - Enabling (ILC)DIRAC for FCC
  - ...

FCCAnalysis improvements

- Some restructuring has happened
  - HEPPY code has moved to heppy-legacy branch
  - Snowmass tutorial running on fcc-edm now moved to fccedm branch
  - Master is now free of HEPPY and fcc-edm and is fully based on EDM4hep
- Some new functionality have been developed (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...

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

Today's meeting

- Whizard for ttbar studies (J Andrea)

Next meetings (tentative)
- 2020: Dec 11th (IDEA Drift Chamber software; TBC)
- 2021: Jan 15th, Jan 29th, Feb 12th, Feb 26th

- Suggestion for discussion topics for next meetings are welcome

Reminder: Vidyo meetings and connections

- Following CERN restrictions from now on - and until further notice - this meeting will be Vidyo only

- The meeting is open to everybody, but people connected **must make themself recognisable**
  - People with a CERN account **must register** to he meeting with their own CERN credentials
  - For people without a CERN primary account, GUEST connection will allowed **only** if agreed previously via email to Gerardo.Ganis@cern.ch or Clement.Helsens@cern.ch