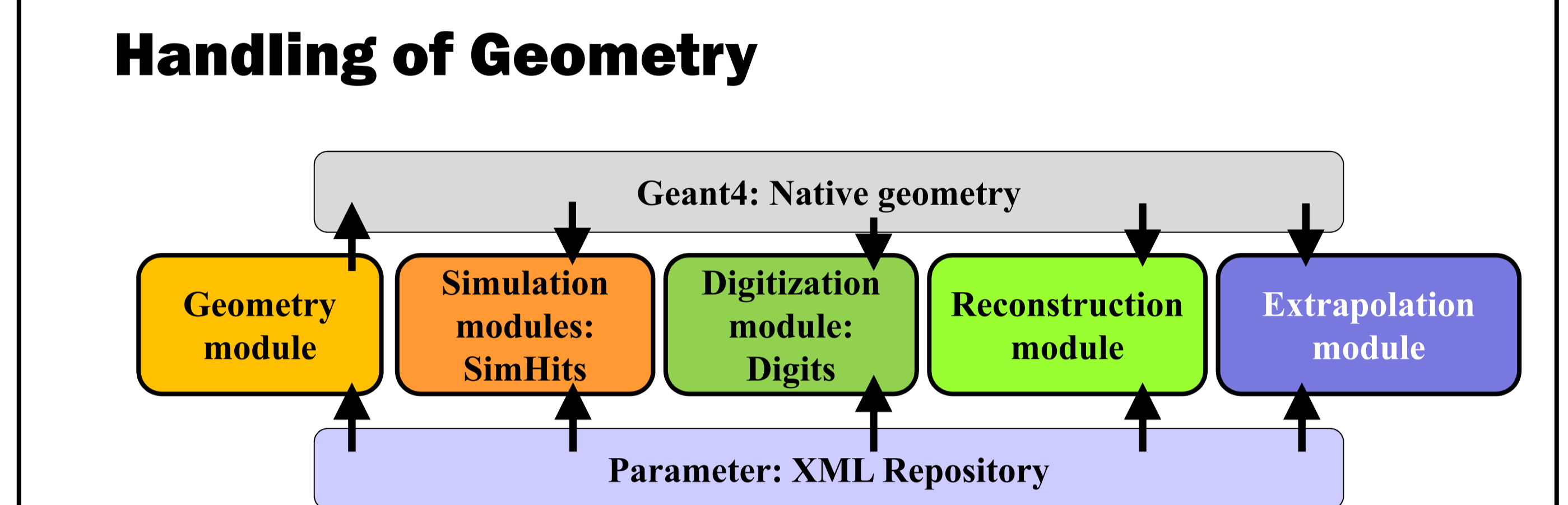
