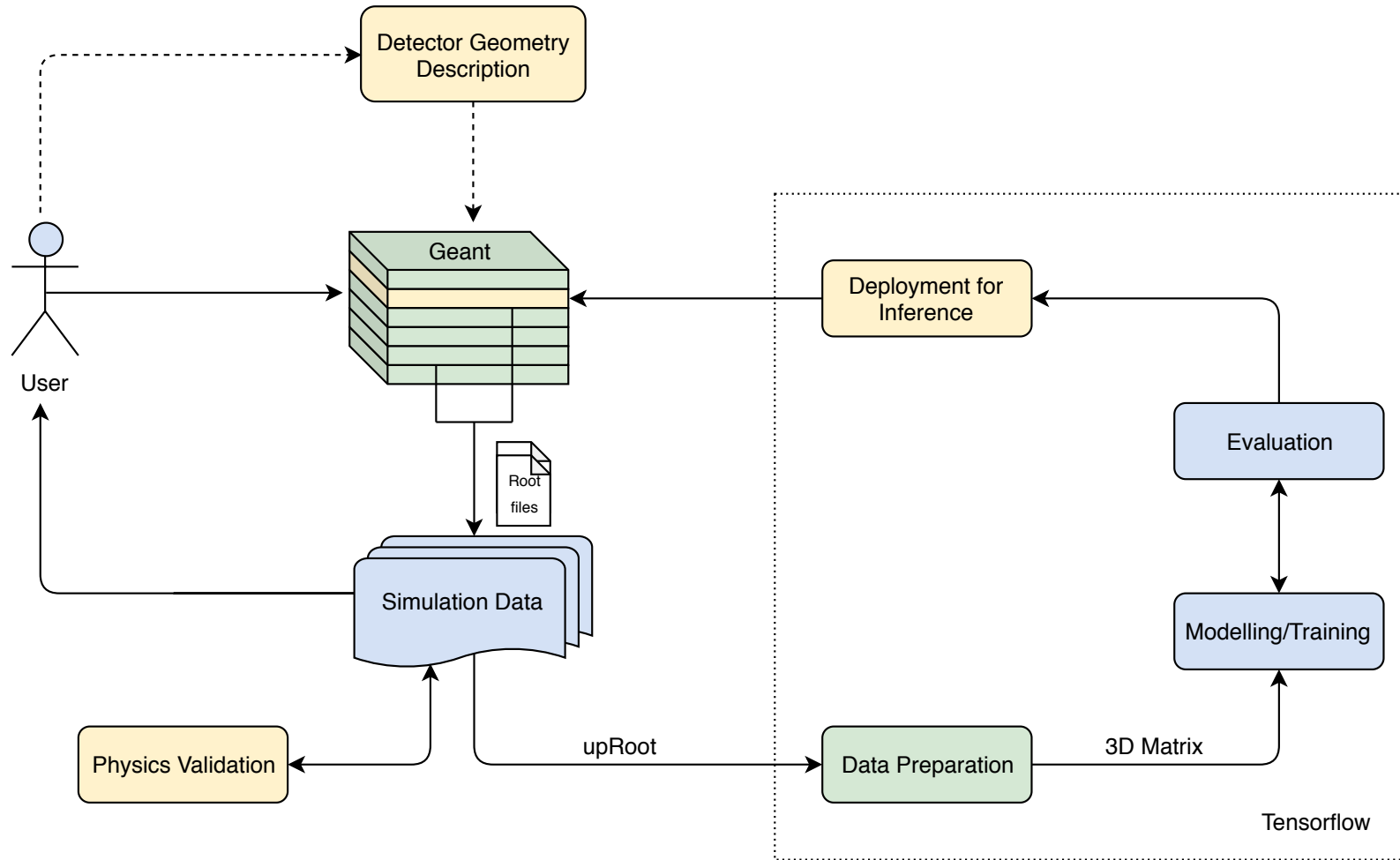


FastSimulation - Machine Learning Techniques

Ioana Ifrim

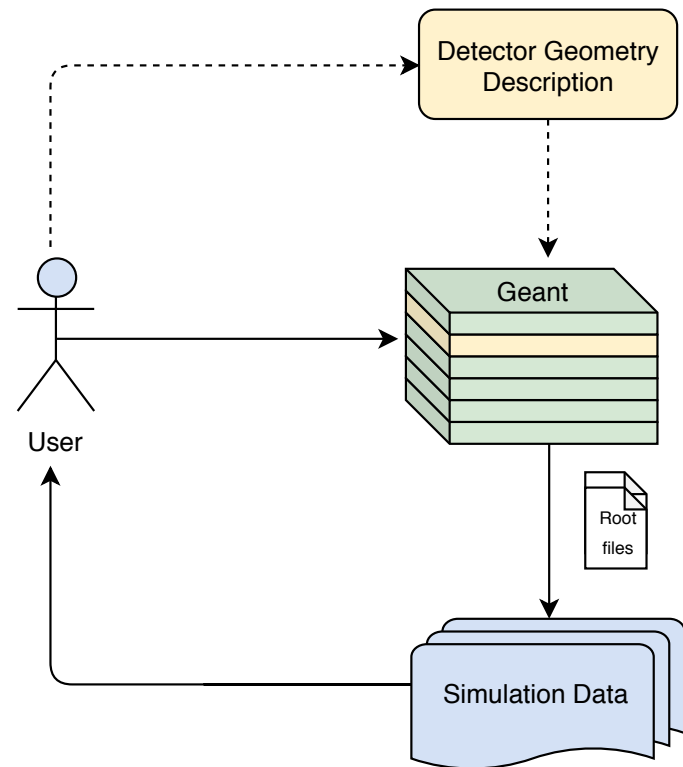


ML FastSim Development Plan



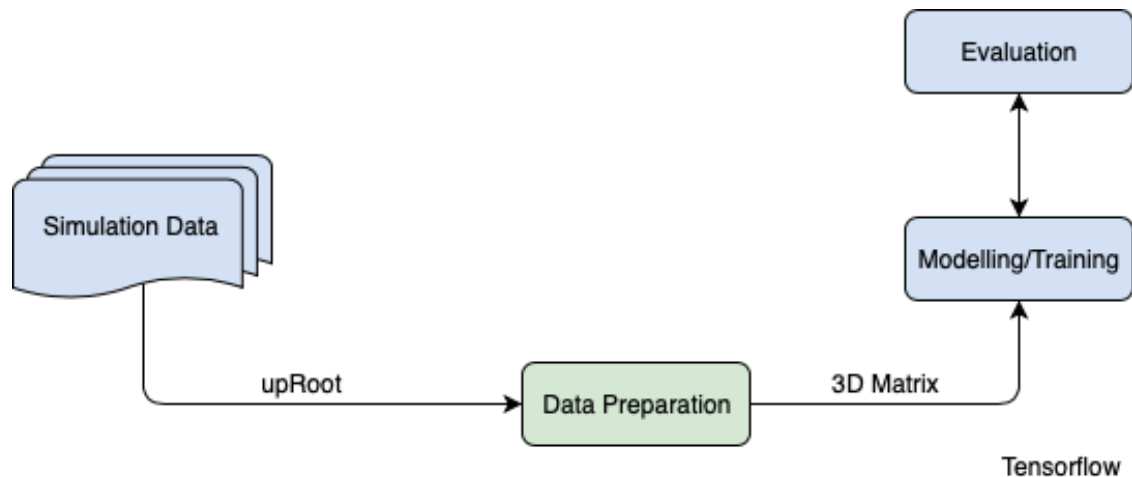
Data Production

- Based on Geant4 validation tools
- Different simplified calorimeters available
 - Pb/LAr (ATLAS like)
 - PbWO4 (CMS like)
 - Pb/Sci (LHCb like)
 - W/Si (ILD, CMS HGCal like)
- Started with production of data sets
