Matrices in TGeo

Coordinates conversion in TGeo

- Functionality provided by TGeoMatrix
  - void MasterToLocal(const Double_t *master, Double_t *local)
  - void LocalToMaster(const Double_t *master, Double_t *local)
- Of course, one has to retrieve the appropriate matrix …

Matrices and hierarchy

- Volumes are positioned with a local matrix with respect to their container
- The same volume may be positioned several times with different copy numbers and matrices
- A given object in geometry (physical node) can be associated with a unique sequence composed of volume_copyNumber starting from the top volume
  - E.g. ALIC_1/TPC_1/SECT_3/…
- TGeo can compute the global matrix associated to such a path

Global matrix for a physical node as state

- TGeo can navigate starting from a physical node as current state.
  - The physical node is not created as object
- TGeoManager::cd(const char *path)
  - Make current volume, current global matrix point to the last volume in the path, respectively to the pile-up of all local matrices
- TGeoManager::GetCurrentMatrix()
  - Usage: TGeoHMatrix global(*gGeoManager->GetCurrentMatrix())
- TGeoManager::MasterToLocal() and inverse
  - Will perform the conversion FOR THE PATH selected with cd()

Global matrices for physical nodes

- TGeoPhysicalNode(const char *path)
  - Physical nodes are created to handle alignables
  - Stores all global matrices for elements in the path
  - GetMatrix(Int_t level)
    - Returns the matrix for a given level, by default the one for the last volume in the path

Cluster coordinates to global coordinates

- An association between a cluster and a physical volume is MANDATORY
- A method converting the cluster-specific local coordinates to normal XYZ in the frame of the associated volume needed per detector
- The rest is trivial
  - Just get the global matrix of the associated physical node
  - Retrieve the global matrix and call LocalToMaster()