

# Start Counter Efficiency Studies

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# Projected tracks selection and Efficiency Calculations

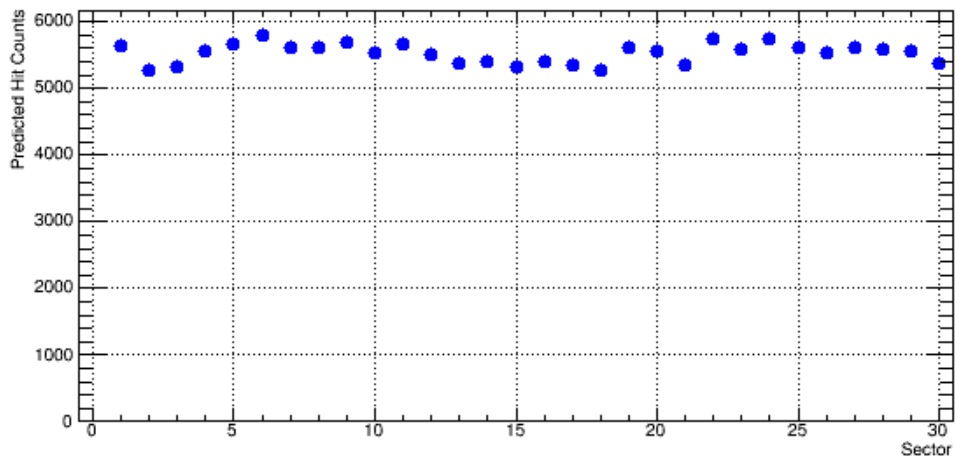
- Do not use SC time in track fitting.
- Get a quality charged track with the following cuts:
  - Number of Hits per track  $\geq 14$
  - Track\_FOM  $\geq 2.69E^{-3}$
  - $\text{abs}(\text{vertex\_z} - \text{target center}) \leq 15$  cm
  - Radial cut  $< 1$  cm
- The track must be matched to BCAL OR (FCAL && TOF).
- Determine the sector of the projected track to the start counter within  $\delta\varphi = \pm 3^\circ$ .
- Get the t0 of each track projected to a SC sector.

# SC Hits and Efficiency Calculations

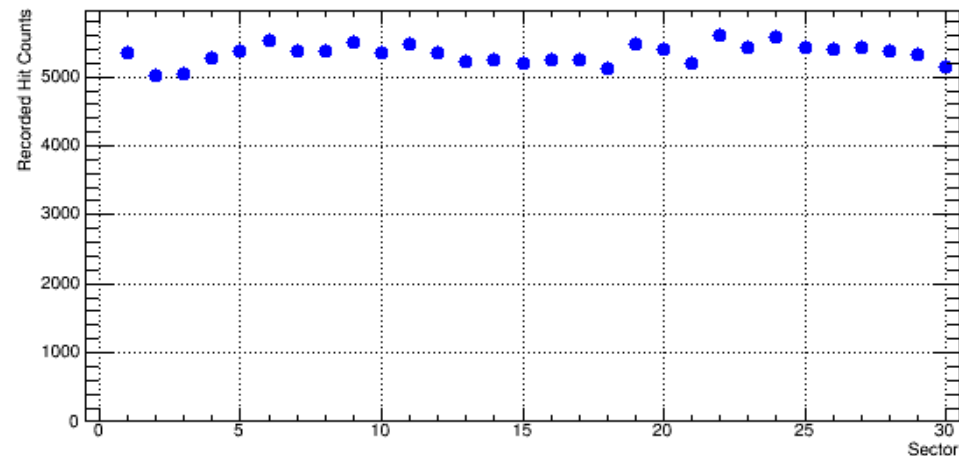
- Loop over the SC hits determined by the hit factory.
- Get the hit time  $t$ .
- If  $-10 < t-t_0 < 20$  ns, check if the same projected sector had hit or its nearest paddle.
- Calculate the hit efficiency = SC hits / Projected hits.
- Calculate the accidentals by counting the out of time hits for  $-25 < t-t_0$  &&  $t-t_0 < 35$
- Calculate the accidental subtracted efficiency = (SC hits - accidentals) / Projected hits.
- The results will be for 0.5 M events of run 11366 and same number of events of sim1\_2.

