Start Counter Efficiency Studies

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GLUEX

Jefferson Lab

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 >=14
  - Track_FOM >= $2.69E^{-3}$
  - abs(vertex_z – target center) <=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 $\delta\varphi = \pm 3^{0}$.

- 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 abs(t-t0) < 35 ns, check if the same projected sector had hit.
- Calculate the hit efficiency = SC hits / Projected hits.
- Calculate the efficiency with another timing cut (-10 < t-t0 < 20) ns
- Calculate the efficiency taking into consideration the same or nearest paddle had hit
- Use Smeared sim1_1 to compare with the previous step.

TDC and ADC Hits Efficiency Calculations

Loop over the SC TDC hits (no timing cut/no nearest paddle), calculate the SC TDC efficiency = SC TDC hits /Projected hits.

Loop over the SC ADC hits (no timing cut/no nearest paddle), calculate the SC ADC efficiency = SC ADC hits /Projected hits.

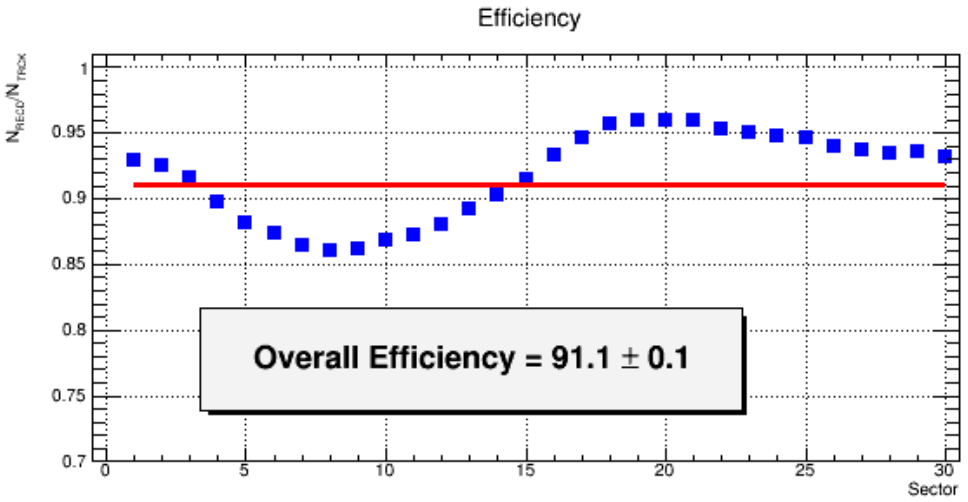
Data and Simulation runs

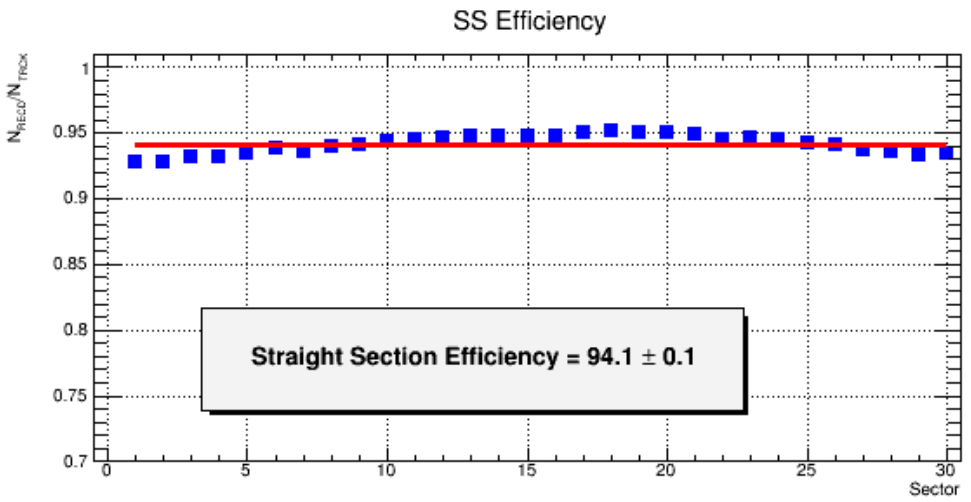
Data : 20 files of run 11366

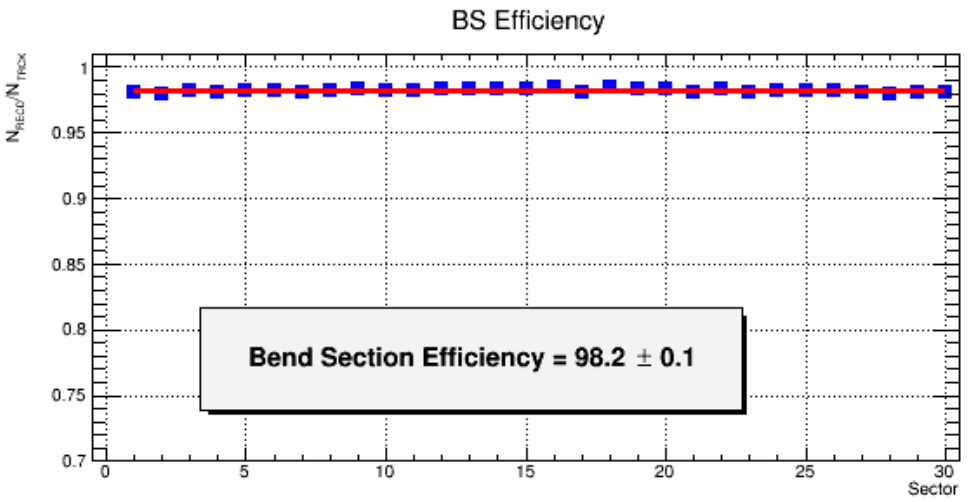
Simulation: the first file of 10 runs

