Generating Track Stubs in Track Trigger Layers
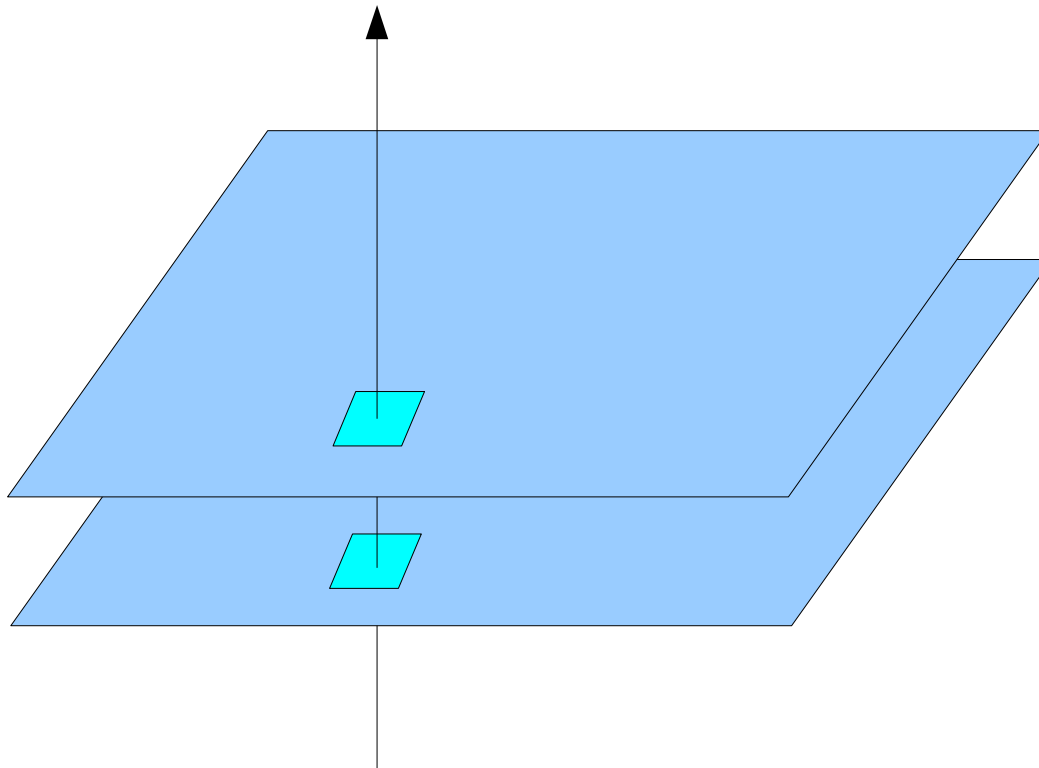
Steve Stroiney
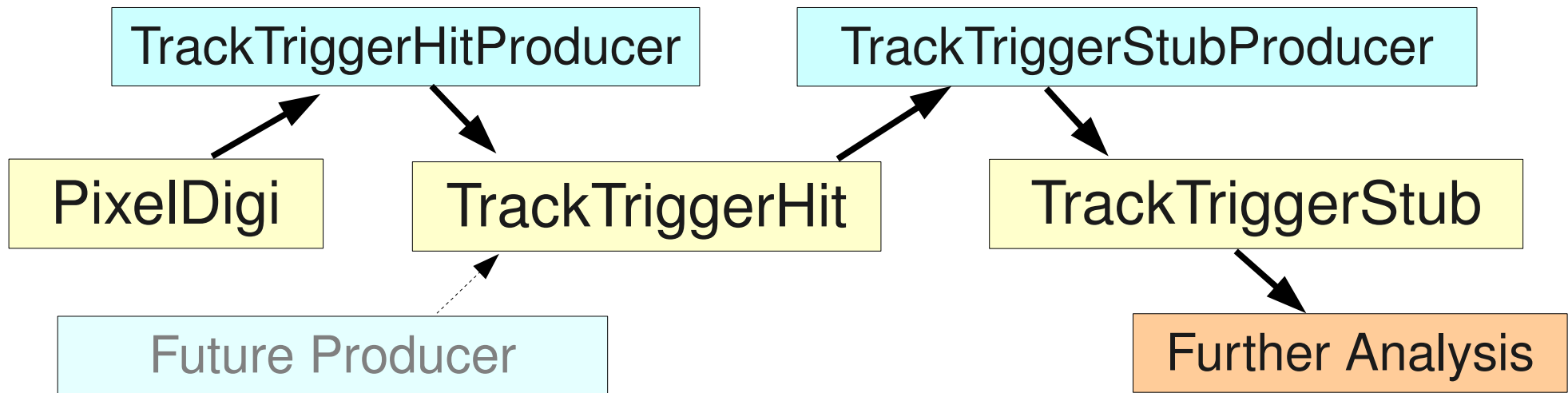
Nov. 20, 2008