# Projected tracks and recorded hits without and with accidentals subtracted in Data

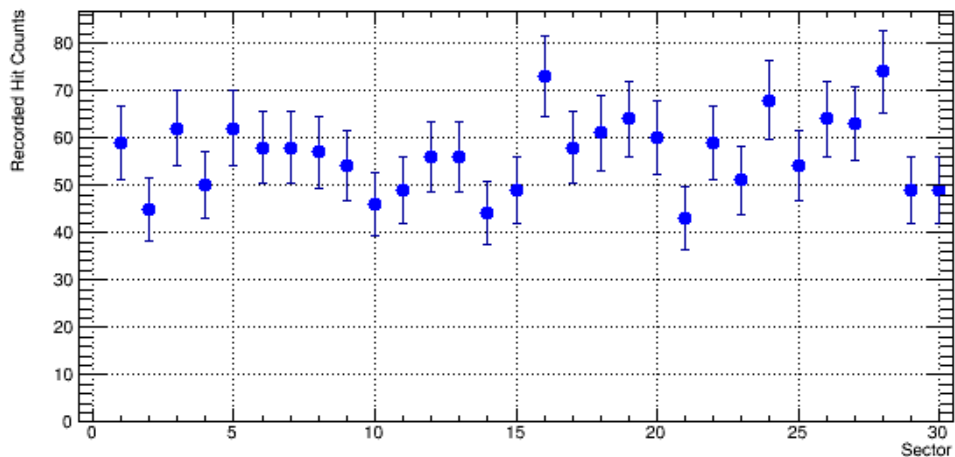
Projected Tracks to the SC



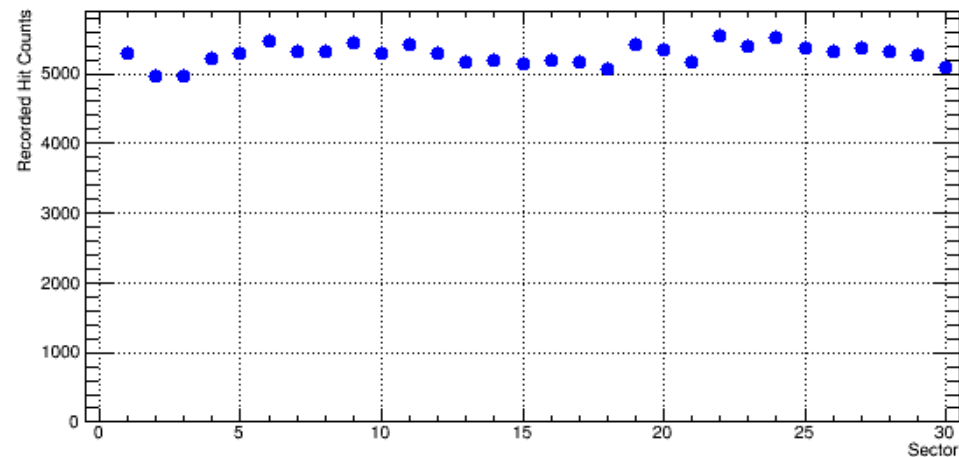
Recorded Hits



Accidentals

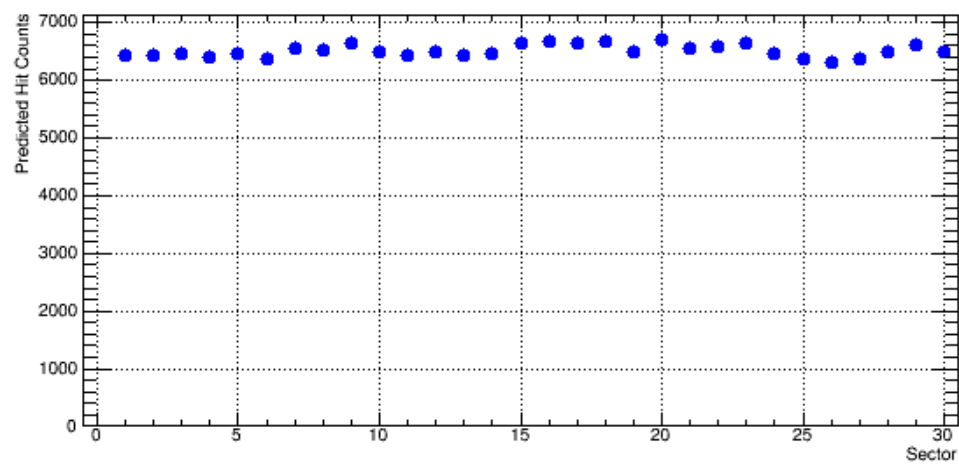


Recorded Hits - Accidentals

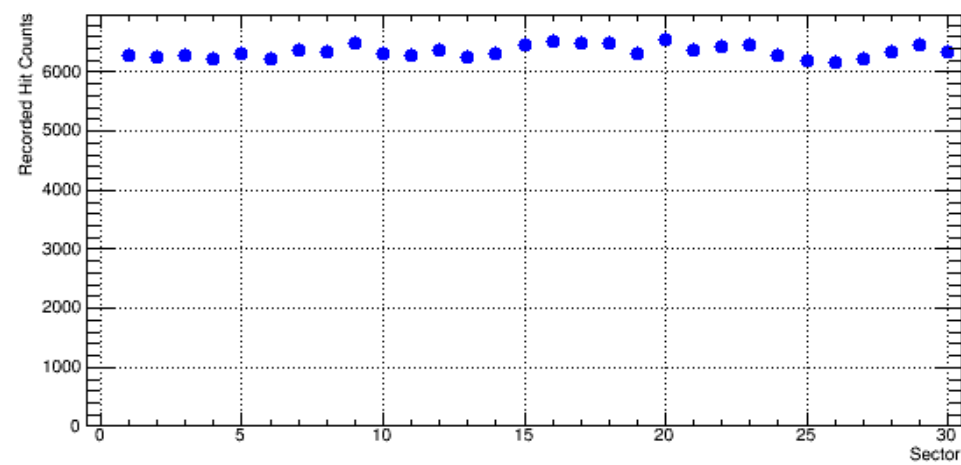


# Projected tracks and recorded hits without and with accidentals subtracted in Sim 1.2

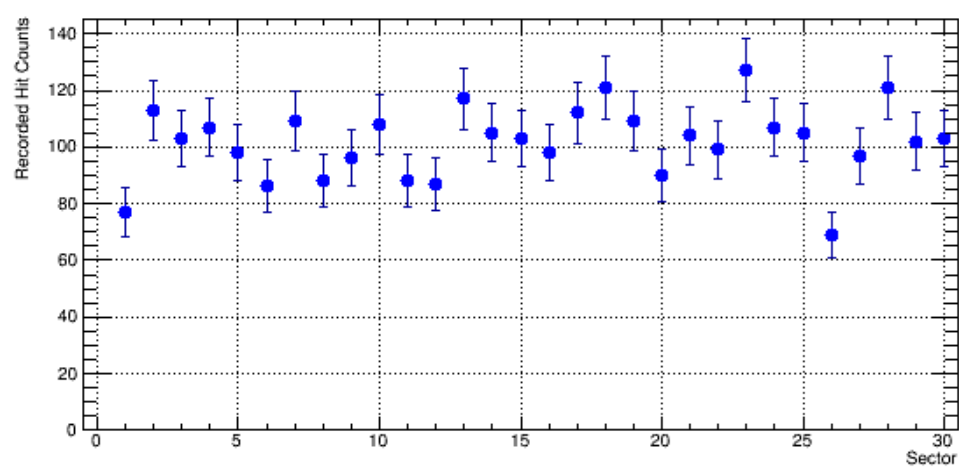
Projected Tracks to the SC



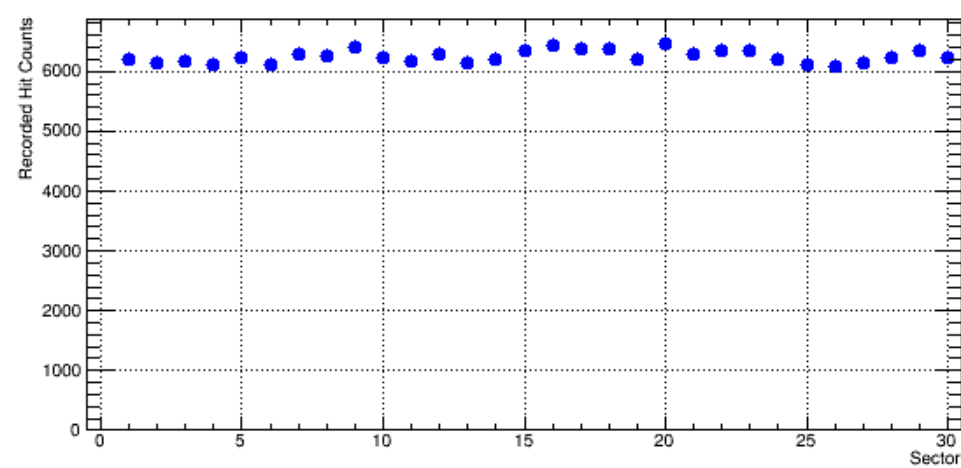
Recorded Hits



Accidentals



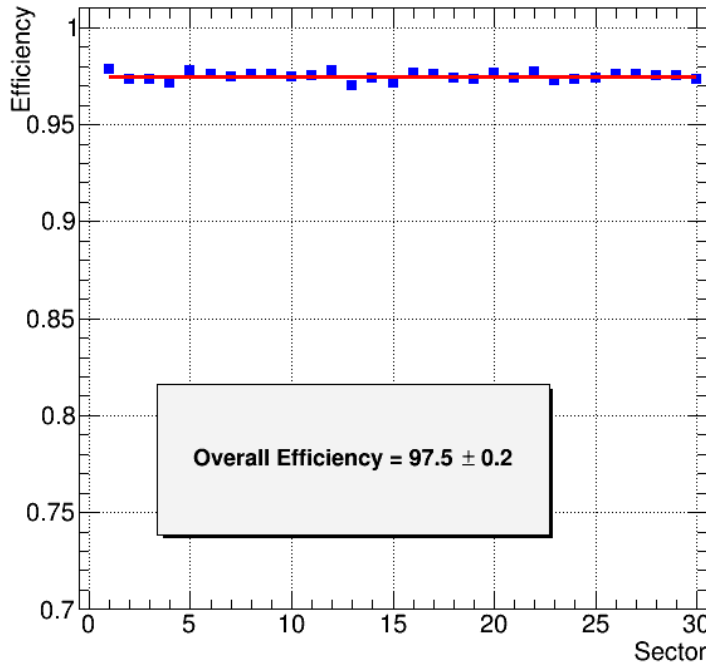
Recorded Hits - Accidentals



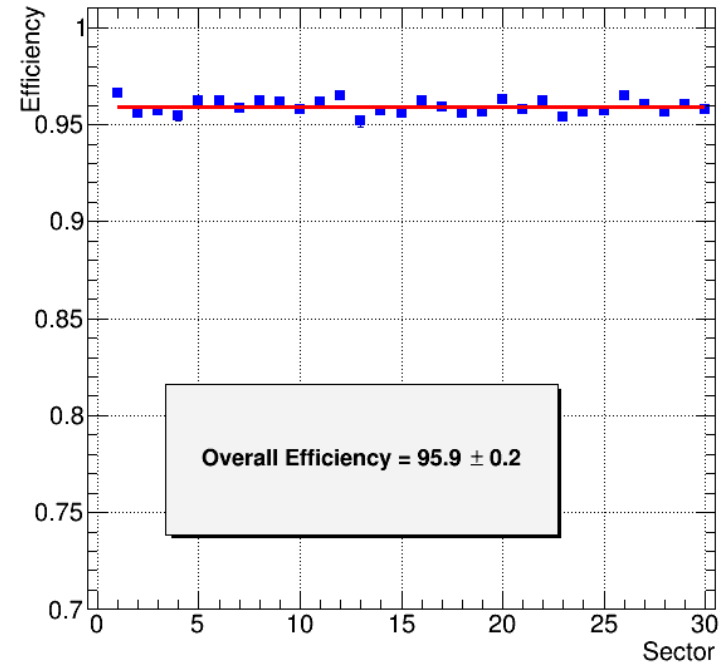
# SC Efficiency without and with accidentals subtracted

Sim1\_2

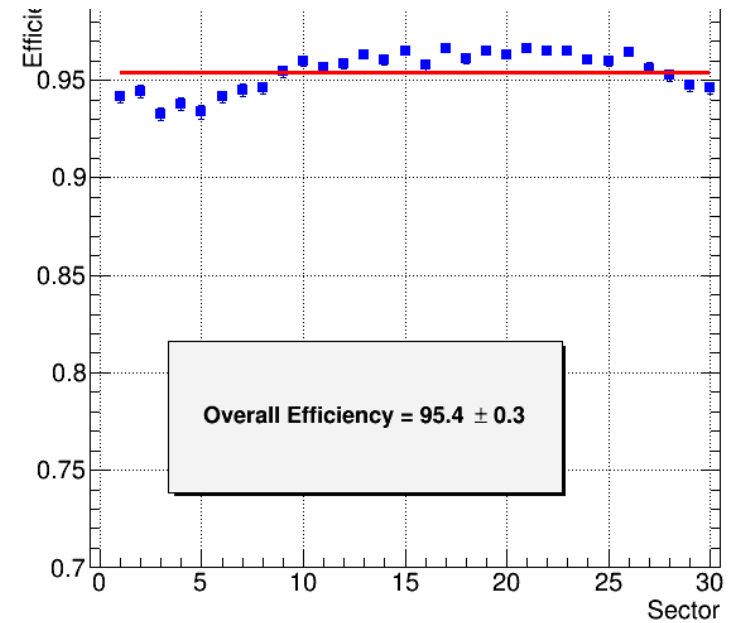
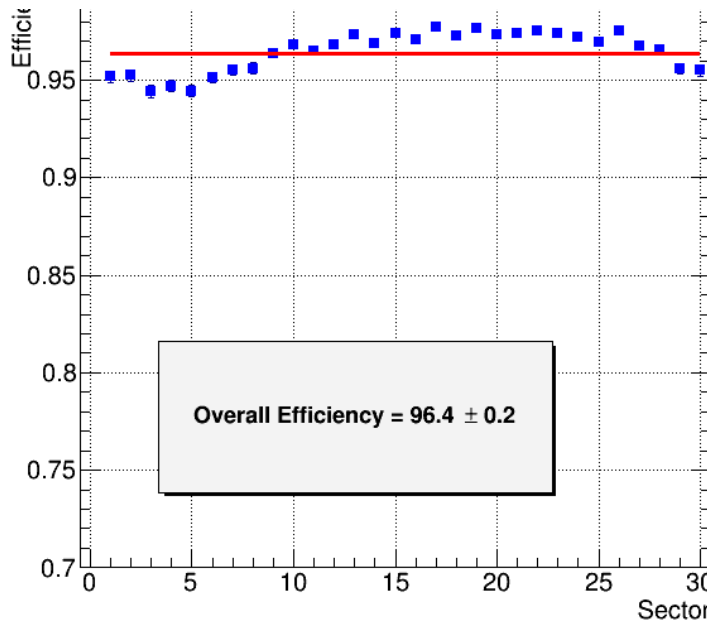
SC Efficiency



