Software and Computing Status

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CERN-EP-LCD

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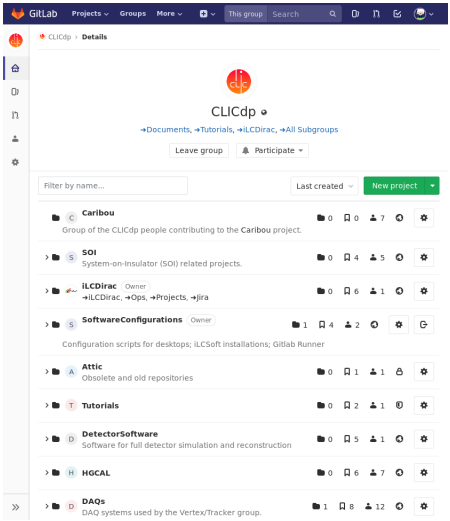
Section 1:

Software and Computing Infrastructure

- Version Control
- Continuous Integration (CI)
- Collaborative Editing
- Shared Storage

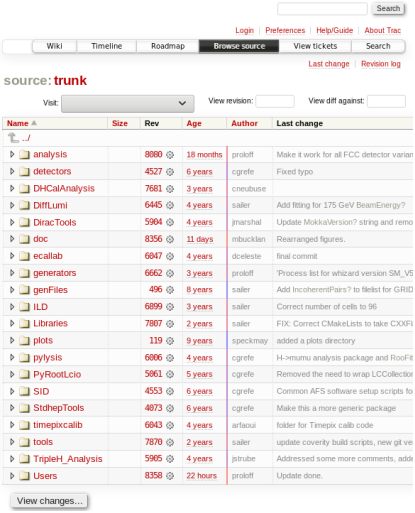
GitLab

- GitLab group for CLICdp https://gitlab.cern.ch/clicdp
- Usable for all types of software projects, websites, and documents



Subversion Retirement

- **CERN subversion is slowly being made read-only and will disappear when AFS does**
- All in-active repositories were migrated from SVN to GitLab: https://gitlab.cern.ch/CLICdp/CLICDetSVN
  - including their history
- Split folders in SVN into many repositories
- Each user in their own repository



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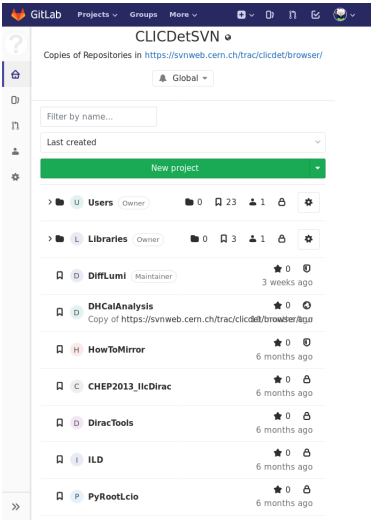

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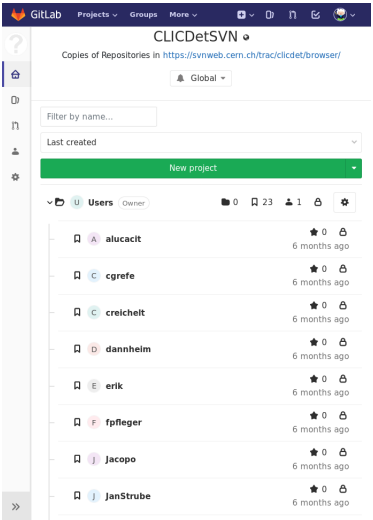
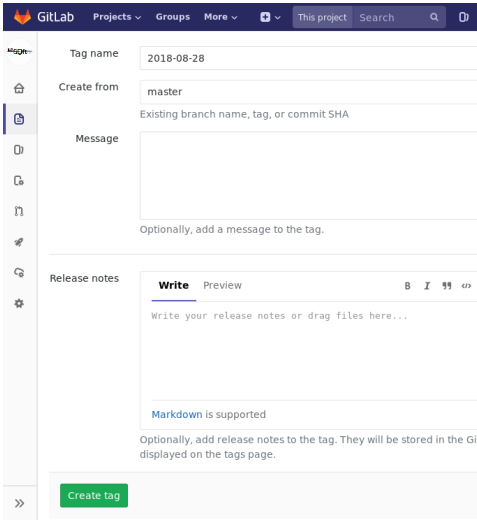


Continuous Integration

Using GitLab-CI beyond testing pull requests (but also for that of course!)

- “Single Click” to compile and deploy software release on CVMFS, automatic nightly releases
- Deploy websites with auto-generated content: ILCDIRAC documentation, DD4HEP
- Compile software for use on the grid using a fixed environment

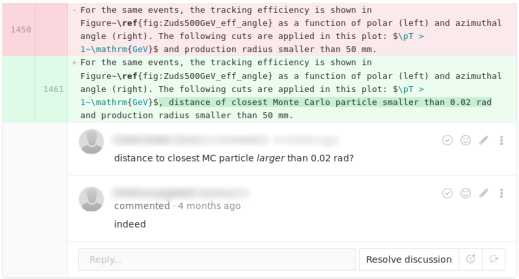


Collaborative Editing

GitLab offers all the tools for collaborative editing, even just with a web browser

- Versioning, access control, automatic builds, web IDE
- https://gitlab.cern.ch/CLICdp/Publications
- You can find all the figures for the publications here

OVERLEAF is also available collaborative editing, but not clear how well the versioning helps when things go wrong.