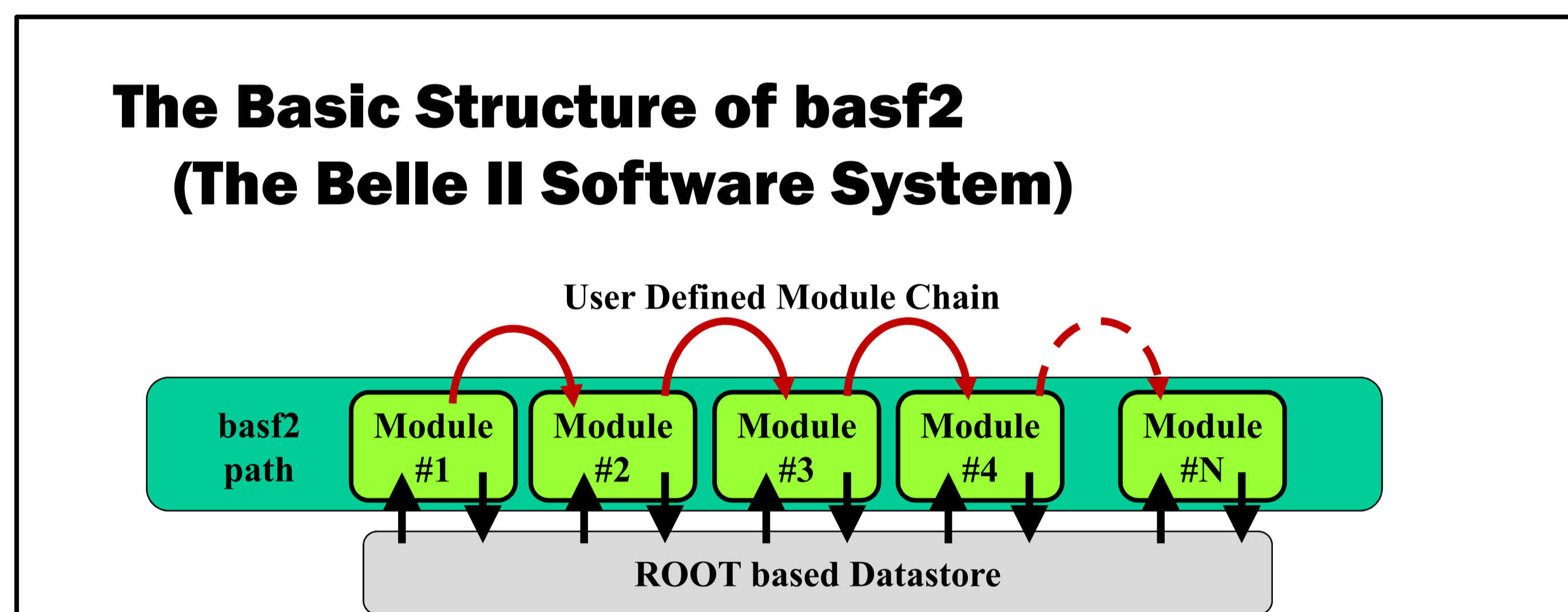
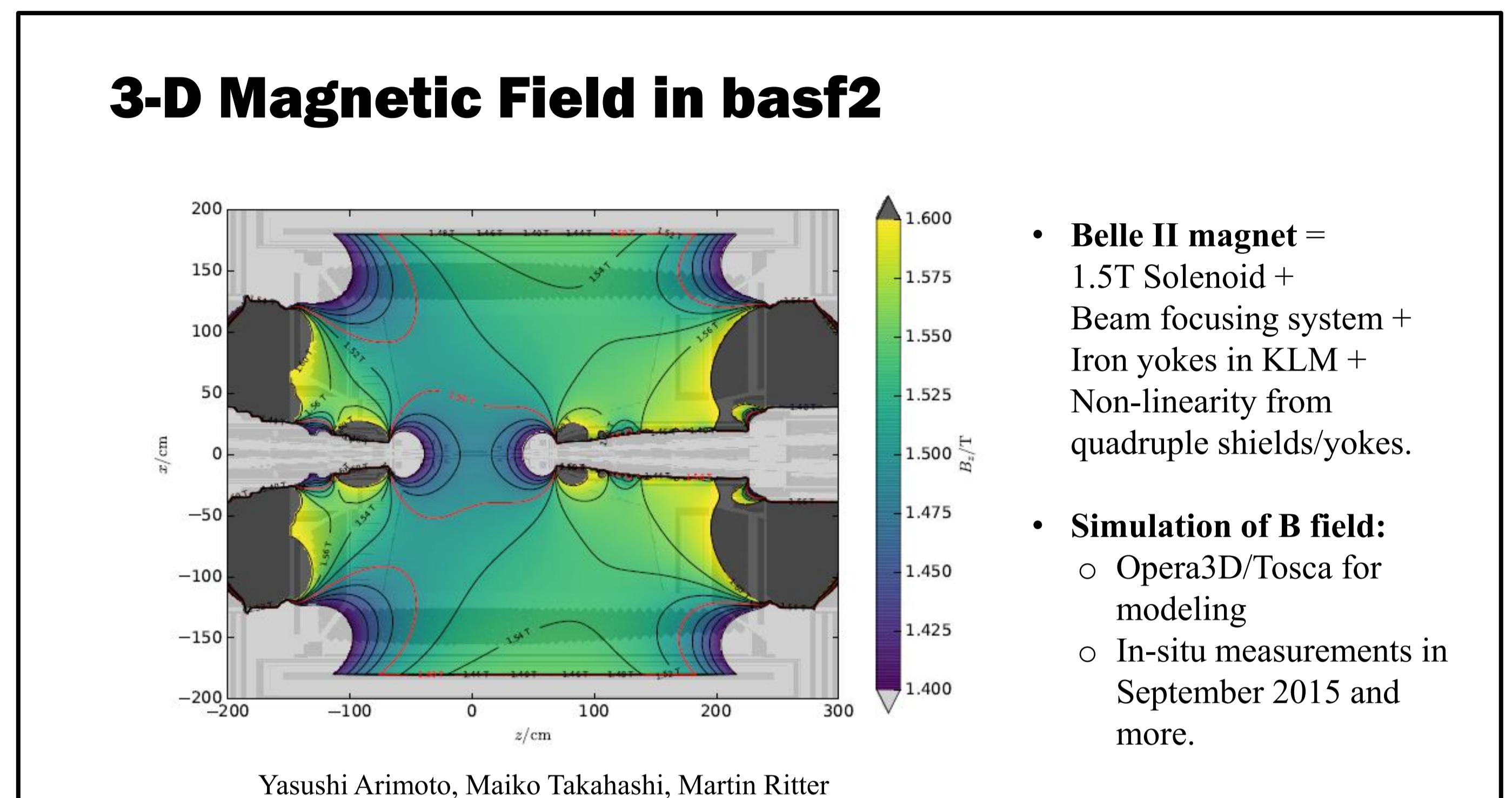