Accidental subtracted efficiency

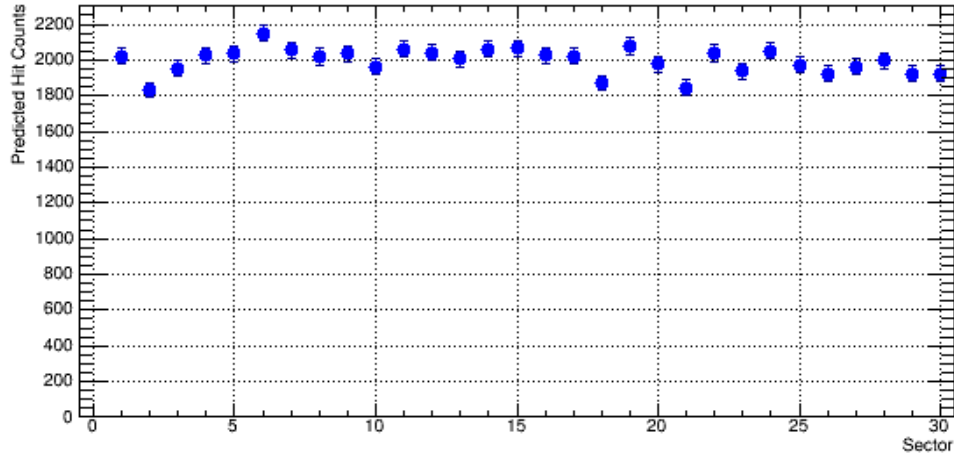


Data

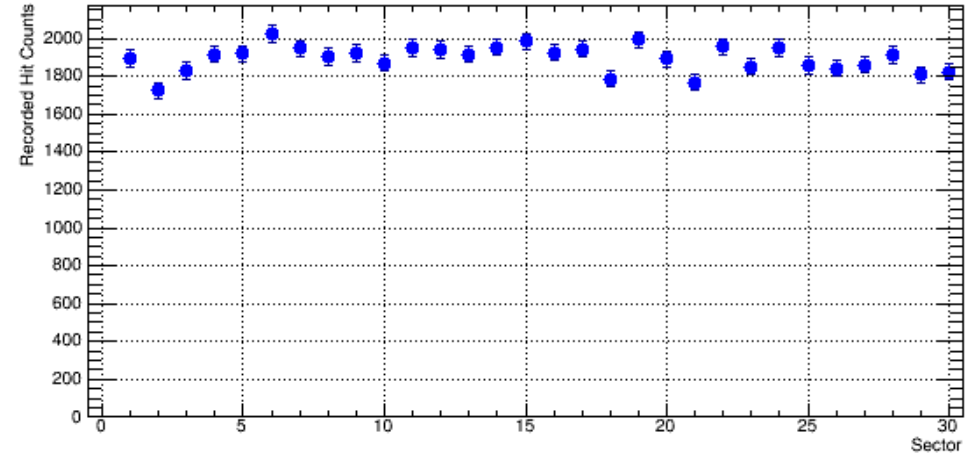


# Projected tracks and recorded hits without and with accidentals subtracted for the straight section in Data

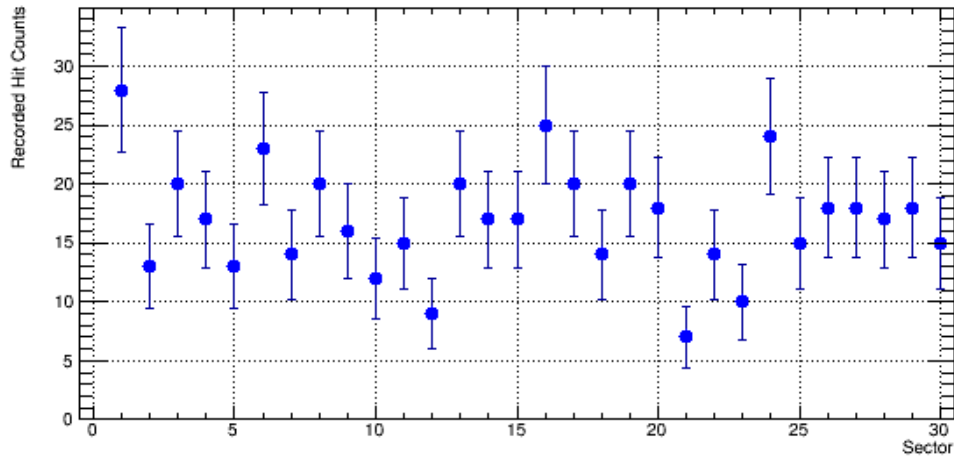
### Projected Tracks to the SC



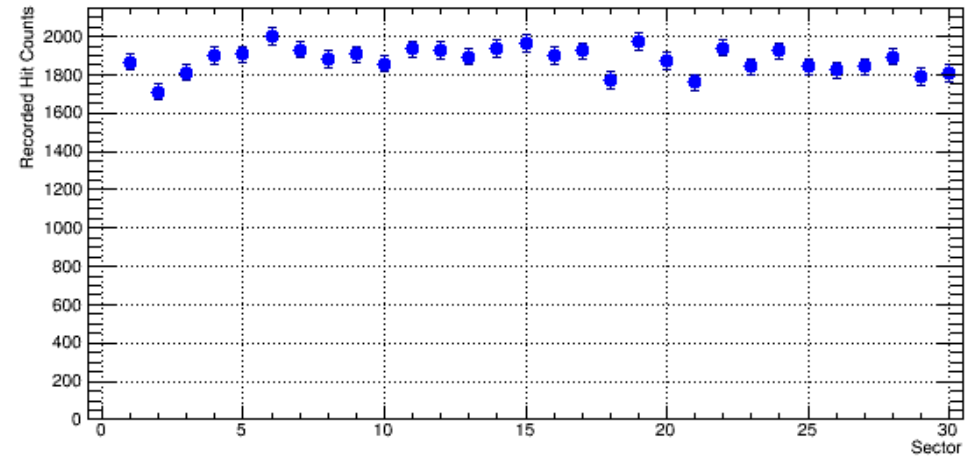
### Recorded Hits



### Accidentals

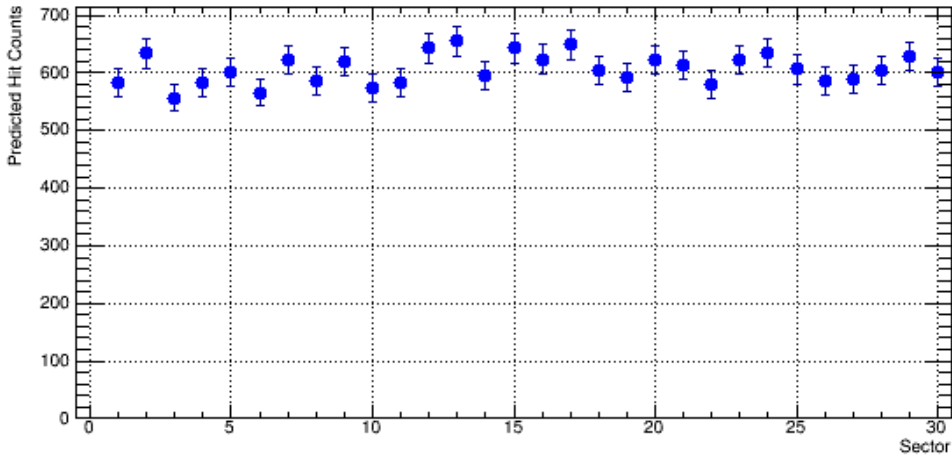


### Recorded Hits - Accidentals

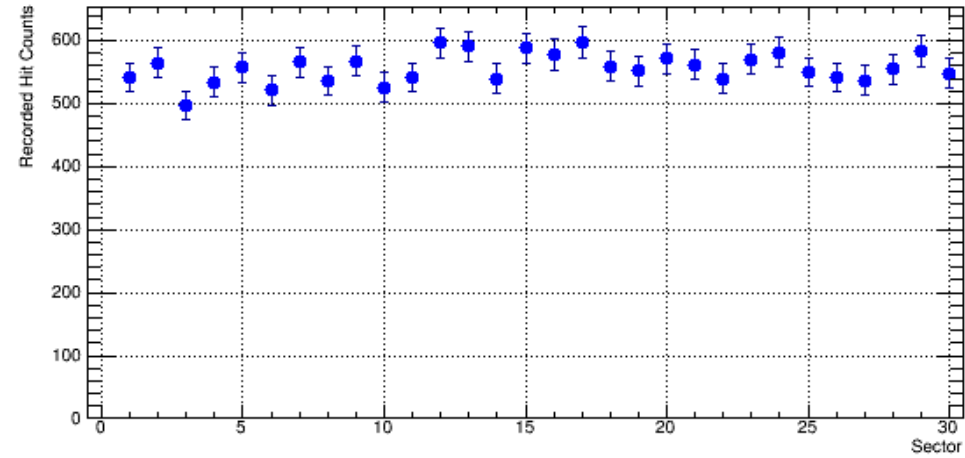