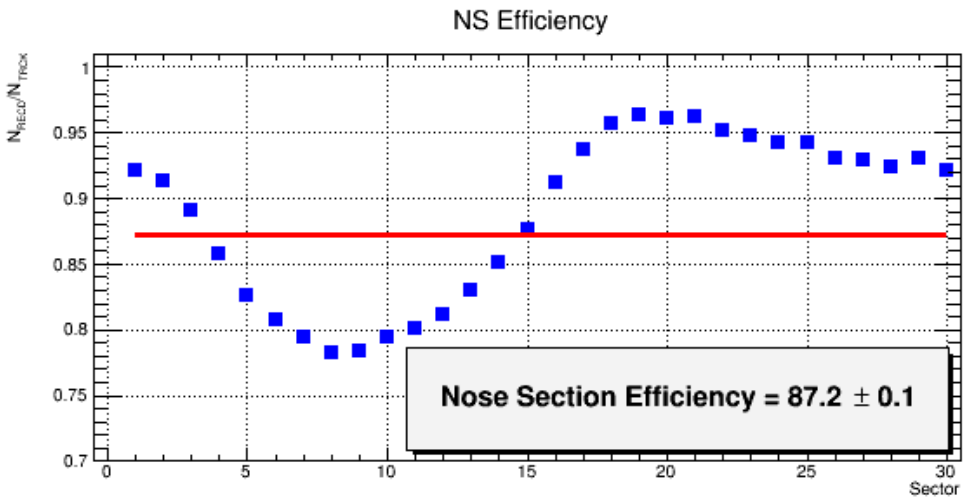
Data

SC efficiency based on TDC hits



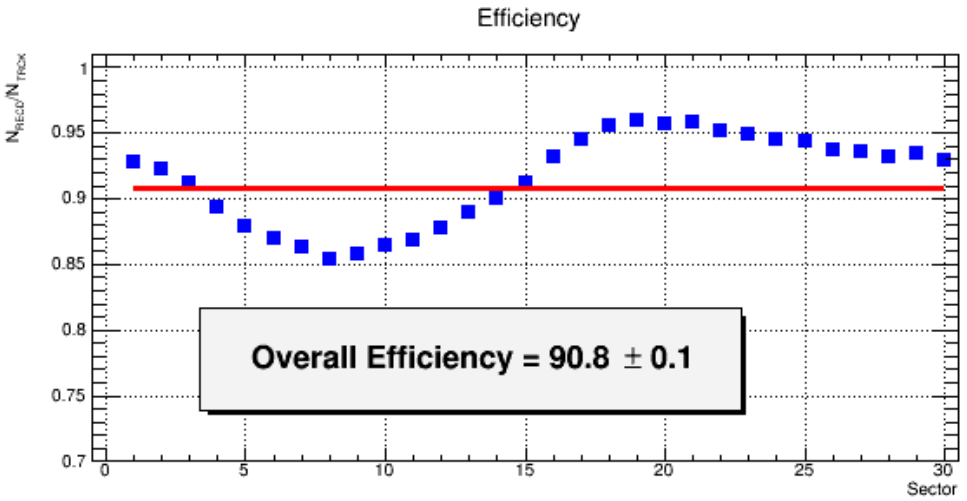


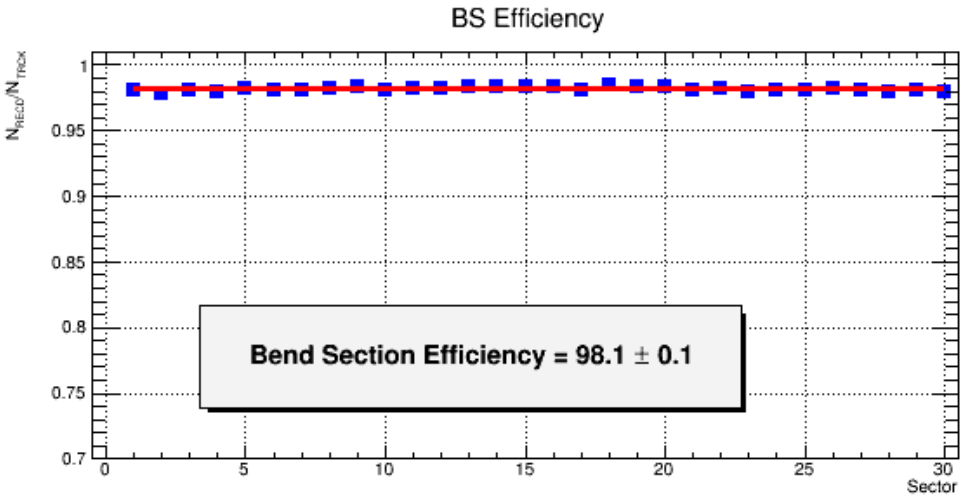


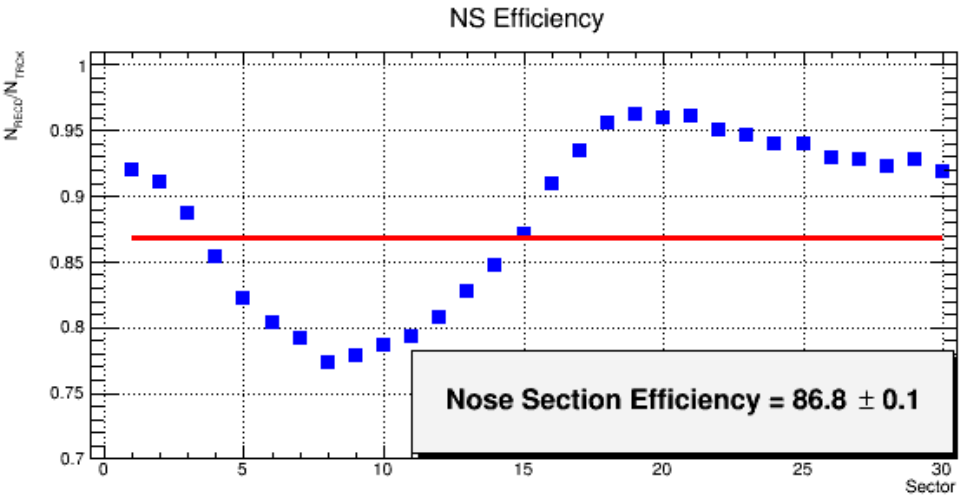


Data

SC efficiency based on ADC hits

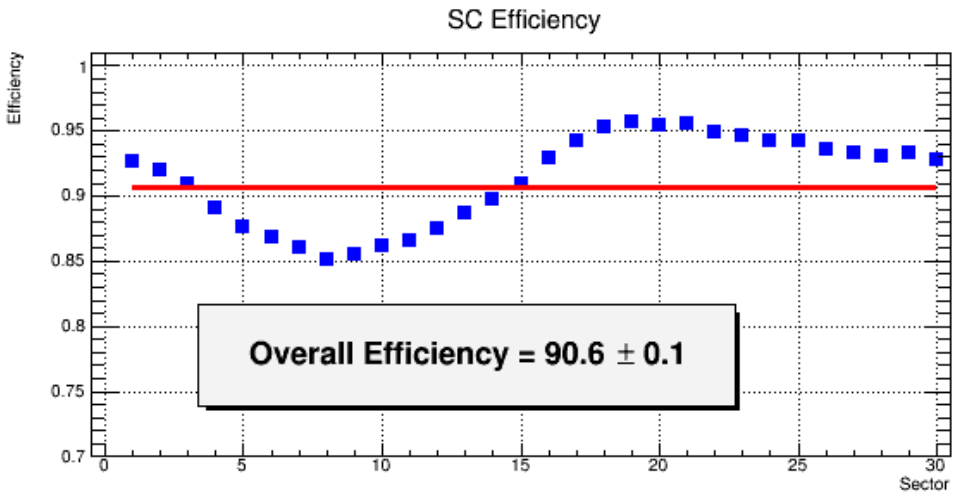


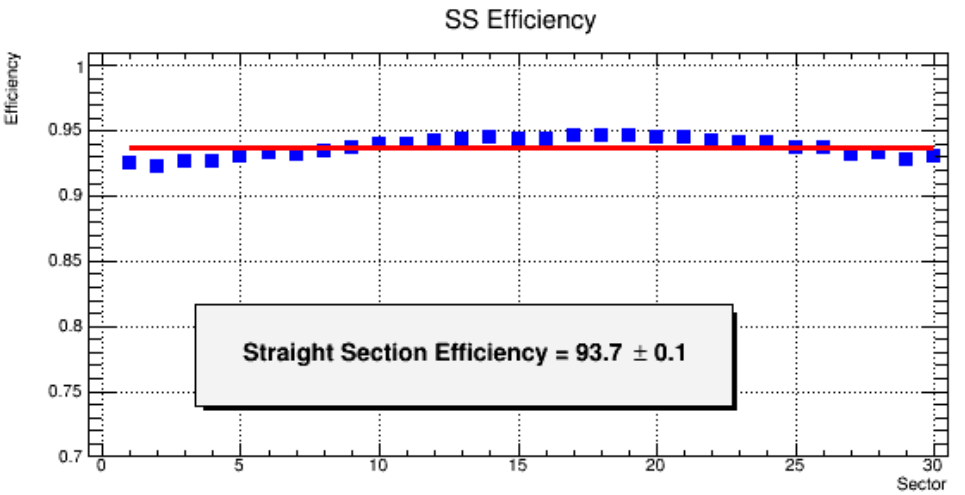


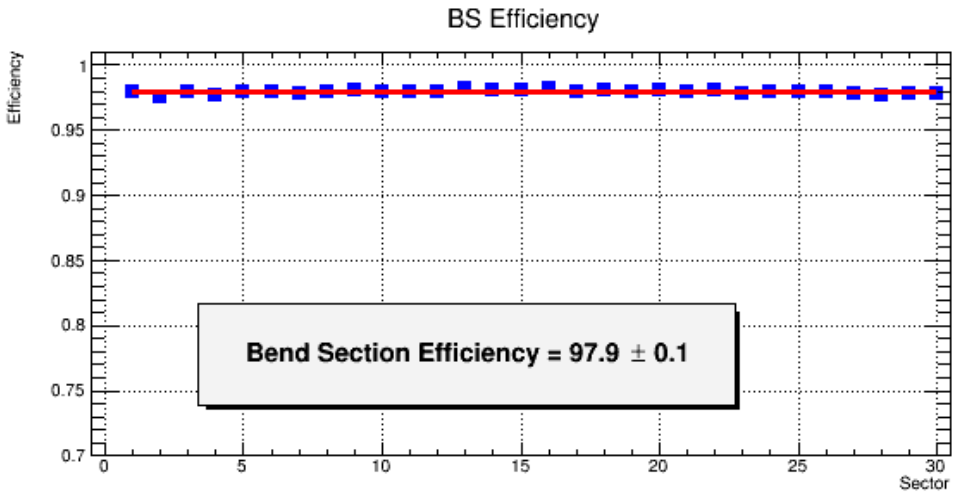