Discuss changes before merging. Only read the phrases that are actually changed

AFS

- AFS is being phased out at CERN at the end of LS2
- `/afs/cern.ch/eng/clic/*` has mostly been archived to `Castor`
- Some harder to relocate software has so-far remained
  - Sentaurus TCAD (needs access protection)
  - legacy SLIC and lcsim

CVMFS

All new software is provided via CVMFS: `/cvmfs/clicdp.cern.ch`

- compilers (gcc 6, 7, 8, llvm), iLCSoft, iLCDirac, git, Emacs, WHIZARD2
- Mounted on desktops, lxplus, lxbatch, and grid sites around the world
- For SL6 and CentOS7, and a few things for macOS

EOS

- Shared storage on EOS `/eos/experiment/clicdp/*`: `grid, data, phys`
  - `grid`: equal to `CERN-DST-EOS` iLCDirac Storage Element, allow direct **read** access for grid files: both central production and user output
  - `data`: test beam data
  - `phys`: Lumi spectra, background files, MC samples
- Personal storage (1TB) under `/eos/user/u/username/`, also connected to cernbox.cern.ch

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- Upcoming configuration change for fuse mounts on Desktop PCs

Section 2:

Simulation and Reconstruction

- Geometry and Simulation
- $\gamma\gamma \rightarrow$ hadron Background
- Installations and Configurations

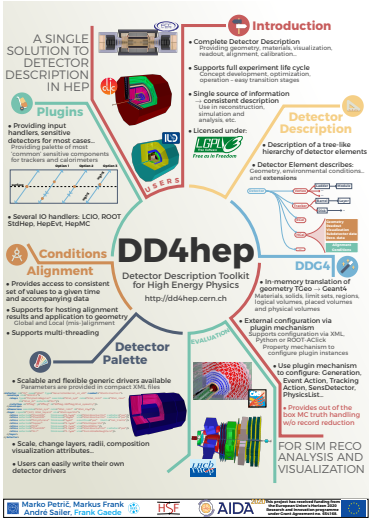
Simulation and Reconstruction Software

- Many improvements and detailed studies for the reconstruction
- See presentations by Emilia, Erica, and Matthias later today

DD4hep

Geometry description based on DD4hep

- Core components stable, but a number of bug fixes and small improvements in the last year, be sure to pick up latest version
- New developments for conditions and alignments (M. Frank)
- Gaining big users: CMS, LHCb
- Contributions from wider HEP user base

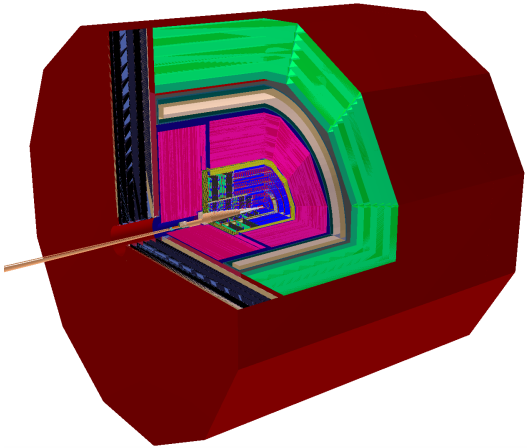


M. Petric CHEP 2018

Detector Model

Current detector model CLIC_o3_v14, unchanged for 9 months

- Only change: fix offset in LumiCal segmentation



$\gamma\gamma \rightarrow$ hadron **Background**

- So far mostly focused on reconstruction with toughest backgrounds from 3 TeV
- Now simulating 380 GeV $\gamma\gamma \rightarrow$ hadron backgrounds
- 350 GeV and 3 TeV $\gamma\gamma \rightarrow$ hadron events already available
- `clicReconstruction.xml` contains configuration for different background conditions, e.g., `-Config.Overlay=380GeV`
- Information, backgrounds, spent beams for different accelerator configurations (Energy, $L^{\star}$, bunch charge) kept up-to-date by D. Arominski (CERN, Warsaw UT)

CLIC 380 GeV with L^{*} = 6 m

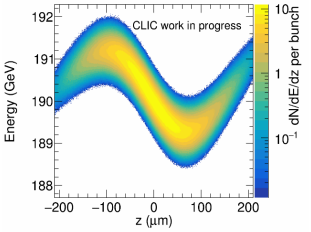
Summary information about CLIC at 380 GeV with L^{*} = 6 m

The following results have been obtained using the longer L^{*} option of 380 GeV Beam Delivery System running at the nominal conditions. In this design the last quadrupole of the final doublet – QD0 is placed outside of the CLIC detector.

Electron and positron beams have been separately generated, then transported through the BDS using Placet and collided in GuineaPig++ software, assuming a perfect beam feedback system.

The beams are generated taking into account the following energy spread contributions:

- energy spread shape coming from the Main Linac
- uncorrelated energy spread of 0.1% of the post-linac beam energy (190 GeV), assuming Gaussian distribution
- uncorrelated energy spread of 1.6% of the pre-linac beam energy (9 GeV); assuming Gaussian distribution



http://clic-beam-beam.web.cern.ch/clic-beam-beam/

Simulation and Reconstruction Configurations

- Software installations on CVMFS `/cvmfs/clicdp.cern.ch/iLCSoft/builds/`
  - Latest build from 2018-08-10
- Configurations: https://github.com/iLCSoft/CLICPerformance, `/cvmfs/clicdp.cern.ch/iLCSoft/builds/<date>/ClicPerformance/HEAD`
- Frequent installations for large scale production with iLCDIRAC

Let us know if you would like to study anything with the new detector model and reconstruction

Thanks to all the contributors to the software effort