# Projected tracks and recorded hits without and with accidentals subtracted for the straight section in Sim1.2

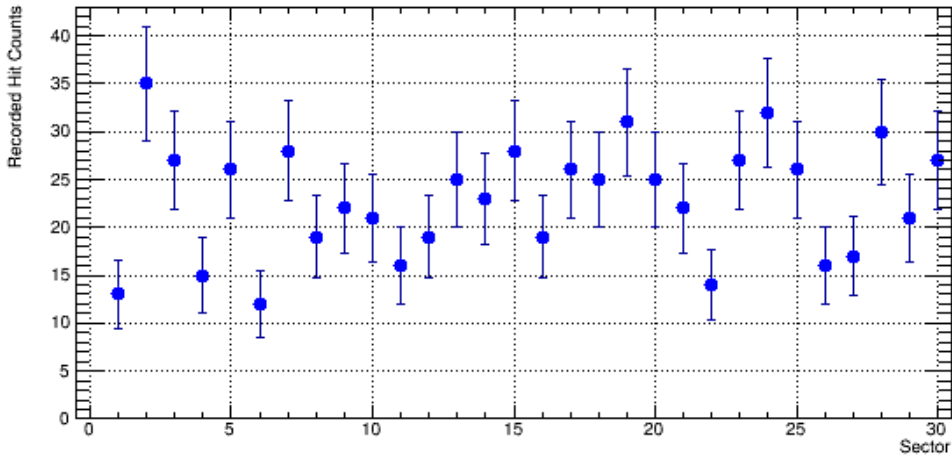
Projected Tracks to the SC



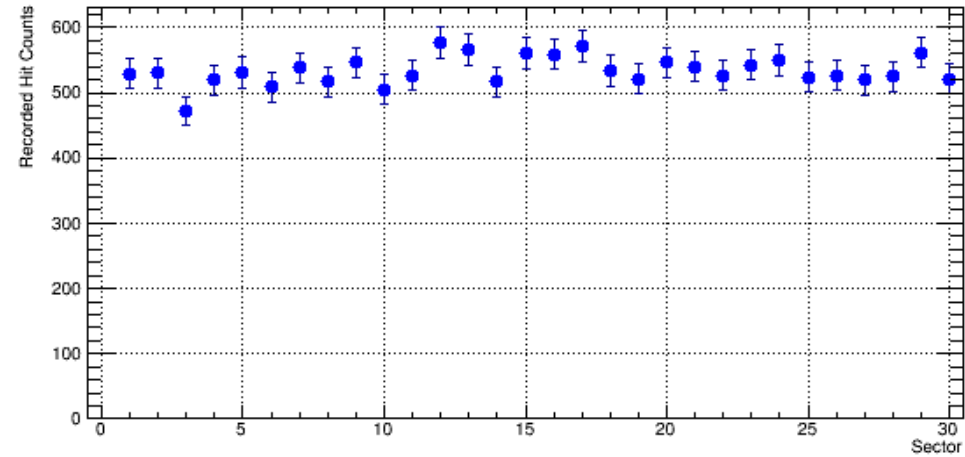
Recorded Hits



Accidentals



Recorded Hits - Accidentals

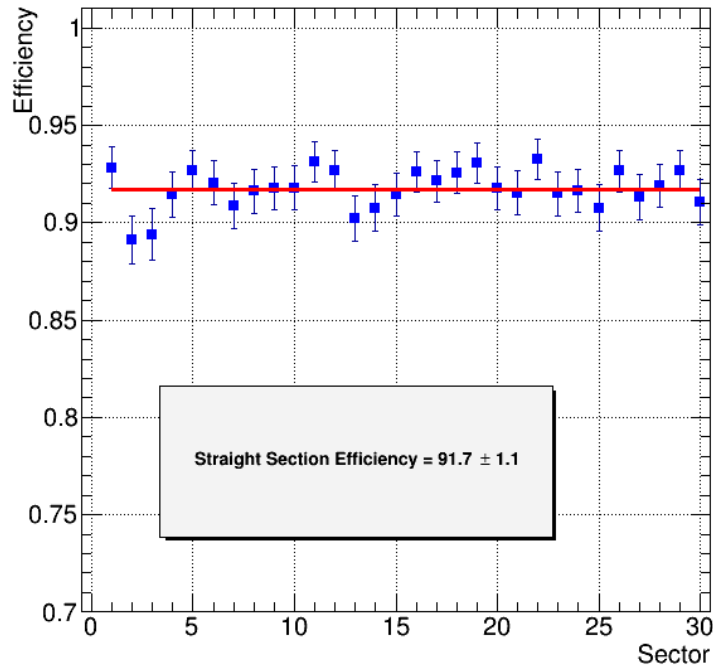




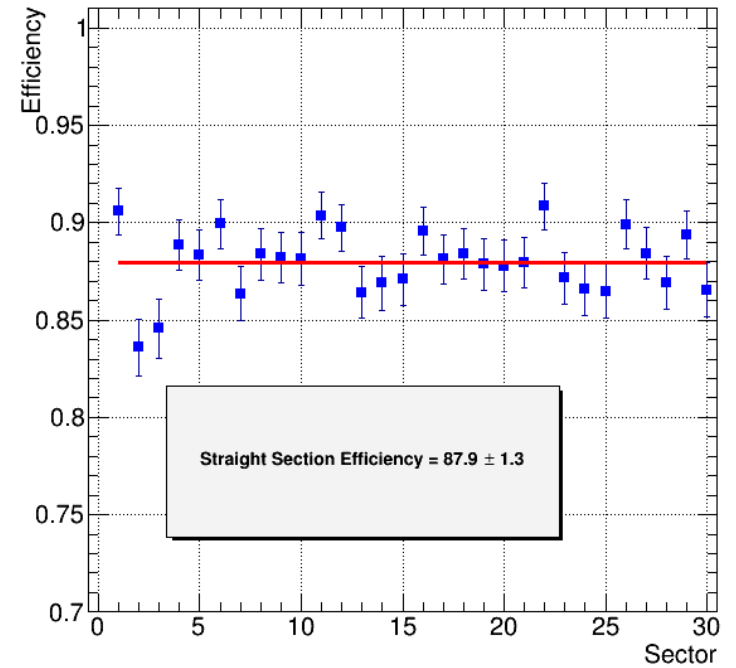
# SC Efficiency without and with accidentals subtracted for the straight section

Sim1\_2

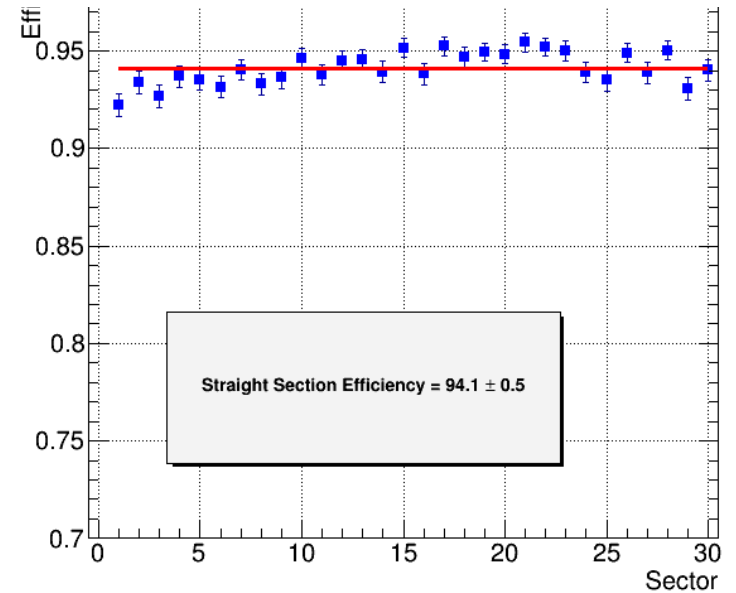
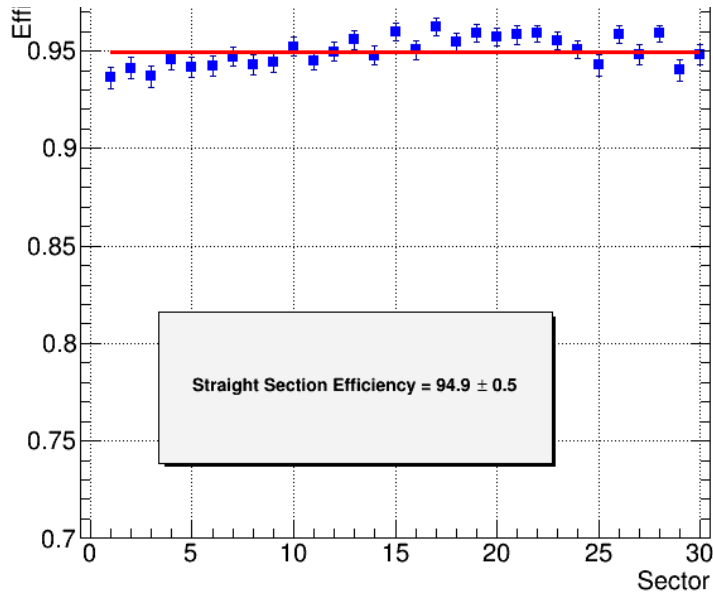
SS Efficiency



