ITTF Detector Model

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For the Integrated Tracker Task Force

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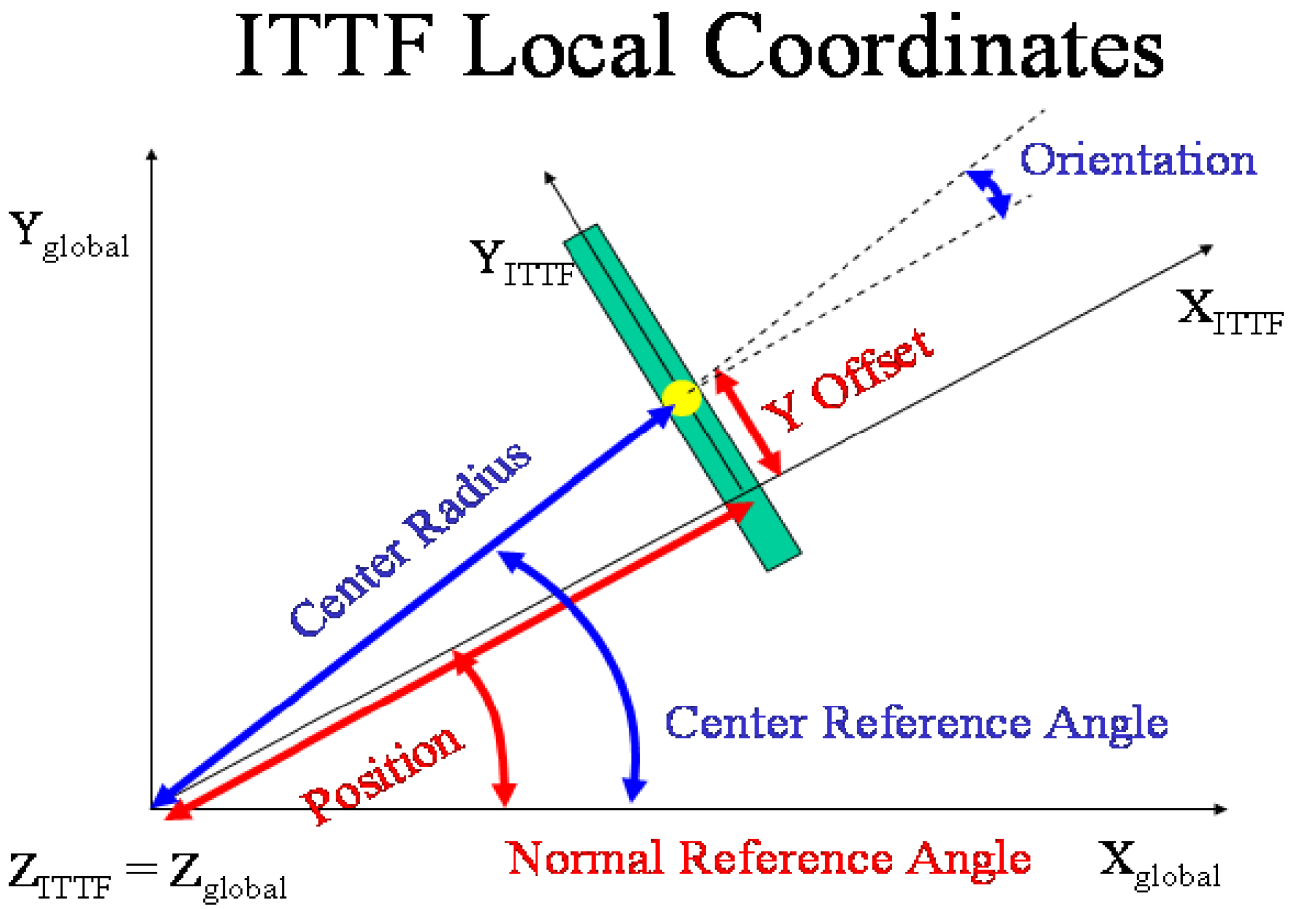
Detector Representation

- Detector Volume
  - Active Detector Hit Information
  - Passive Detector Simple Scatterer
- Flags
  - On: added to detector container
  - Active: provides hit information
  - Discreet: discreet scatterer (SVT ladder)
  - Continuous: continuous scatterer (TPC padrow)

Detector Representation II

- Material
  - Density
  - Radiation length
- Shape (Cylindrical,Rectangular,Conical)
  - Extent
  - Boundaries (including edge regions)
- Placement
  - Normal representation
  - Center representation

