Geometry Description

✔ **From ASCII files based on a few tags**

◆ Define a single logical volume (solid and material): VOLU

```
:VOLU "TPC"   "TUBE"   "Air"     3    0.0   454.0   1100.0
```

◆ Define a logical volume made up of a substraction (addition, intersection) of two volumes: VOLU_SUBS(_ADD/_INTERS)

```
:VOLU_SUBS "Tpc Gas" "Tpc Gas1" "Tpc Gas2" "RM0" 0. 0. -560.25
```

◆ Single positioning: POS

```
:POS "Tpc Gas" 1 "TPC"     "RM0"  0.00   0.00   40.0
```

◆ Replica: DIV_NUM / DIV_STEP

```
:DIV_NUM "PAD sector" "PAD support" "Epoxy" 6 "PHI"
```
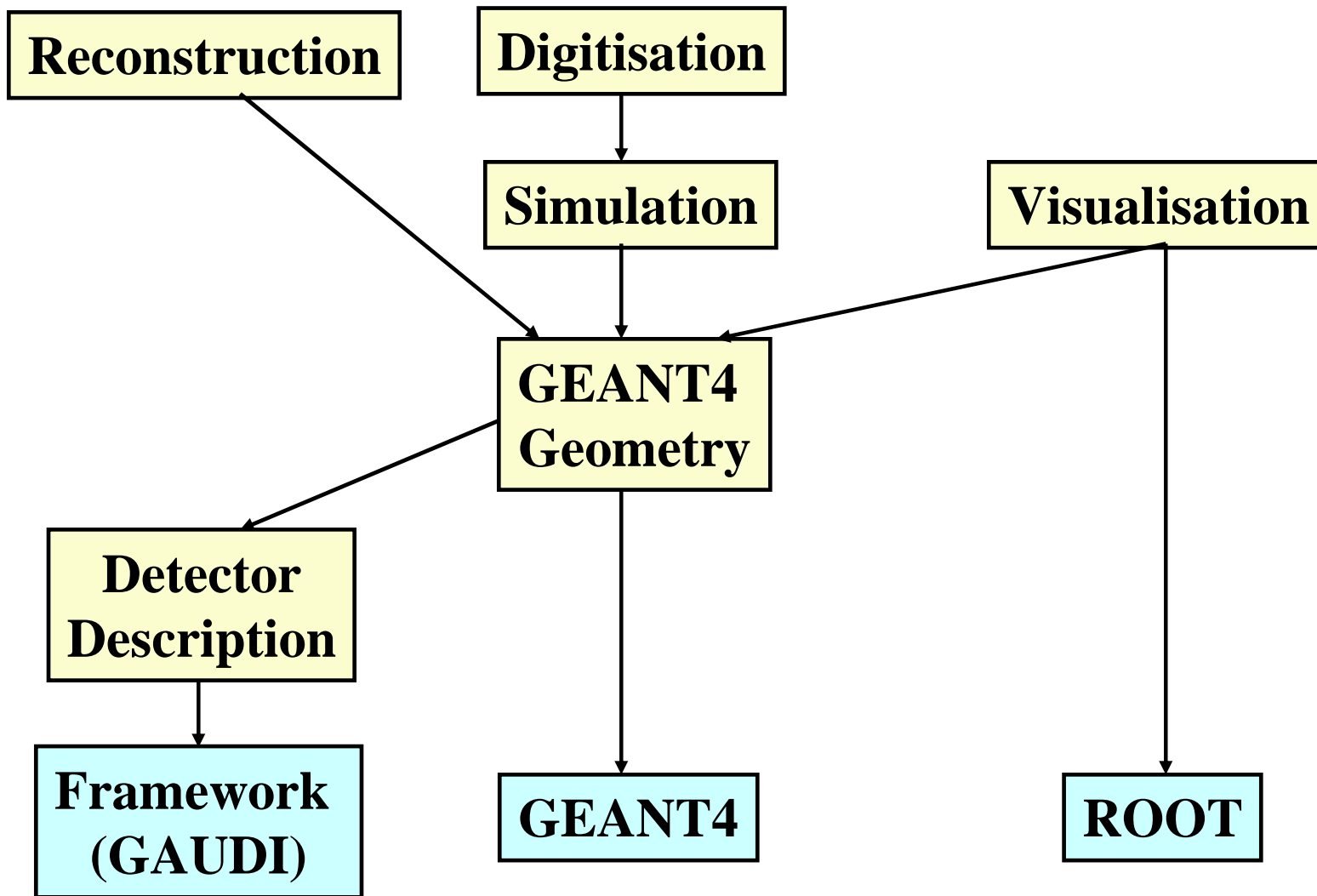
◆ Positioning with a parameterisation: POS_PARAM

  ● Need C++ code calculate position/rotation (only a few available)

```
:POS_PARAM "PAD" 1 "PAD sector" "CIRCLE" 11 0.0863 -0.431 82.22
```

Geometry Representations

◆ **Generic representation independent GEANT4**

◆ **GEANT4 representation**

   – access all data from the generic representation

◆ **Digitisation / Reconstruction**

   – ask GEANT4 representation for the volumes they need (by name)