Accidental subtracted efficiency

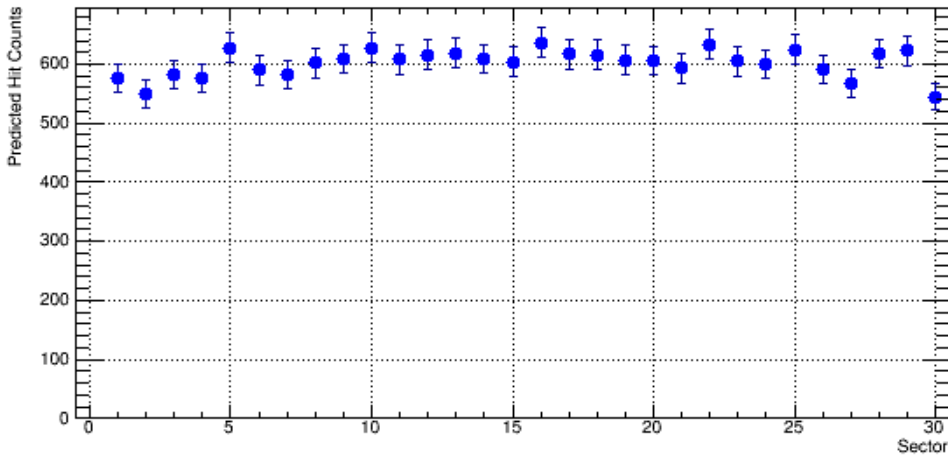


Data

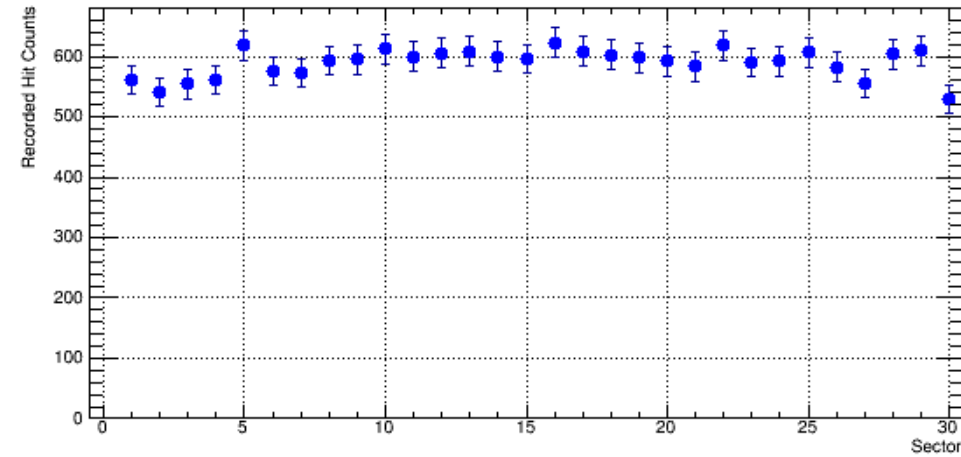


# Projected tracks and recorded hits without and with accidentals subtracted for the Bend section in Data

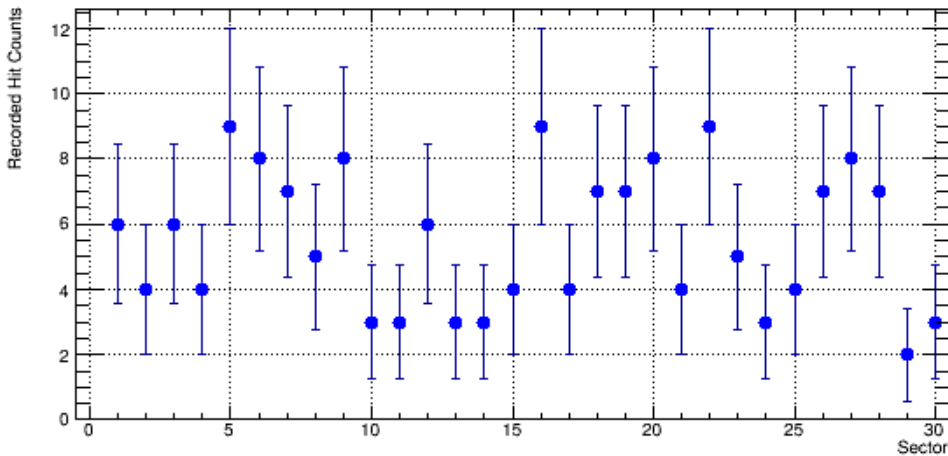
Projected Tracks to the SC



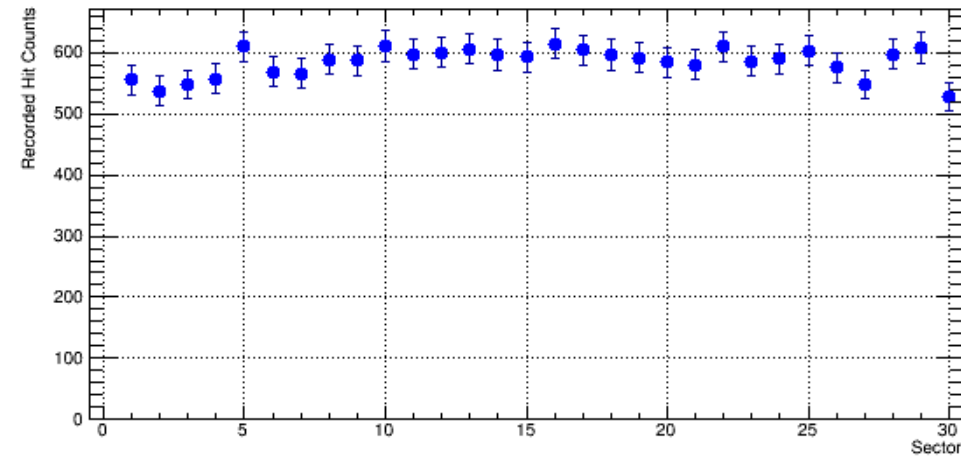
Recorded Hits



Accidentals

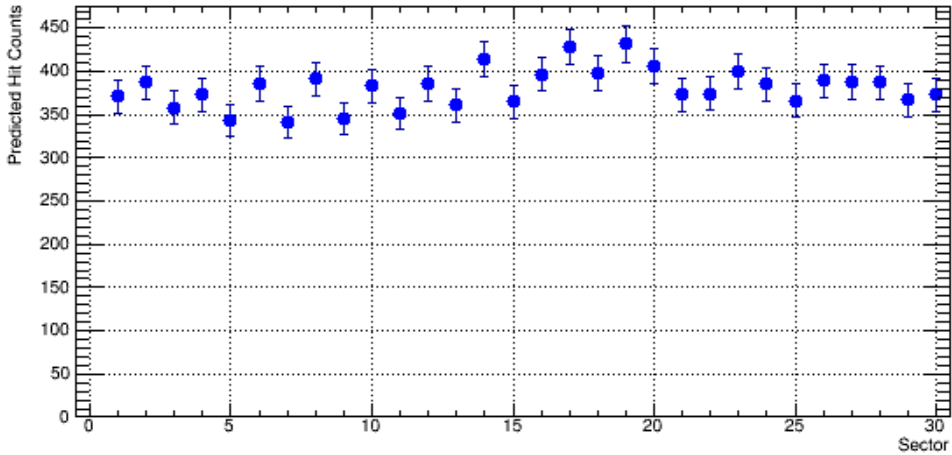


Recorded Hits - Accidentals

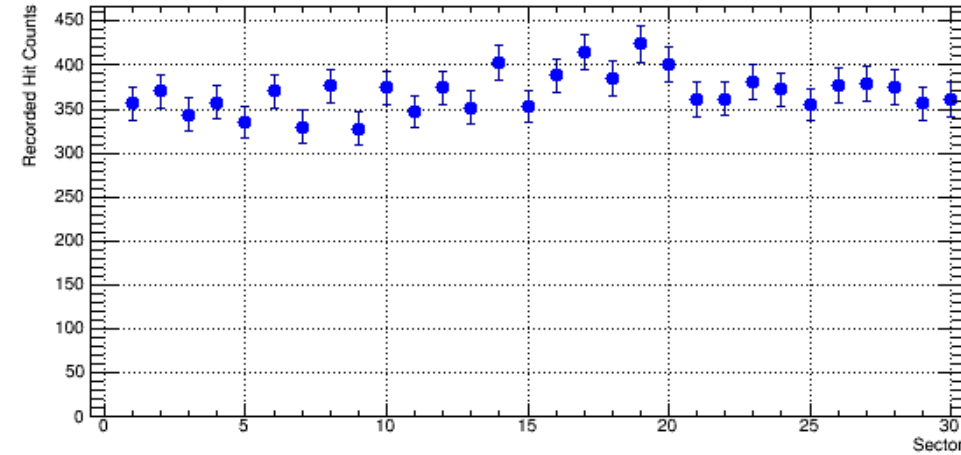


