# Software and computing challenges in a Muon Collider Detector

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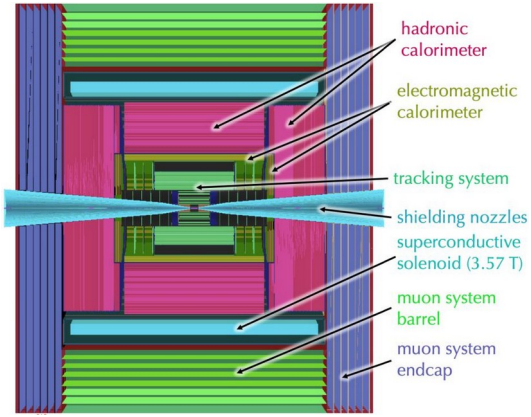
# Muon Collider: the challenge

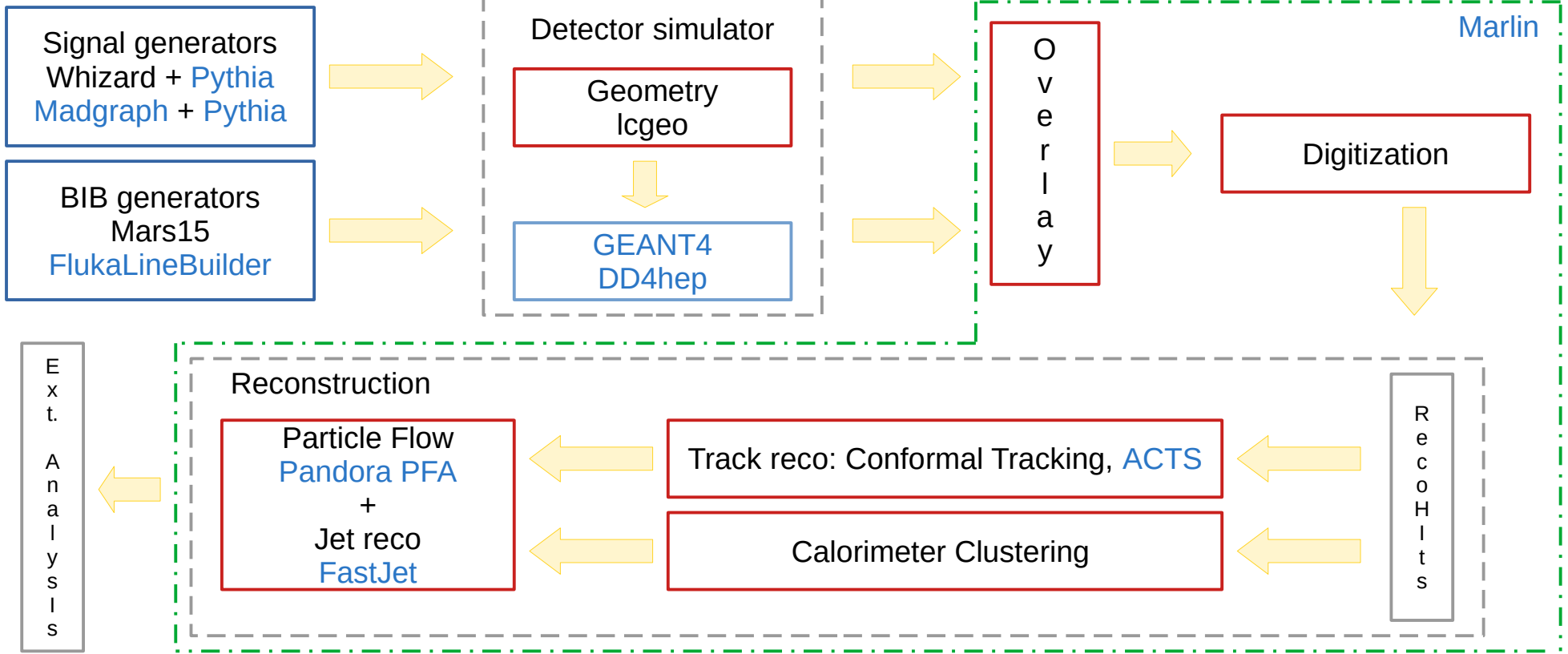
Setup a complete environment for simulation and analysis of the Muon Collider detector behavior and performances
Software and infrastructures for development, testing and production
The environment must scale on heterogeneous computing infrastructures




The environment must be suitable for an international collaboration:

- Coordination tools and services for managing software and accessing resources
- Resources are geographically distributed
- Usable also by external collaborators on third-party infrastructures

# Muon collider: the framework

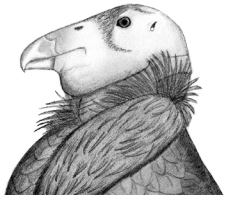


# Muon Collider: resources

CloudVeneto: Openstack based cloud infrastructure (IAAS)
Platforms available: Docker, Kubernetes, batch clusters on demand
200 VCPU, 740 GB RAM, 100 Virtual machines
Storage on volumes: 90TB, Object storage: 75TB
Access via INFN IdP

INFN CNAF site: batch system based on HTCondor
Storage: 150TB on INFN StoRM
Access via VOMS

CERN site: batch system based on HTCondor
Storage: 100TB on CERN EOS
Now in pre-production



# Software development and distribution

Development and production previously based on CentOS 8
Temporary moved to CentOS 8 Stream
Waiting for a final solution from CERN/FermiLab

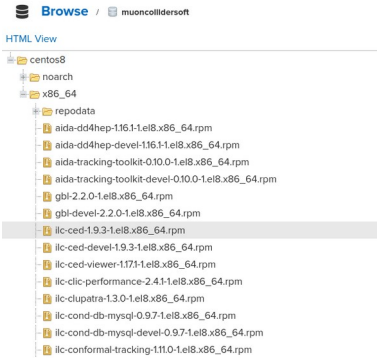
Development tools and guidelines from iLCSoft
The code is available in Github
A Github-based CI has been configured by BerkeleyLab people

The reference artifact for the production is a docker container, published in Docker Hub
Conversion from docker image into singularity one is performed
The singularity container:

- is distributed via storage element for batch processing at INFN-CNAF
- will be available via CVMFS at CERN (still work in progress)

# Future works

A continuous integration system is still under discussion
It must guarantee a convenient way for designing new components and testing them directly on a distributed system
Github is a good starting point but other solution can be evaluated




A singularity container published in CVMFS is a flexible solution but not suitable for any situation
It’s worth investigating other distribution channel
A complete set of RPM packages is ongoing; third-party dependencies are already available

# References for feed-back

For a manually setup of the environment and for further details:
https://confluence.infn.it/display/muoncollider/Installation
For available datasets:
https://confluence.infn.it/display/muoncollider/Monte+Carlo+Simulated+Samples

Tutorial on simulation software is available at:
https://indico.fnal.gov/event/45187/

For any feed-back about infrastructure and software the mailing list is:
muon_collider_software<at>lists.infn.it

Other useful mailing lists are:
muon_collider_detectors<at>lists.infn.it
muon_collider_studies<at>lists.infn.it

Thank you for your attention

Any questions?