 - >200k events for first tests



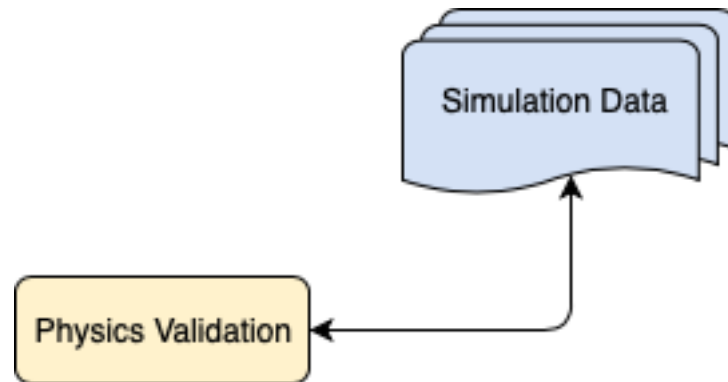
Network Testing

- Launched training with our data on a TechLab machine
 - Nvidia Tesla K20X GPU
- Training time is a bottleneck at the moment (0.5 epoch in 36h)



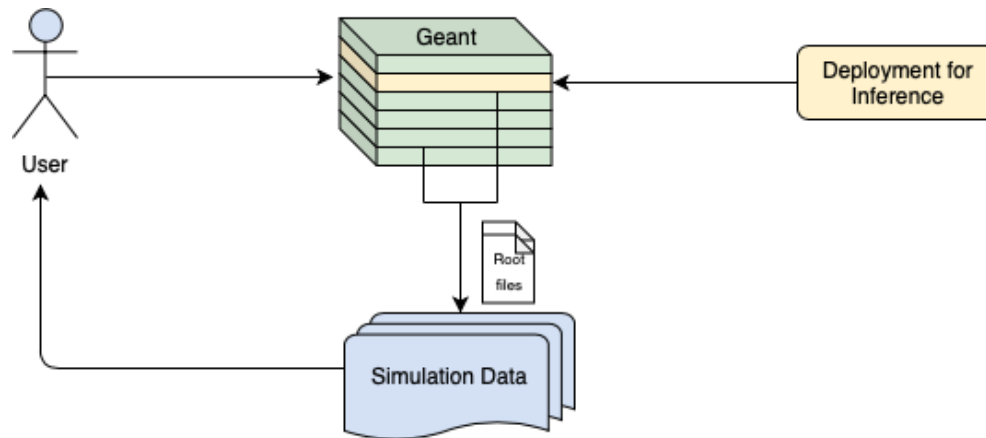
Validation

- Based on existing validation tools and plots used by ML FastSim community
 - Visible Energy
 - Energy/cell (layer)
 - Shower profiles (+ mean, second moment)
 - ...