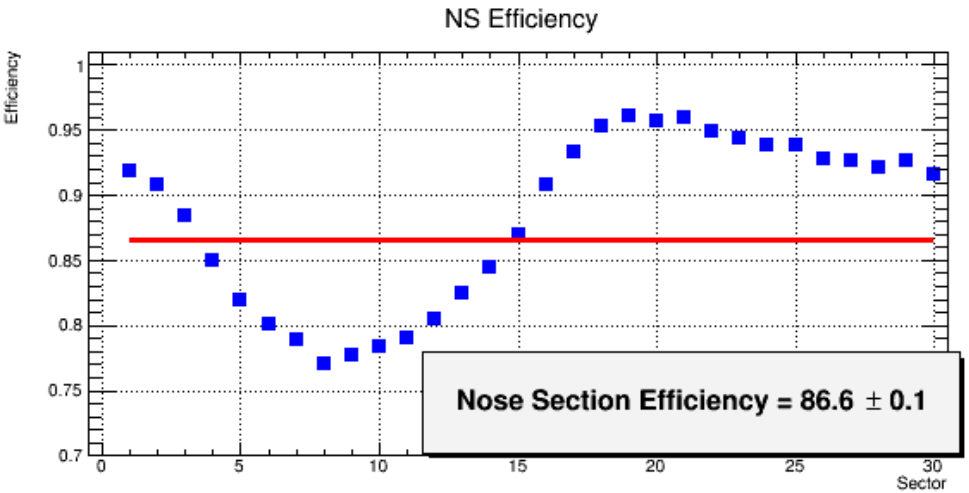
Data

SC hit efficiency with no Timing cut



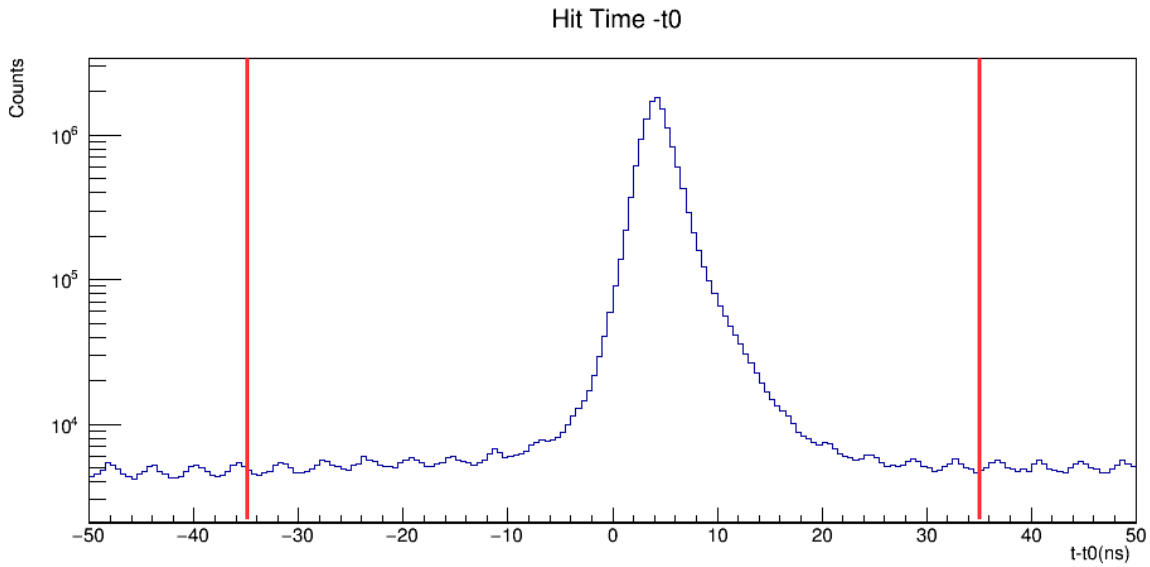






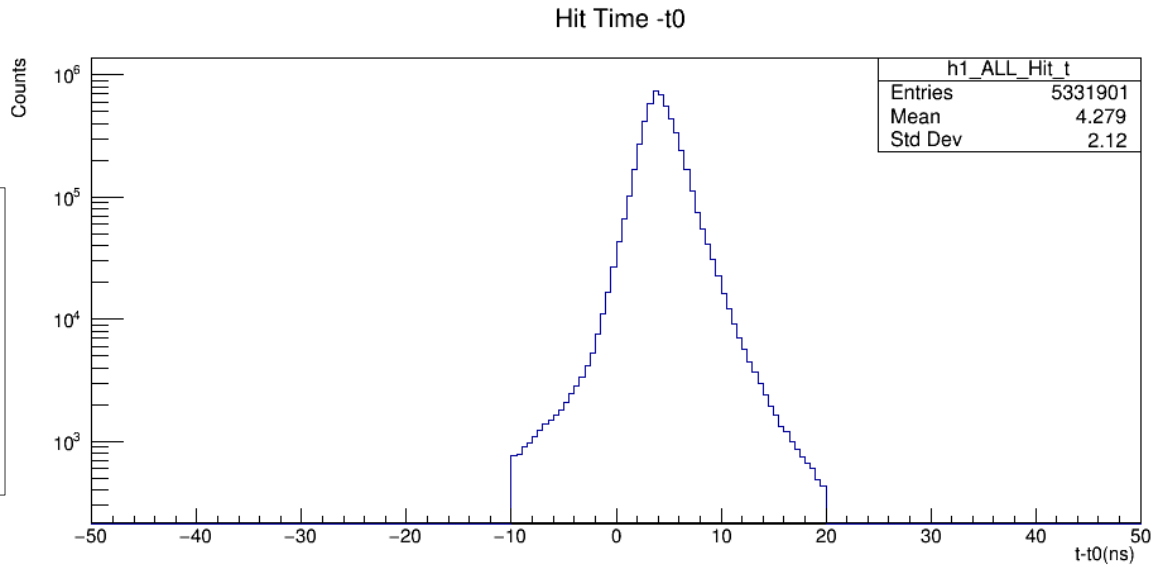
Data

Run11366: 20 files are used



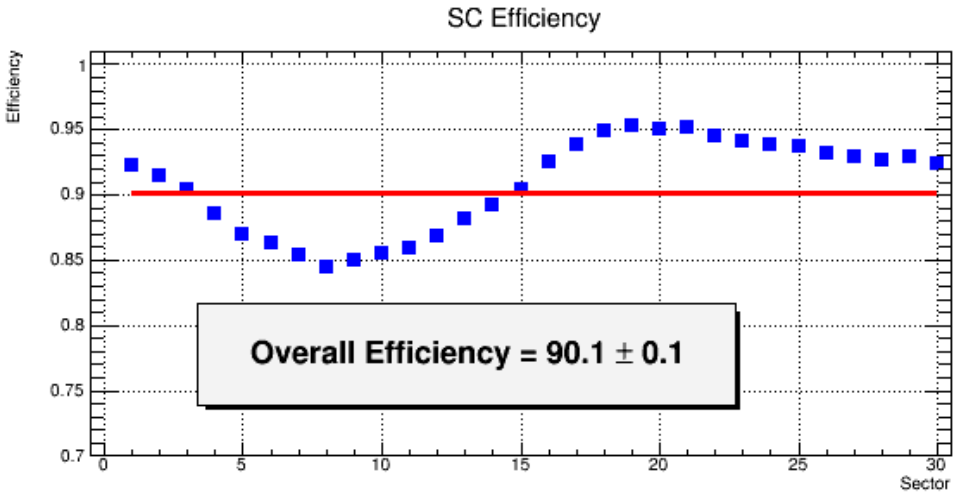
Time difference between the projected hit and the recorded hit

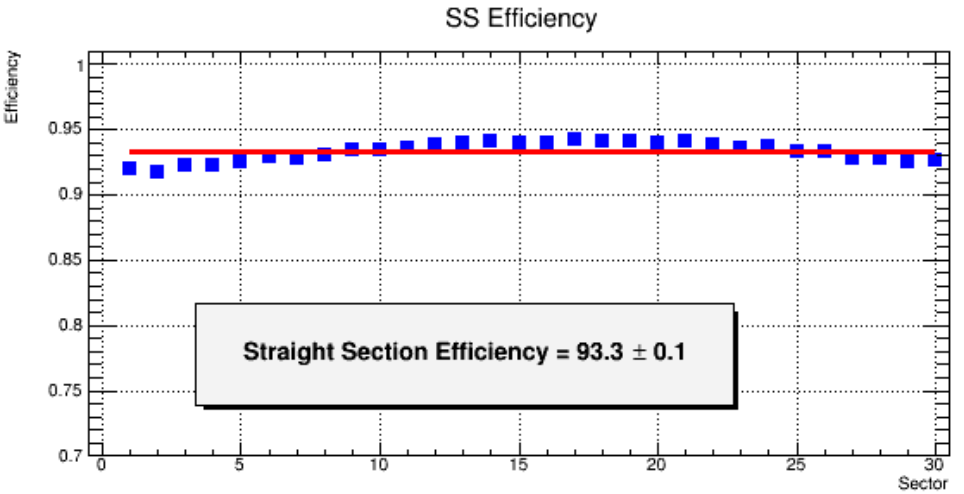
The projected hit had the Same sector as the recorded hit