HdrGeometryMgr::getInstance()->getTouchables("TpcSector#2/TpcPad#12")

   ⇒ return GEANT4 independent representation: touchables and logical volumes

◆ **Visualisation (ROOT)**

   – ask generic representation, except replicated and parameterised positionings, where it asks GEANT4

   ⇒ builds ROOT representation

Software architecture

HARP framework

◆ HARP configuration management: CMT

◆ HARP framework: GAUDI based
- Manages GEANT4 event loop
- Manages User Interface (still allows GEANT4 commands)
- Simulation writes GAUDI objects
  - ASCII files
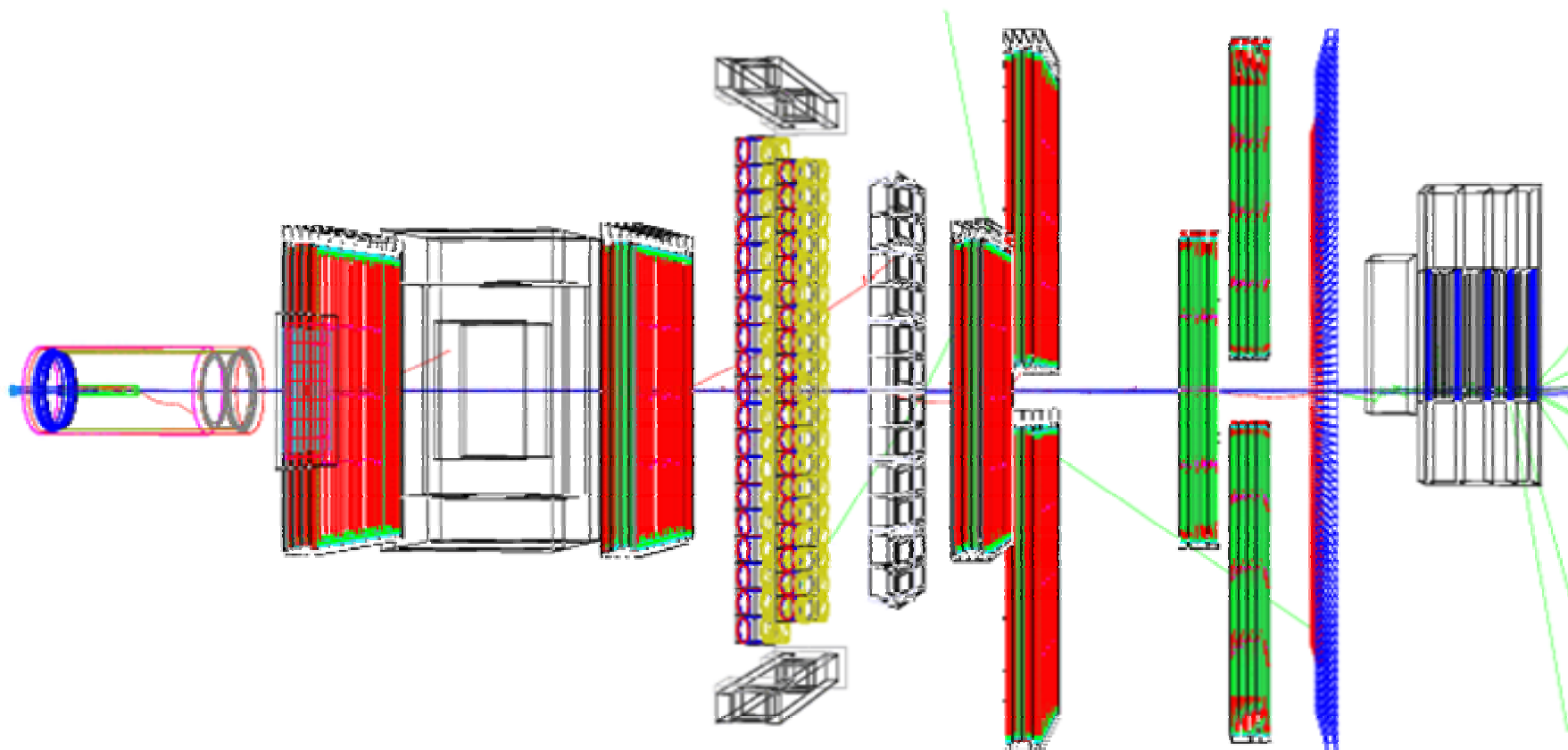 - FUTURE: Objectivity
- Event can be simulated + reconstructed

Status of GEANT4 simulation

☺ All geometry described

☺ Magnetic field described (parameterised)

☺ Physics list electromagnetic and hadronic

☺ Digitisation implemented for most subdetectors

☺ Work on progress for digitisation of other subdetectors

☺ Reconstruction using GEANT4:

– error propagator (GEANE)

– simulated events for debugging

☹ Reconstruction and analysis software not ready

$\Rightarrow$ Several thousands of events produced

(exceptions being investigated)

$\Rightarrow$ No need of mass production of simulated events before a few months

$\Rightarrow$ No results of cross sections for GEANT4 before six months