Detector Representation III

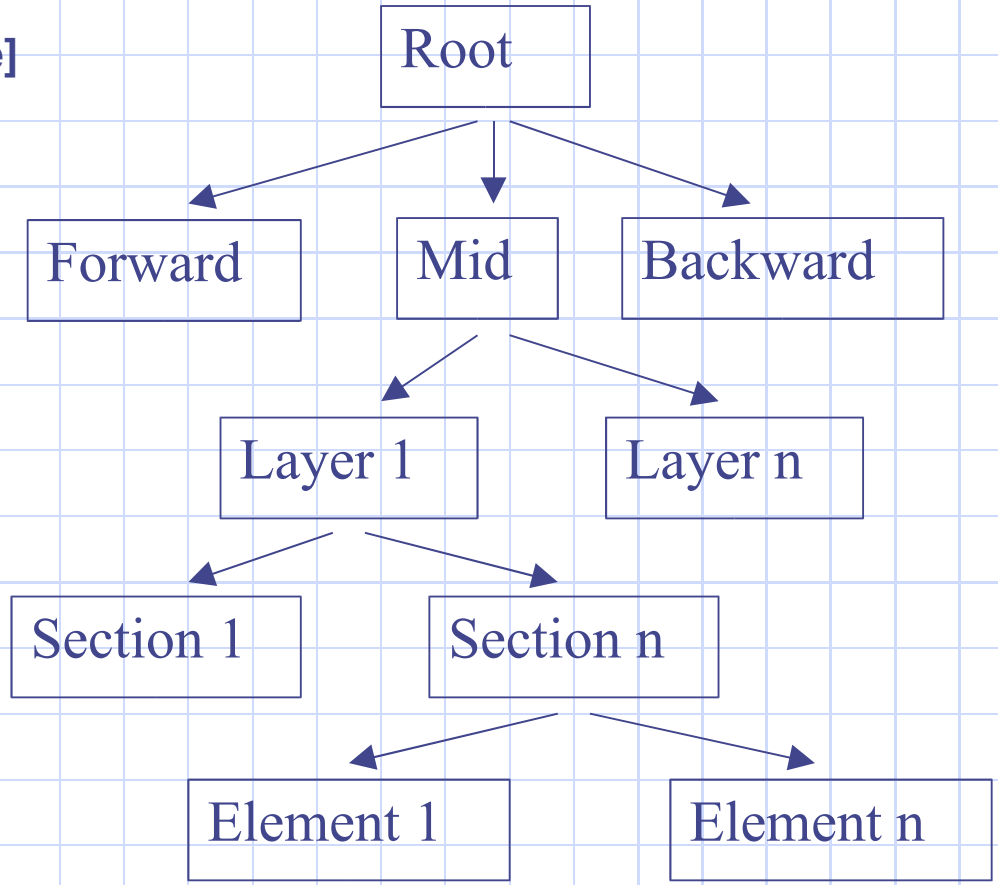


Usage

- Sti(Coded)DetectorBuilder
  - Reads offline dB
  - Creates all materials, shapes, placements, & detectors
- StiDetectorContainer
  - Stores Detectors in tree structure
  - Ordered by: (extensible)
    - Forward/mid/backward rapidity
    - Radial position / z
    - Azimuth

(StiDetectorContainer)

[Thanks, Mike]



Extension

- Subsystem tasks:
  - Write StXXXHits objects into StEvent
  - Transformation functor StXXXCoordinateTransform
    - StXXXLocalCoordinate StGlobalCoordinate
  - SqlDB access to detector physical characteristics:
    - Size
    - Position
    - Material – density & radiation length approximations

Extension II

- ITTF Responsibilities:
  - Create StiKalmanTrackNode subclass
    - Use z as independent parameter (instead of r)
  - Add to StiHitFiller
    - fillXXXHits(): copies StHits to StiHits for tracking
  - Add to StiGeometryTransform:
    - Pointers to transform functors
    - Utility methods
  - Add to StiCodedDetectorBuilder:
    - Materials in buildMaterials()
    - Shapes in buildShapes()
    - Placements in buildDetectors()
    - Detectors in buildDetectors()
  - Add to StiLocalTrackSeedFinder
    - Starting points for seed-finding (eg., outer layers of FTPC)

Material Interaction

- Intersection - StiMaterialInteraction
  - Line extrapolation for short steps
  - Helix extrapolation available for long steps
- Scattering / Energy Loss
  - StiMaterialInteraction determines
    - # of radiation lengths traversed in each step
    - Radial distance traversed
    - Mean density
  - Track finder computes E-loss & effect of scattering on error matrix

Conclusions

- Modularity assures extensibility
- Well defined path for extension
- Tracker truly integrates heterogeneous STAR components