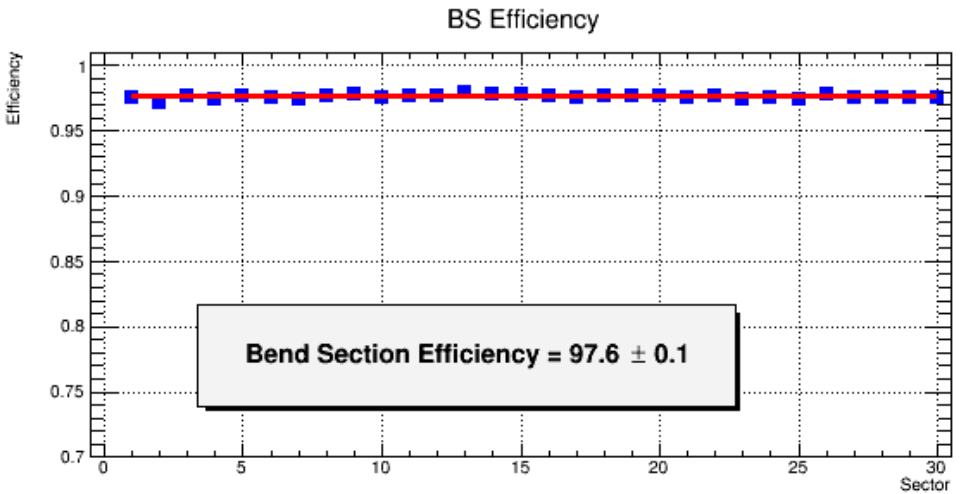


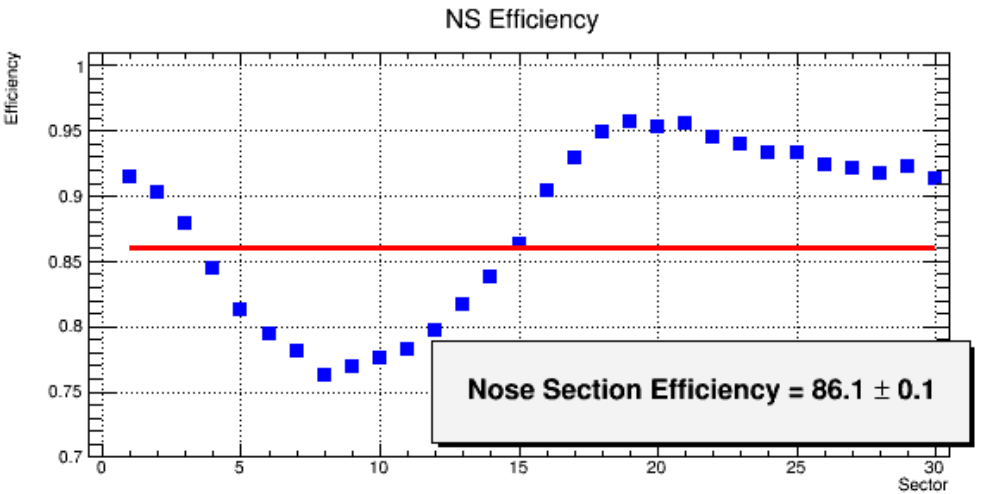
Data

SC hit efficiency with ±35 ns Timing cut



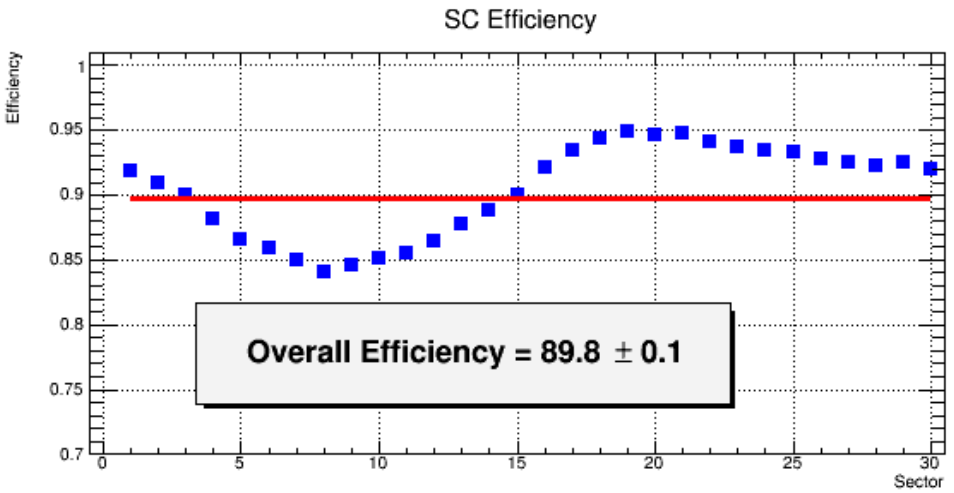


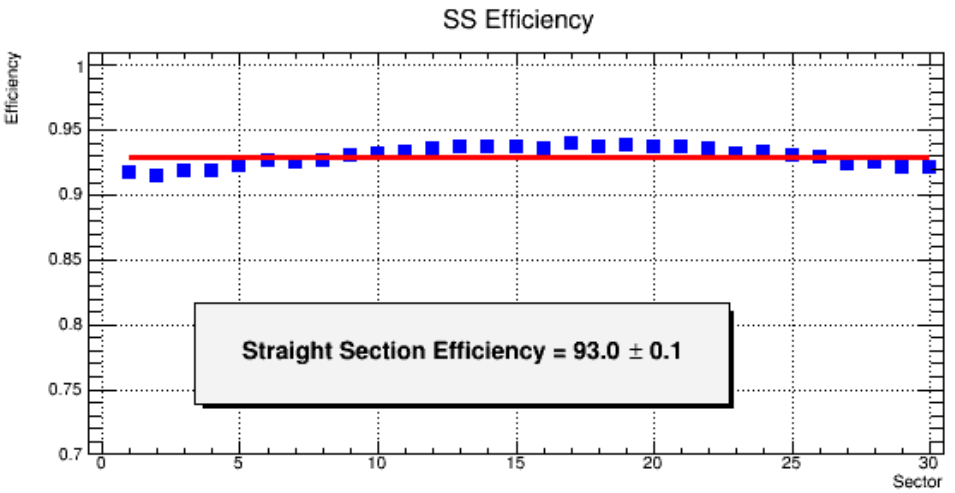