Goal

- Track trigger requires a design that minimizes data volume by accepting only hits from high-Pt tracks.
  - Stacked layers
  - Cluster size
- Need to simulate these designs
  - Initially focus on stacked layers and the existing Strawman designs.
  - First step: Create track stubs in the stacked barrel layers.
  - Eventually need to consider endcap geometry.

Stacked Layers

- On a matching pair of modules in a stacked trigger layer, form track stubs from hits on each layer.
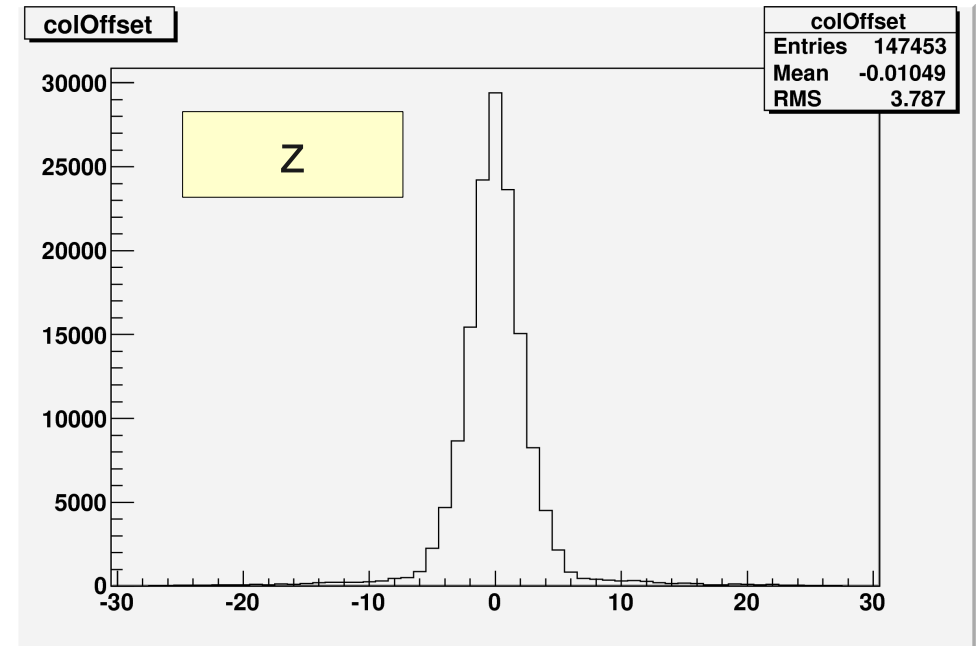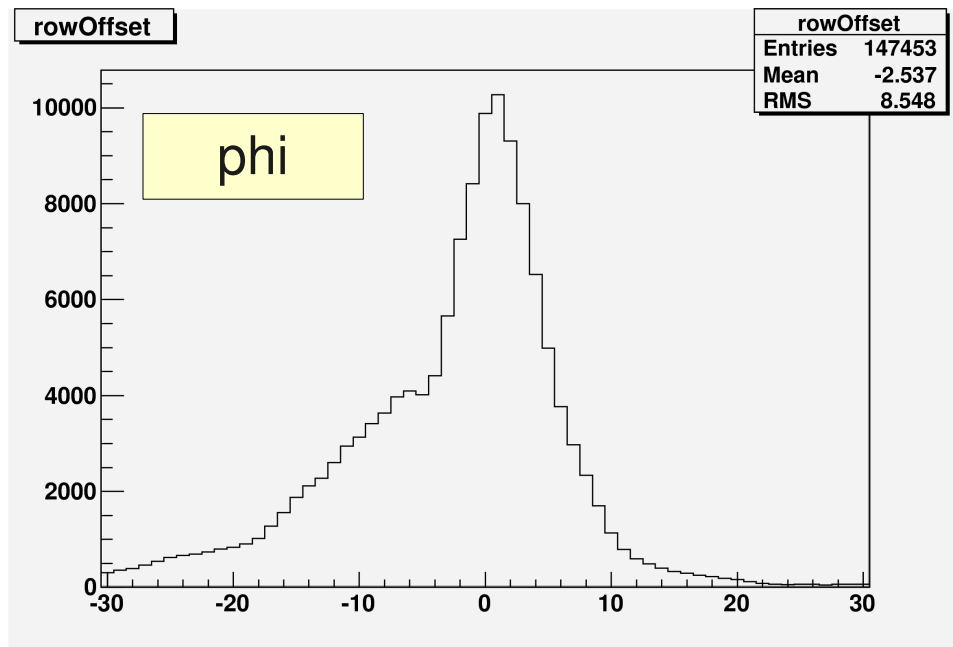
Code Structure