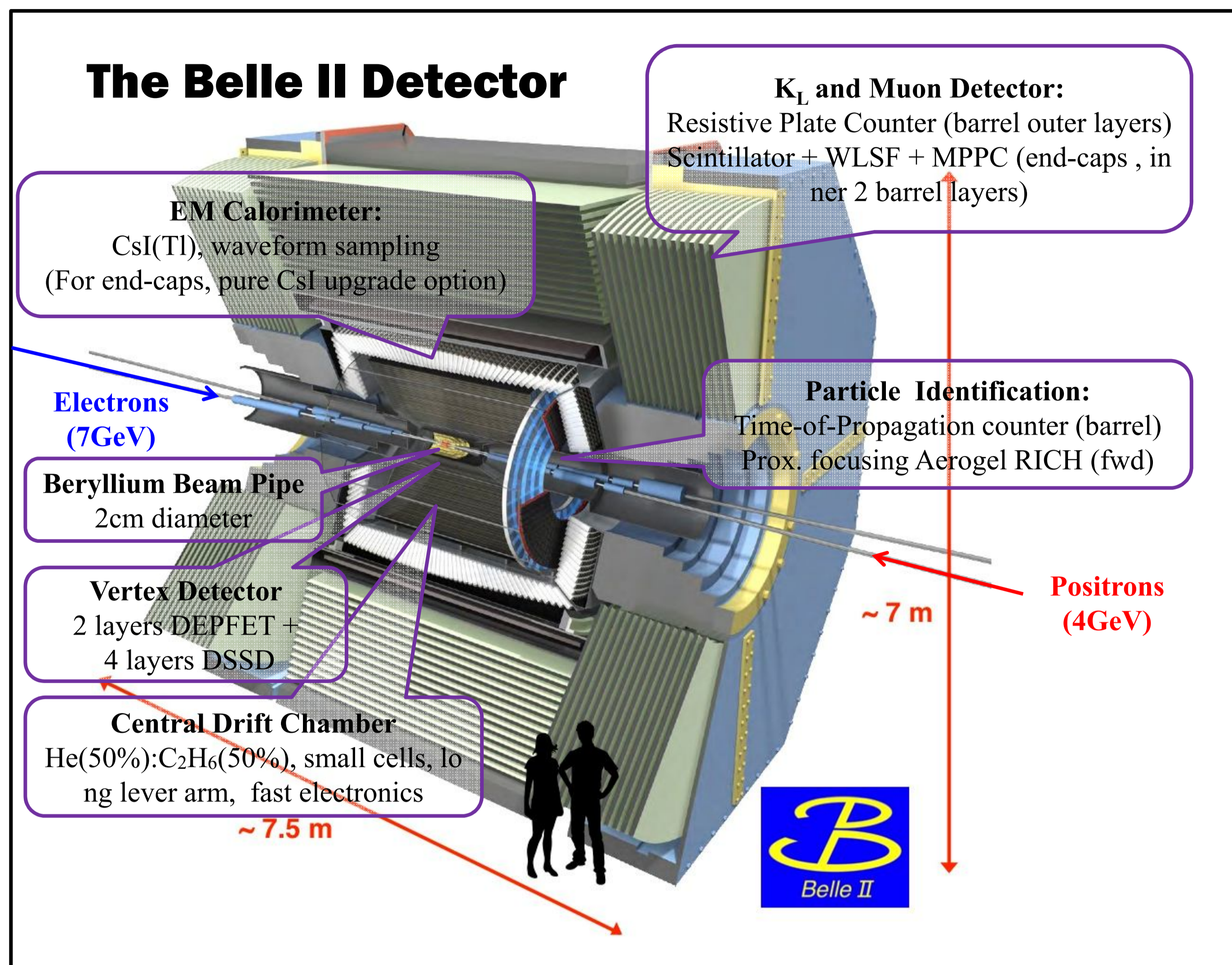