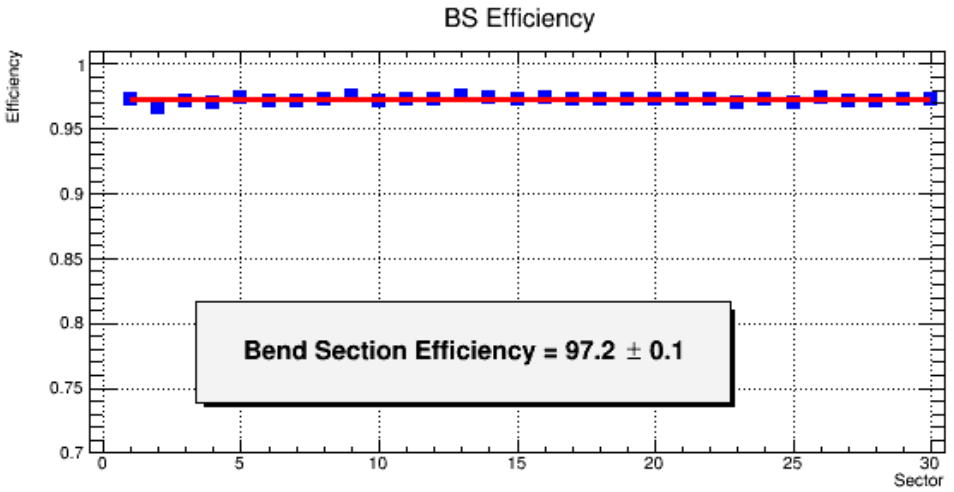


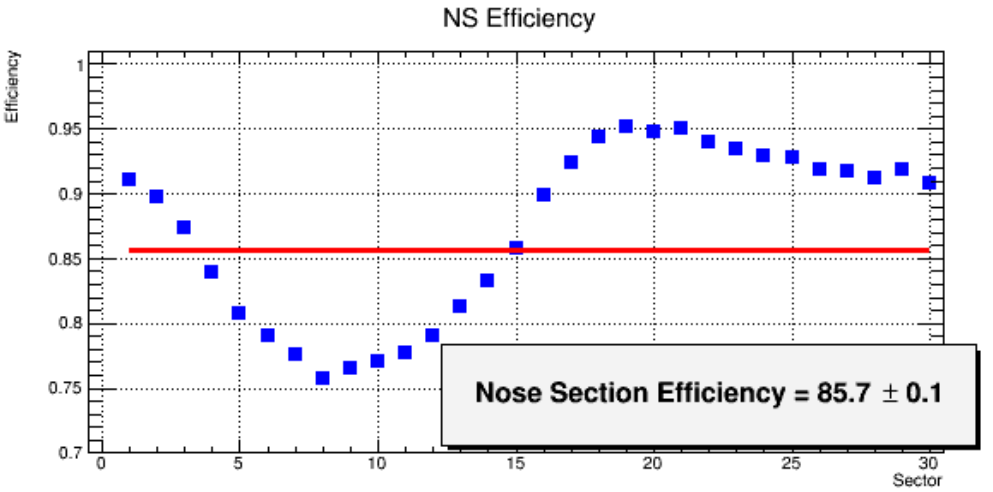
Data

SC hit efficiency with -10/+20 ns Timing cut



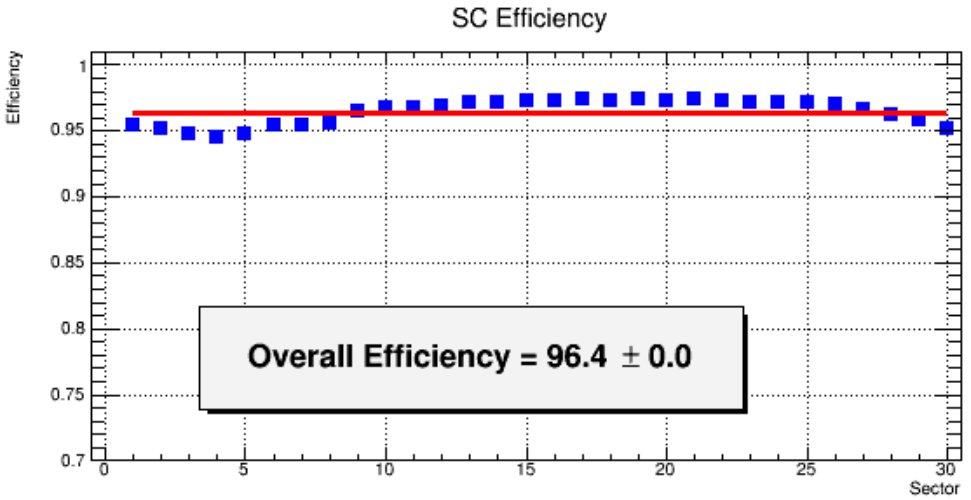


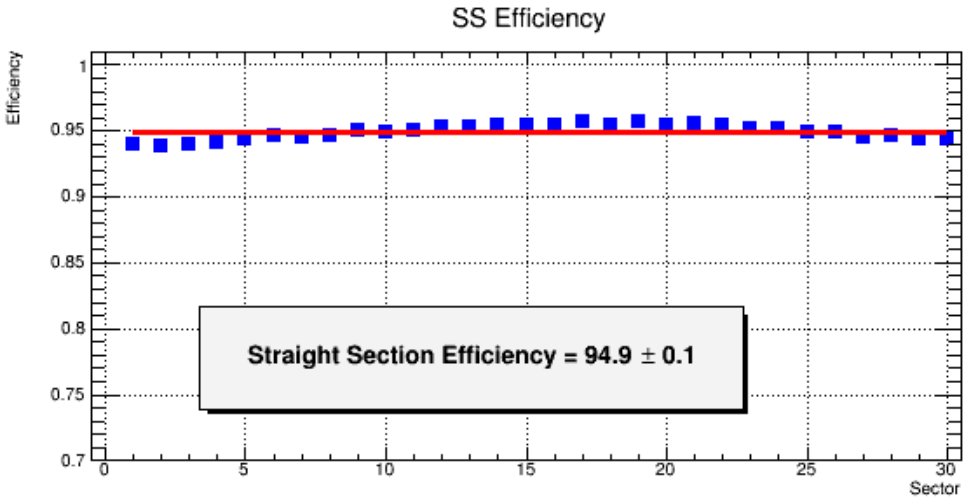


