

GEOMETRIC STUDY OF CALIBRATION USING COSMIC TRACKER

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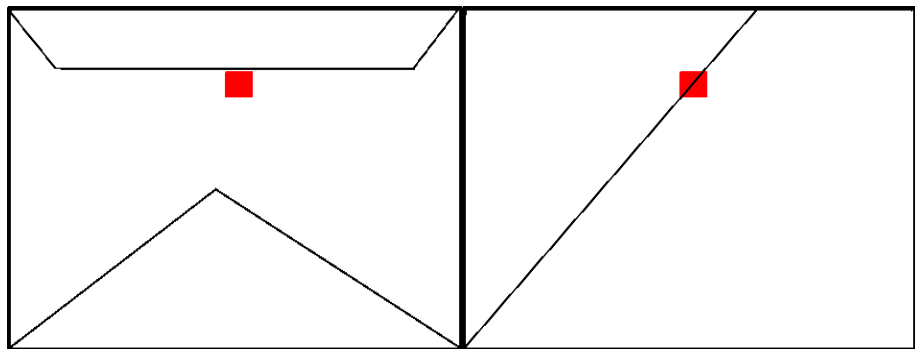
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- ProtoDune Detector to be calibrated by cosmics
- Ambiguity in fields if only one track passes through that volume of the detector (voxel)
- Want to see what part of the detector could be calibrated geometrically by crossing cosmics

- Loop through all Voxels
- Loop through pixels of one tracker to construct lines going through the voxel
- Skip over any pixel that can't construct a line through both trackers and the voxel
- Check that angle between lines is sufficiently large assuming intersection at center of voxel

METHOD OF SELECTING PIXELS

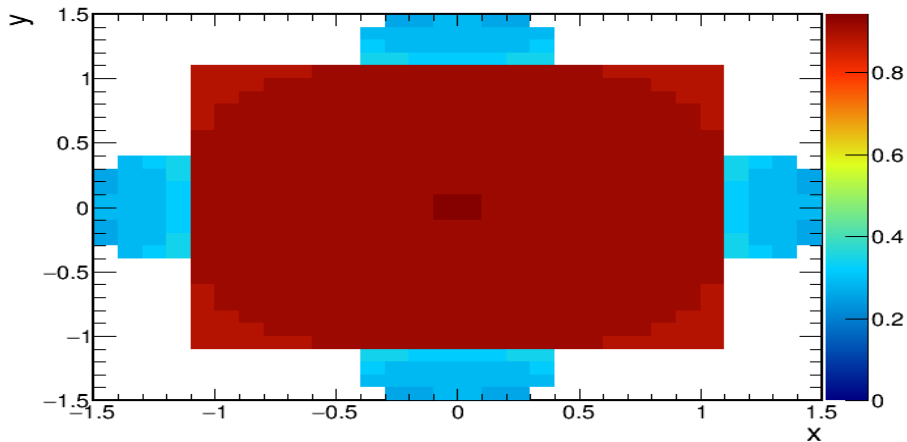
- Only back tracker pixels looped over
- Determine front tracker pixels geometrically



PARAMETERS USED

- Voxel Size = 0.1m
- Pixel Size = 0.025m
- Distance between Cosmic trackers and Detector = 1m
- Angle cut used, 30°
 - assumes intersection occurs at center of voxel

PERCENT OF DETECTOR THAT CAN BE CALIBRATED



- 52.48% of volume can be calibrated
- The hard edges are from the transition between the 2 methods
 - Changes in binning/angle cut can modify the shape but don't eliminate these edges
- Need to include tracks that could be generated somewhere between these two methods

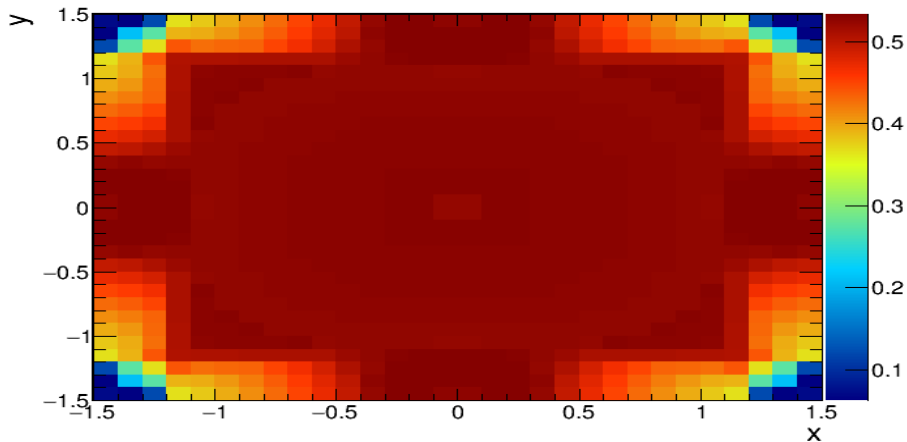
- Loop through voxels, assume tracks pass through this voxel's center
- Choose pixels on back tracker randomly
- Geometrically determine pixels on front tracker
- Continue to randomly generate tracks until:
 - Angle cut passed
 - A certain number of tracks have been generated

NEXT STEPS

- Finish new method
- Utilize real cosmic flux
- Allow for multiple intersections

Back Up

MAXIMUM ANGLE THAT CAN BE PRODUCED



X START PIXEL VALUE FOR MAXIMUM ANGLE