- TrackTriggerHit = PixelDigi without ADC info

- TrackTriggerStub

    – Can store an arbitrary number of hits in each layer.

    – Current algorithm just puts one hit from each layer.

Running on Strawman B

- For track stubs, pixel offsets between layers:

- Can impose tolerances on offsets in the producer.
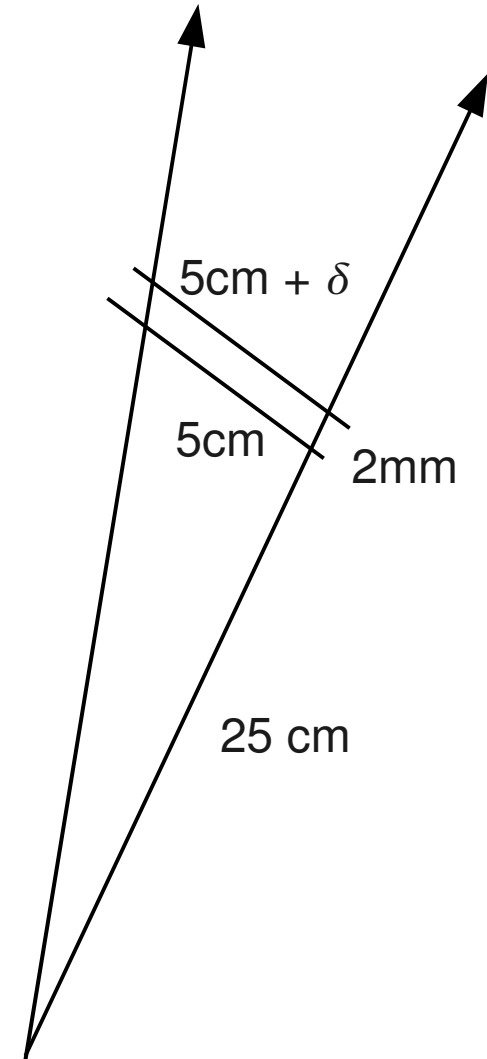
- This code is now in CVS.

Pixel Offset

- Pixel offset for a straight track varies across a single module.

