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 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

- Reconstruction
- Digitisation
- Simulation
- Visualisation

GEANT4 Geometry

Detector Description

Framework (GAUDI)

GEANT4

ROOT
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
HARP in GEANT4

Pedro Arce (CERN/IFCA)
Reconstruction and analysis software not ready

⇒ Several thousands of events produced
   (exceptions being investigated)

⇒ No need of mass production of simulated events before a few months

⇒ No results of cross sections for GEANT4 before six months