The Simulation Library of the Belle II Software System

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Example of the Python Steering File

```

Main Steering File
from basf2 import *
main = create_path()

# no of events to be generated
main.add_module(EventInfoSetter)

# generator (evtgen, particle gun, etc.)
main.add_module(EvtGen)

# simulation
add_simulation(main)

# reconstruction
add_reconstruction(main)

# output
main.add_module(output)

process(main)

Simulation Steering File
from basf2 import *

def add_simulation(path):
    # background mixing
    path.add_module(BGMixer)

    # geometry parameter database
    path.add_module(Gearbox)

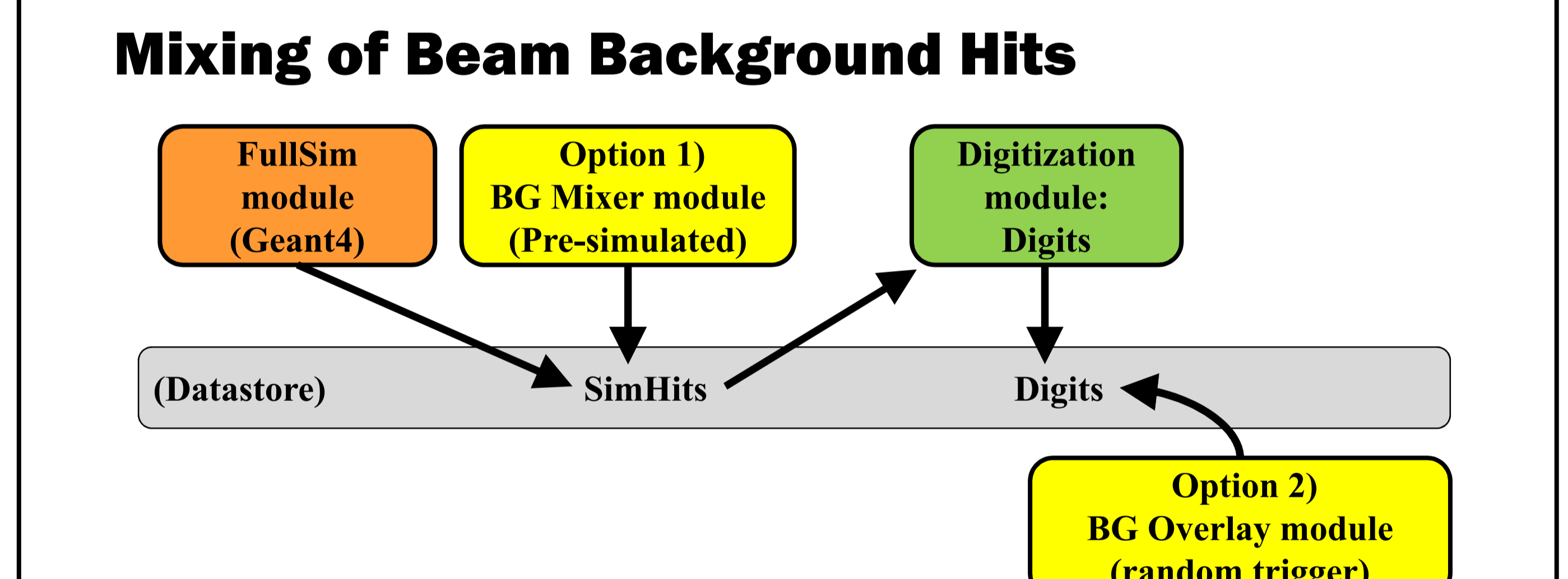
    # detector geometry
    path.add_module(Geometry)

    # detector simulation/Interface to Geant4
    path.add_module(FullSim)

    # PXD simulation (digitization, clustering)
    path.add_module(PXD)

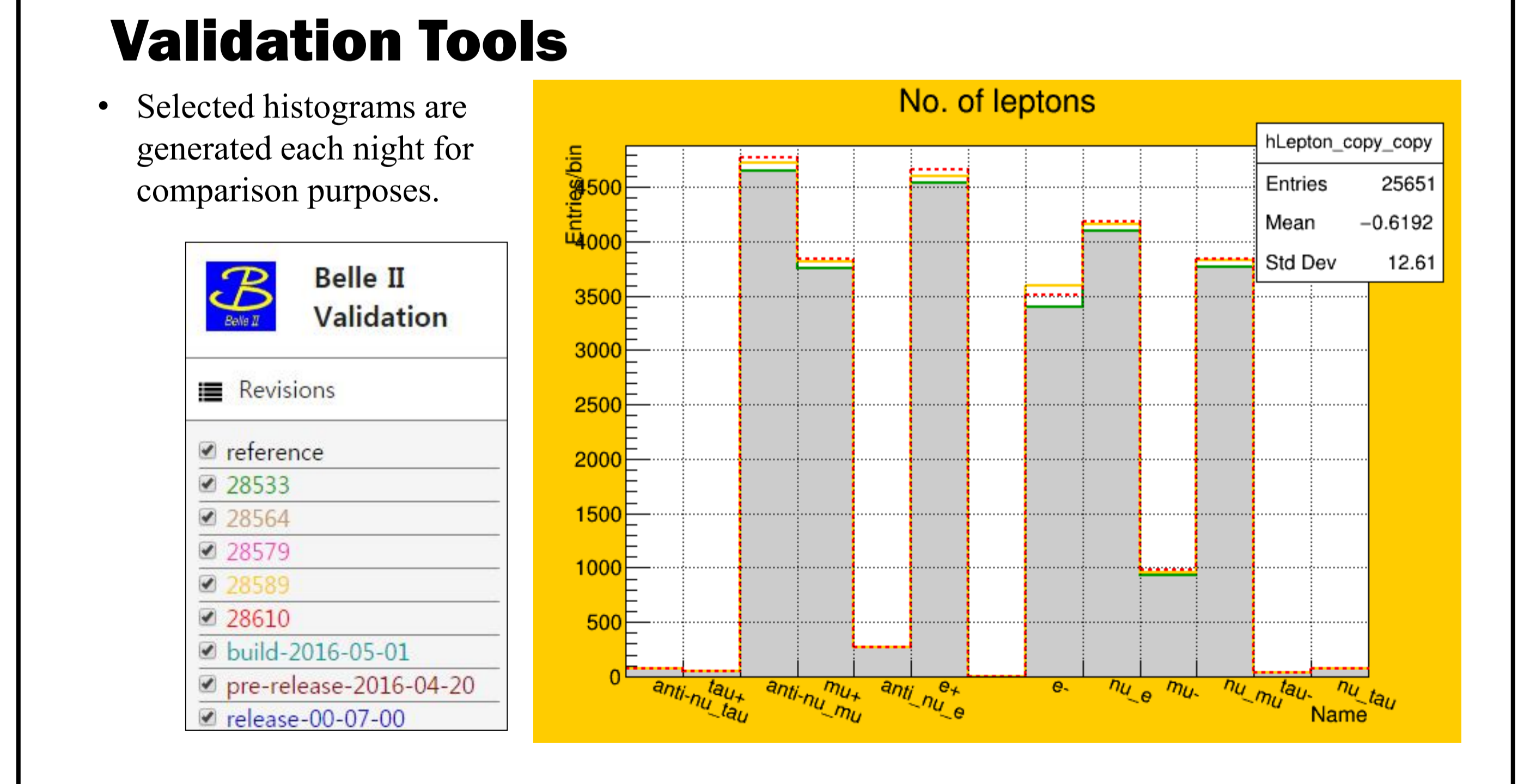
    # SVD simulation (digitization, clustering)
    path.add_module(SVD)

    # Other sub-detectors here.
  
```



Two different methods to simulated beam background hits:

- Option 1) Pre-simulated beam background hits: Radiative Bhabha, Touschek scattering, beam-gas interactions, two-photon QED.
- Option 2) The background overlay scheme using random trigger events.



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Recent Development and Future Plan

- Nominal geometry has been implemented. Currently we are implementing the displacement geometry, which is the difference between the design values and the actual construction.
- The FullSim module has been upgraded from Geant4 v 9.6.2 to Geant4 v 10.1.2. basf2 uses the physics list FTFP_BERT, which provided by the Geant4 group.
- The geometry parameters will be imported from DB instead of Gearbox/XML.
- Plan to improve the magnetic field simulation.
- Plan to use the 2017 commission data to fine-tune the simulation library.
- Optional: Fast simulation

Simulation of 10000 Generic Events on E5-2660 v3

Time per Event / s

Geometry Region

Martin Ritter