# Projected tracks and recorded hits without and with accidentals subtracted for the Bend section in Sim1\_2

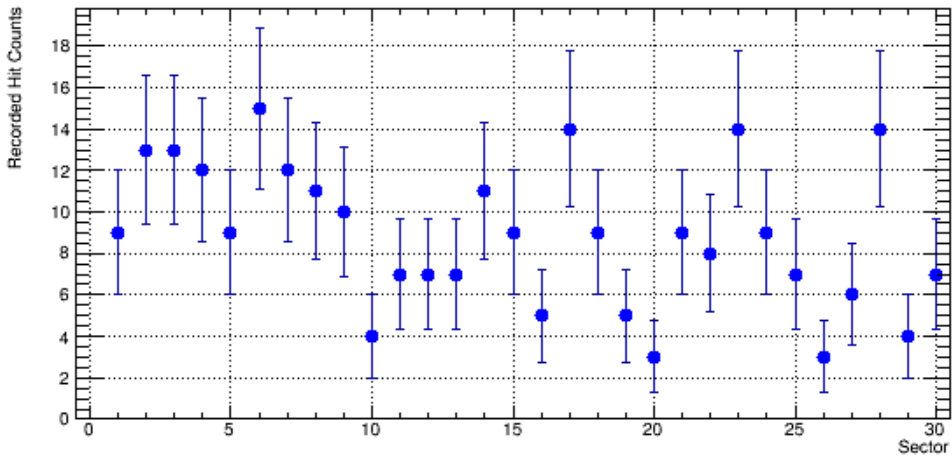
Projected Tracks to the SC



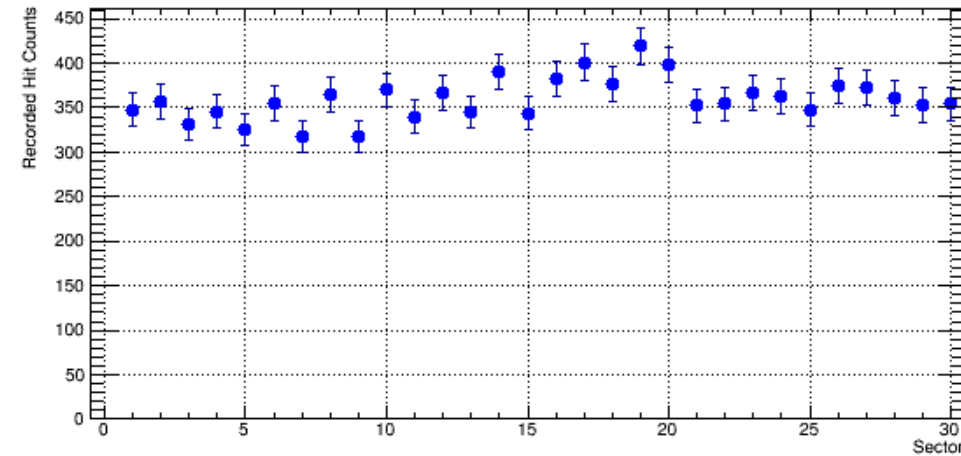
Recorded Hits



Accidentals



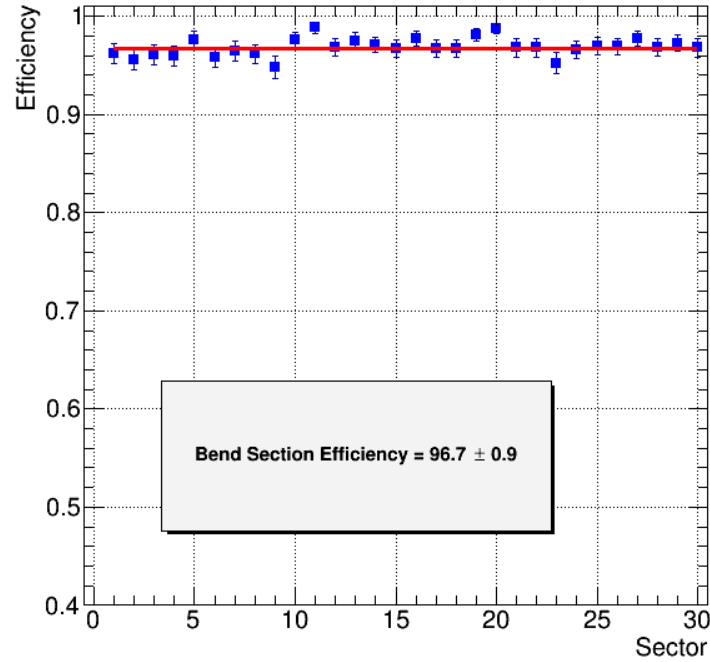
Recorded Hits - Accidentals



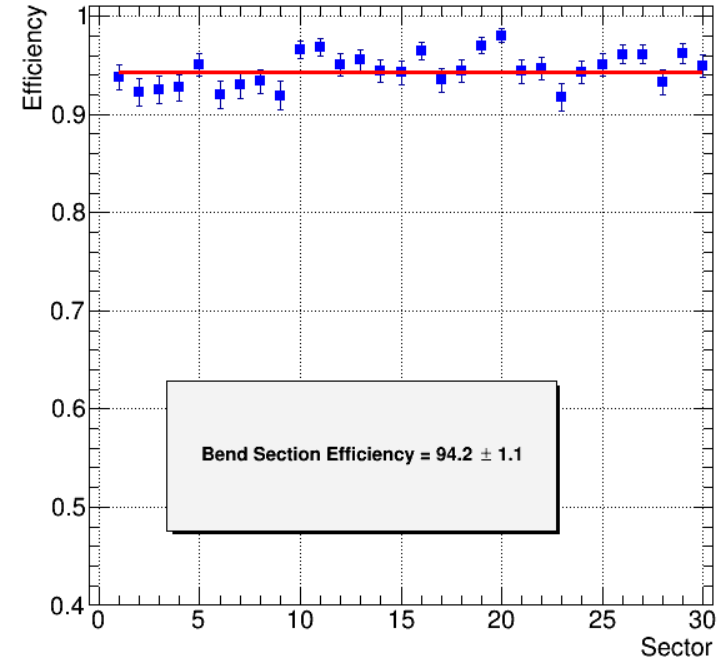
# SC Efficiency without and with accidentals subtracted for the Bend section

Sim1\_2

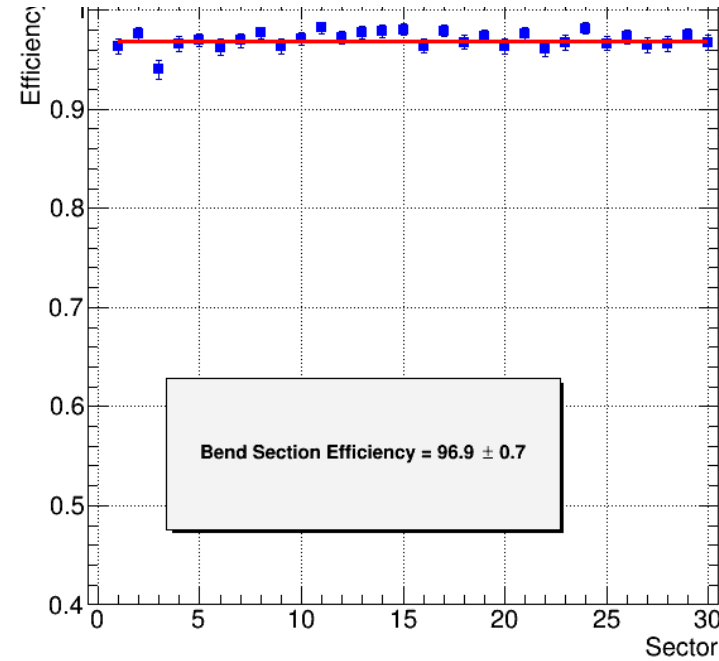
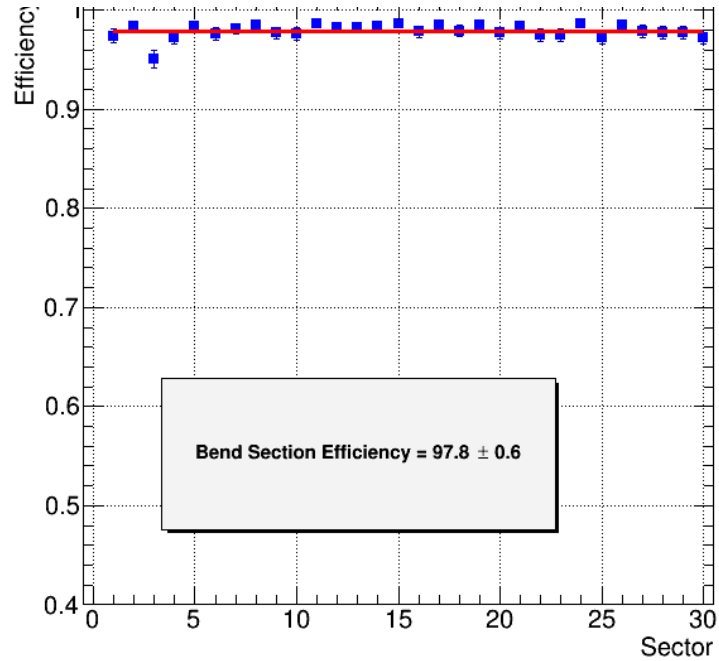
BS Efficiency