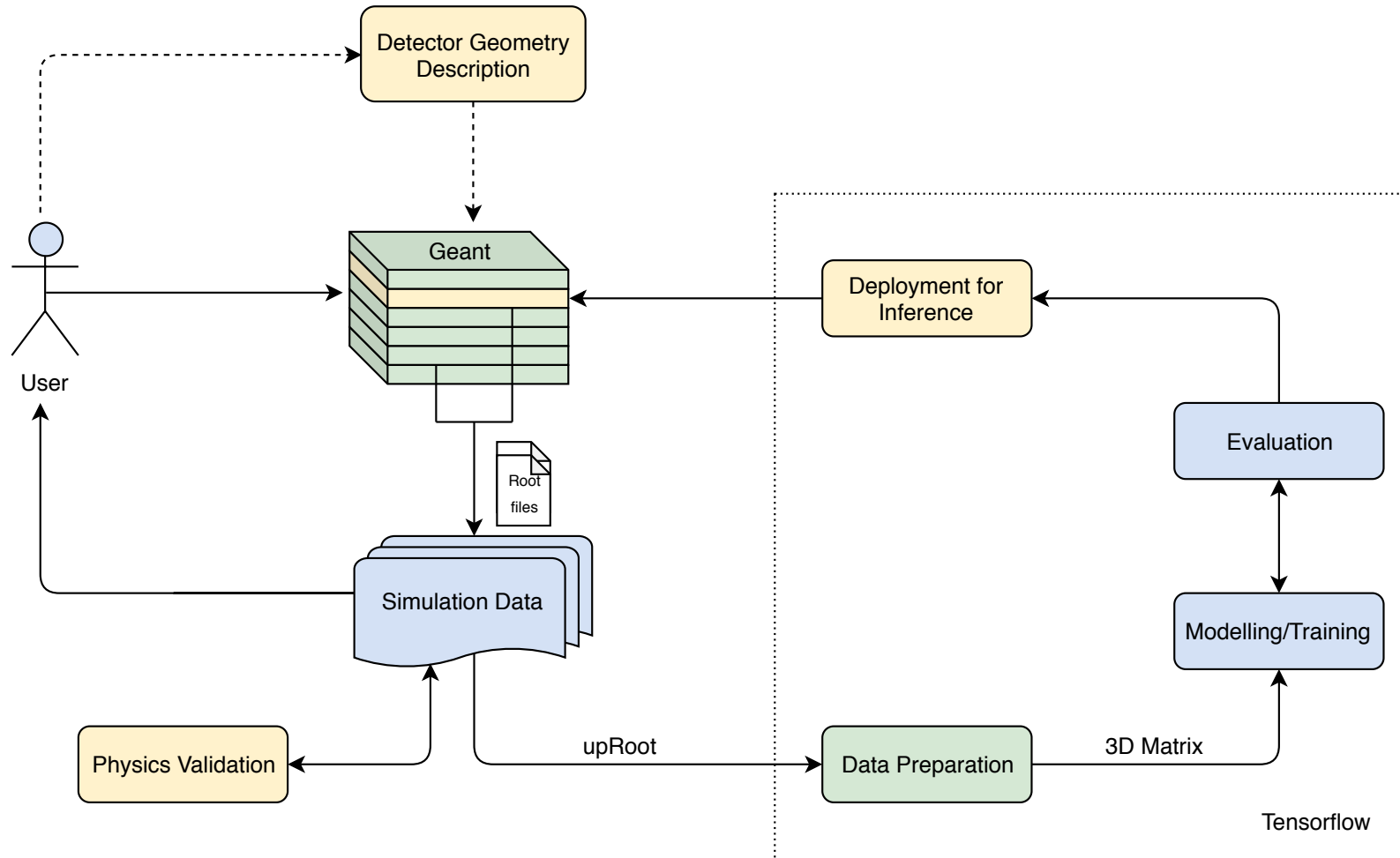


Integration into Geant4

- Inference called through Geant4
 - Using internal Geant4 FastSim hooks (G4VFastSimulationModel)
- First idea: Tensorflow C++ API



ML FastSim Development Plan



Summary

- Work in progress on every element
- Exploring different geometries and understanding their influence on the results
- Looking into training on multiple GPUs