$$\frac{5\,cm + \delta}{5\,cm} = \frac{25\,cm + 2\,mm}{25\,cm}$$

$$\Rightarrow \delta = 0.4\,mm = 400\,\mu m \approx 8 \text{ pixels}$$

- Will be a complication for software, and a major challenge for trigger hardware.
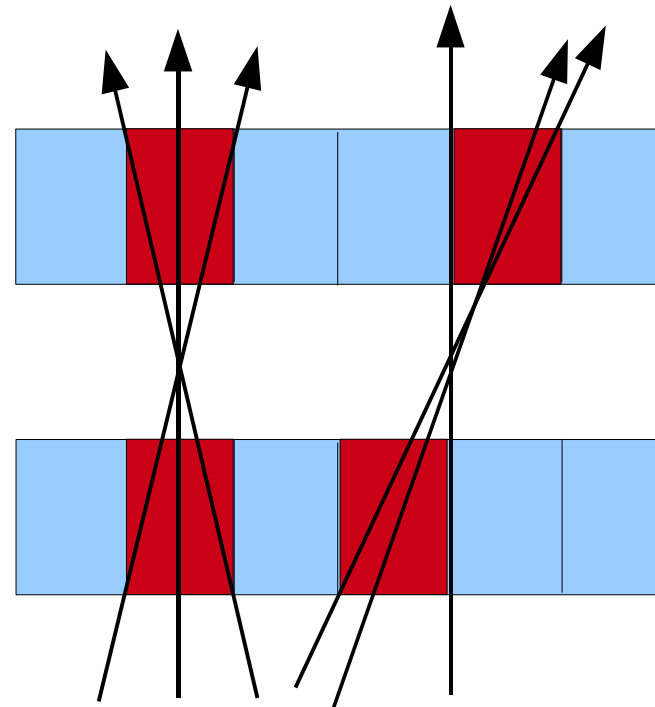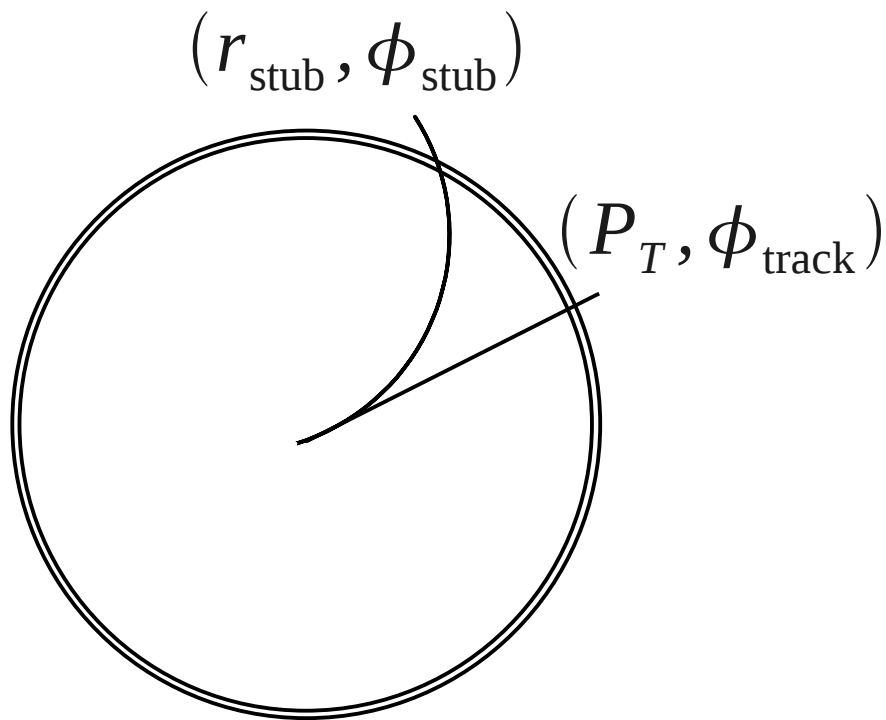
5cm + δ

5cm

2mm

25 cm

Need Geometry Awareness

- To form stubs:

  - Need to know which modules (DetIds) are paired (currently hard-coded for Strawman B).

  - May wish to incorporate Andrew Rose's code.

  - Need pixel offset to account for tilt angle.

- To analyze stubs:

  - TrackTriggerStub just stores the DetIds of the inner and outer module – no knowledge of geometry.

  - Need functions to calculate geometrical quantities (next slide) – probably implement in a helper class.

- Stub location and tilt angle

- Best-guess track parameters & allowable range

- Other ideas?

$$(r_{\text{stub}}, \phi_{\text{stub}})$$

$$(P_T, \phi_{\text{track}})$$

Status & Plans

- Formats and producers to create track stubs are in CVS.

- Can add this to the current Strawman B simulation.

  - I've run this, but the existing .cfg file in CVS doesn't create the stubs.

- Next step: Add geometry awareness.

- Then: Test trigger algorithms using track stubs.