Accidental subtracted efficiency

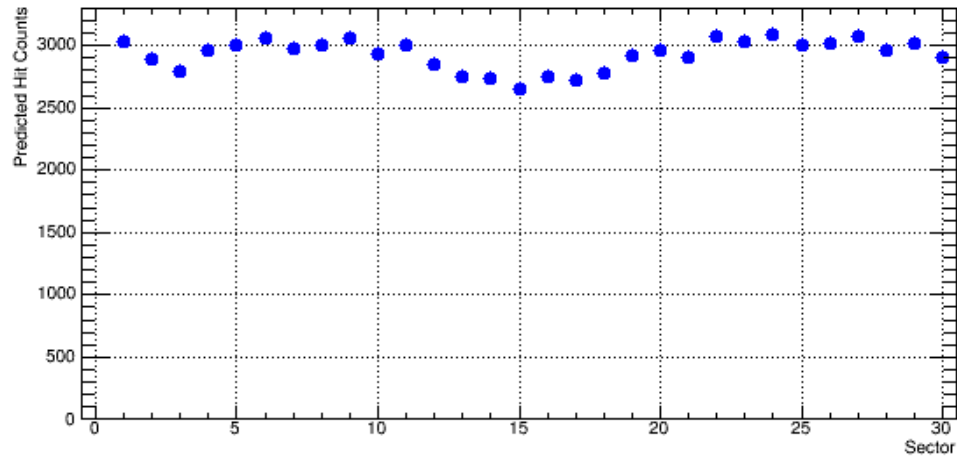


Data

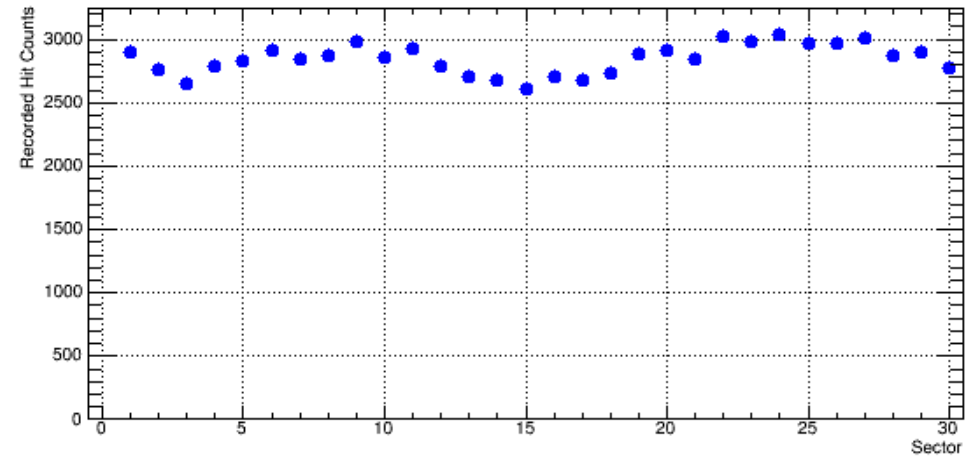


# Projected tracks and recorded hits without and with accidentals subtracted for the Nose section in Data

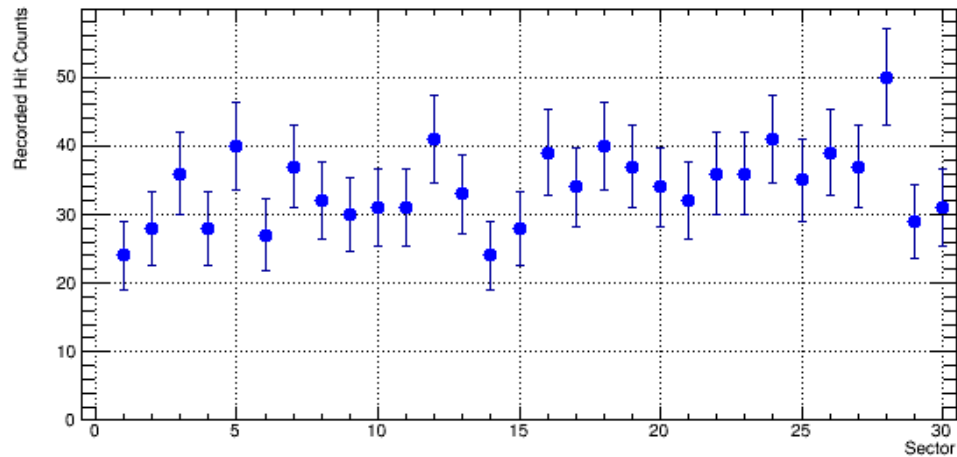
Projected Tracks to the SC



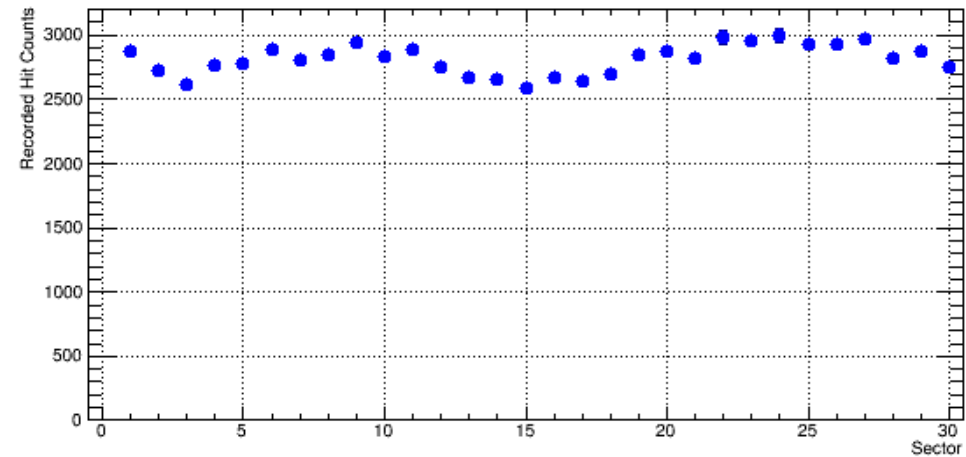
Recorded Hits



Accidentals

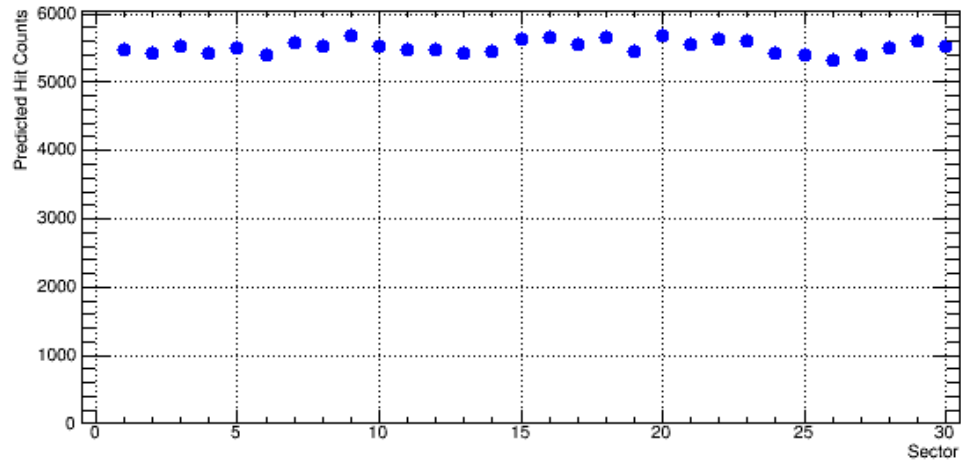


Recorded Hits - Accidentals

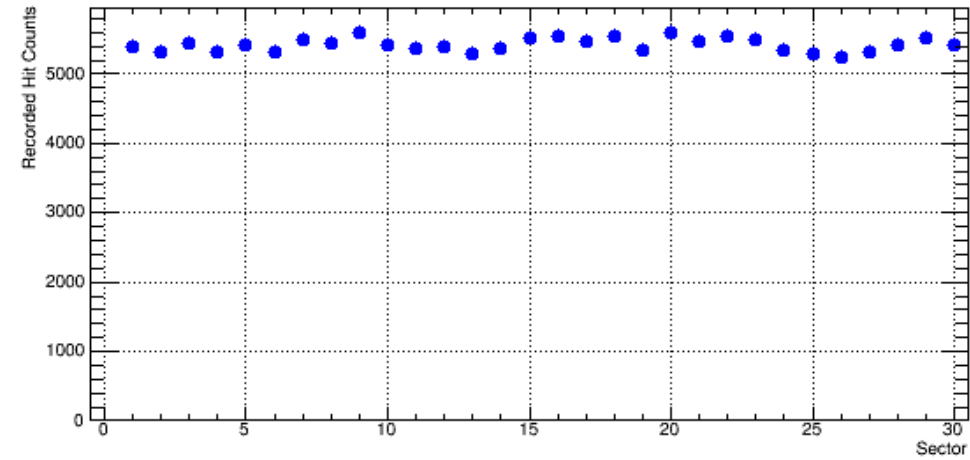


# Projected tracks and recorded hits without and with accidentals subtracted for the Nose section in Sim1\_2

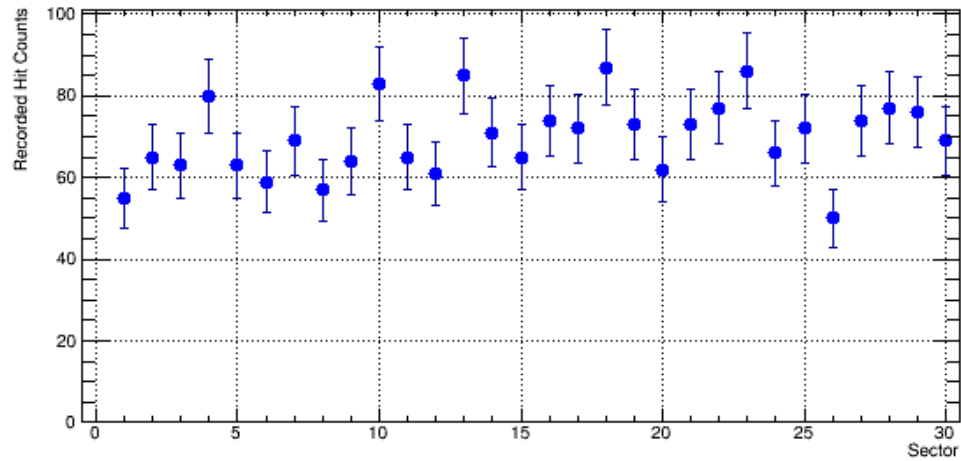
Projected Tracks to the SC



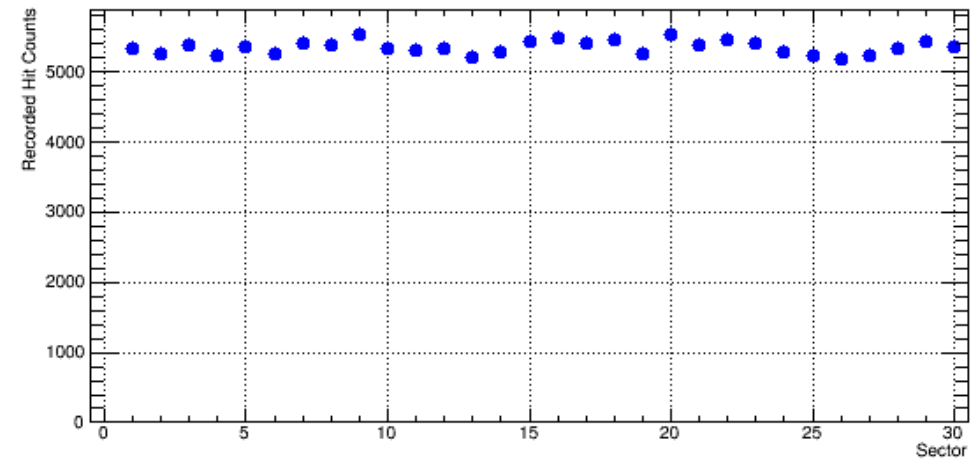
Recorded Hits



Accidentals



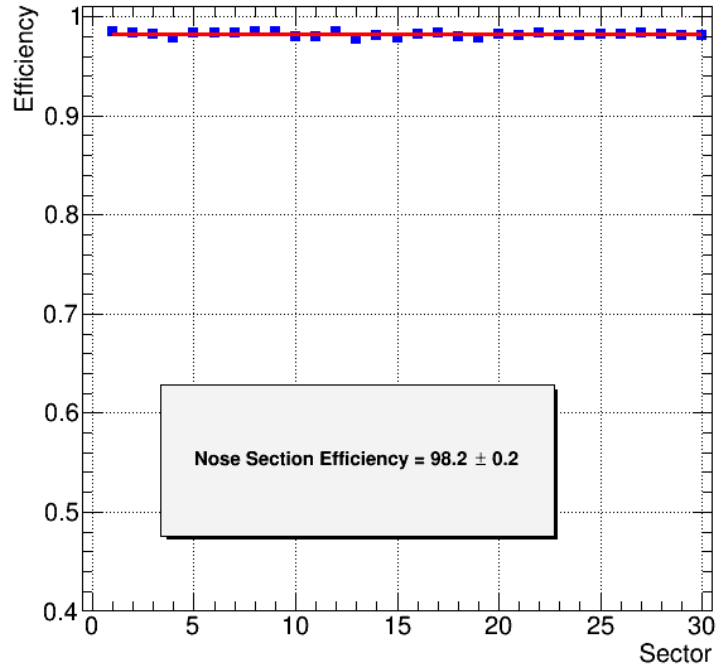
Recorded Hits - Accidentals



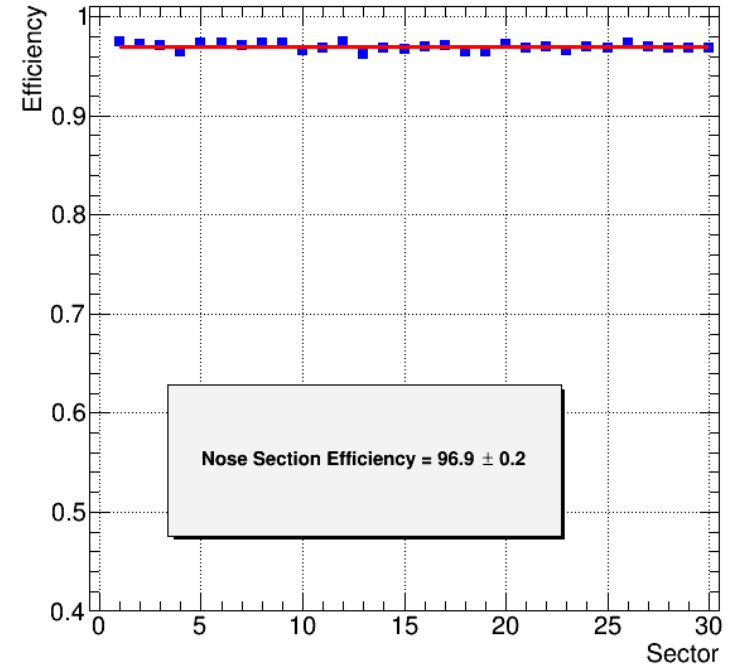
# SC Efficiency without and with accidentals subtracted for the Nose section

Sim1\_2

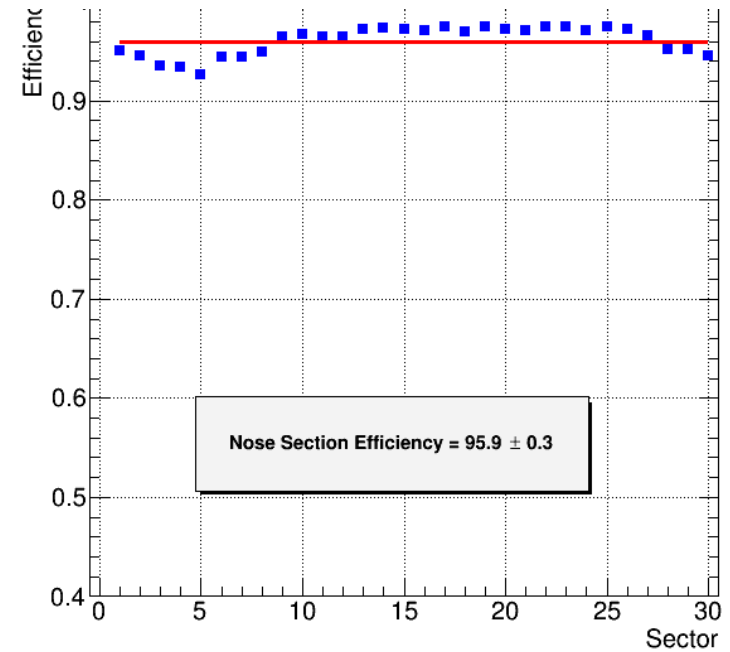
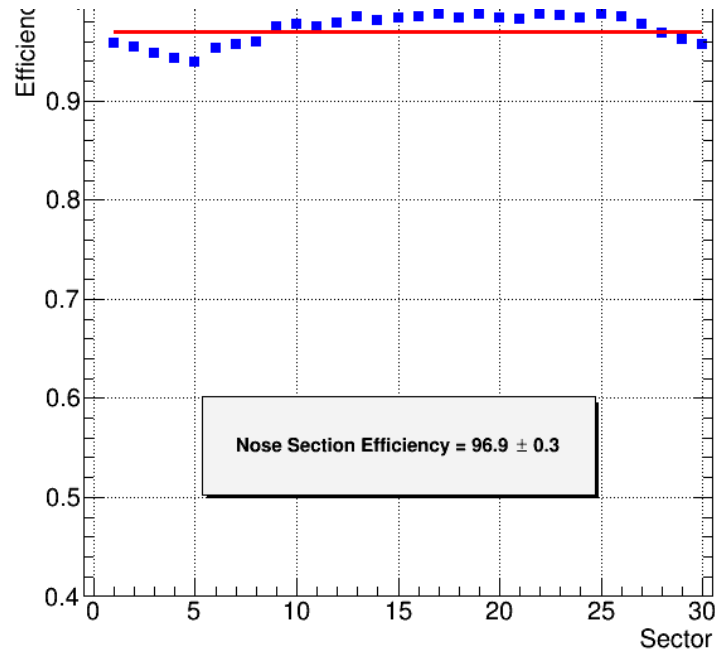
NS Efficiency



Accidental subtracted efficiency



Data

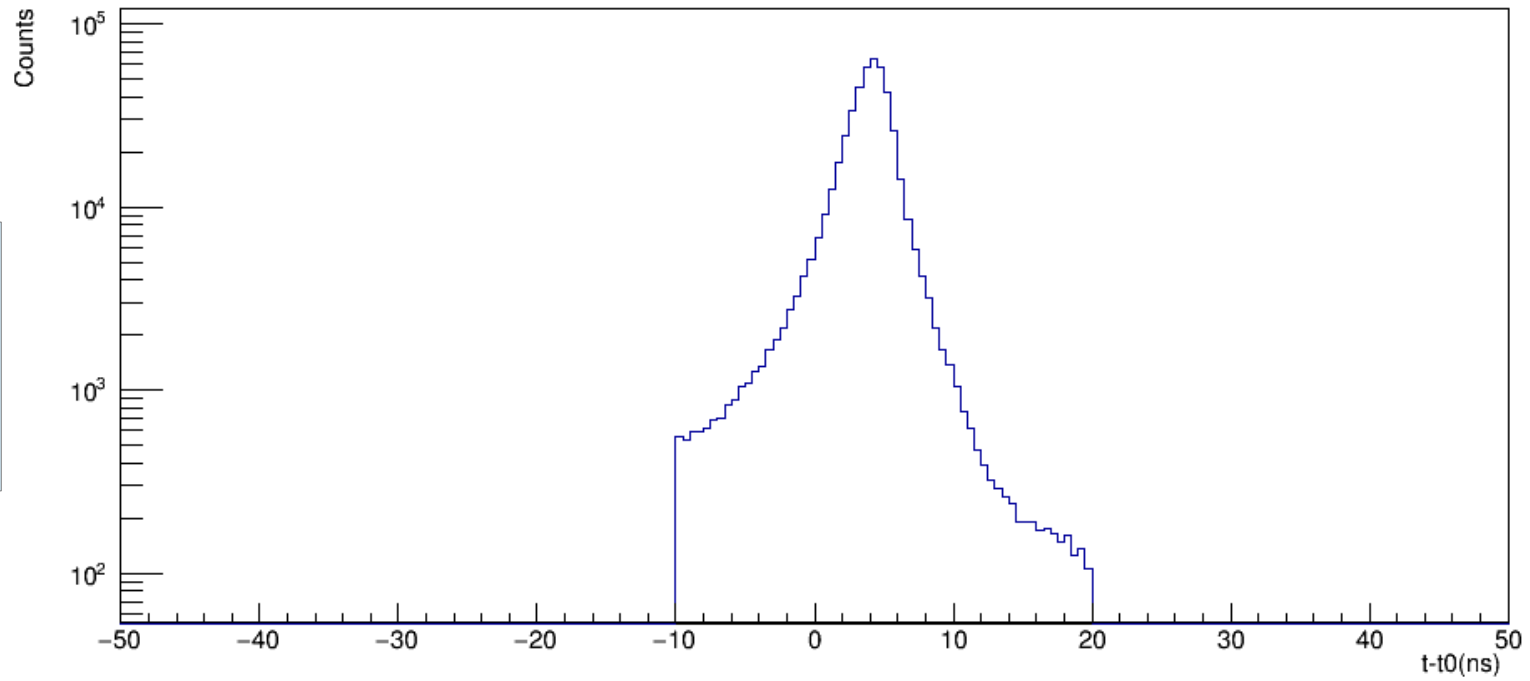


Back Up Slides



# Hit Time -t0

Sim1\_2



Data