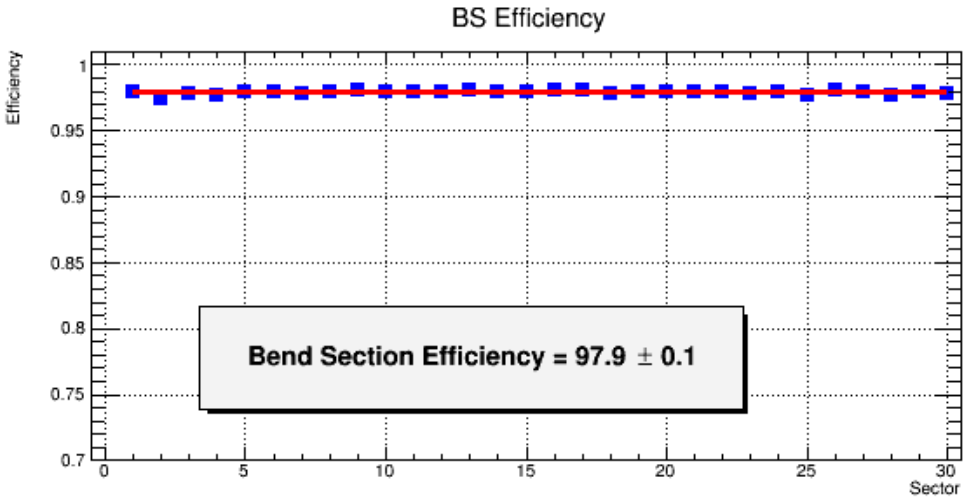


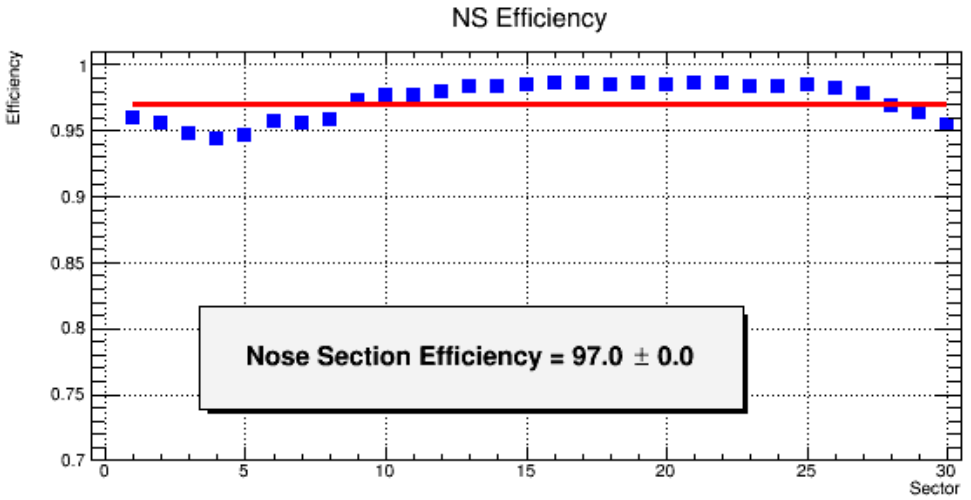
Data

SC hit efficiency with -10/+20 ns Timing cut taking into consideration the nearest paddles



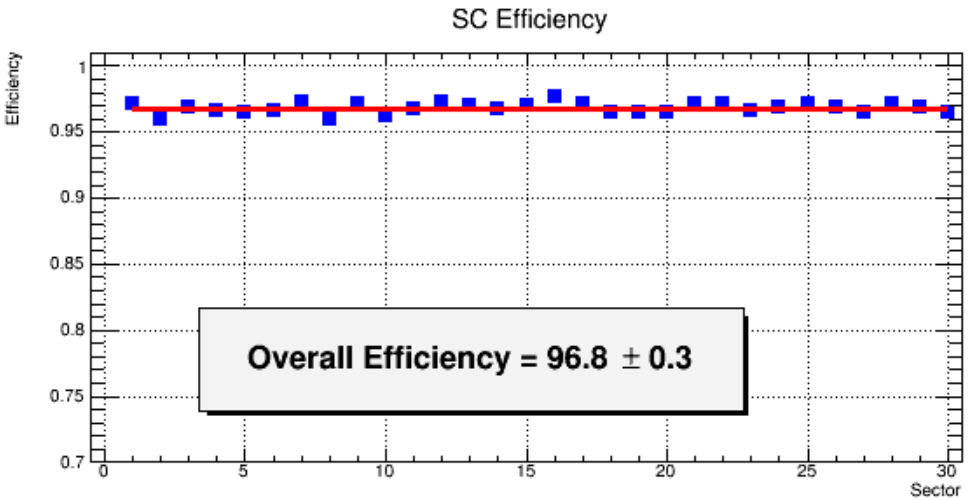


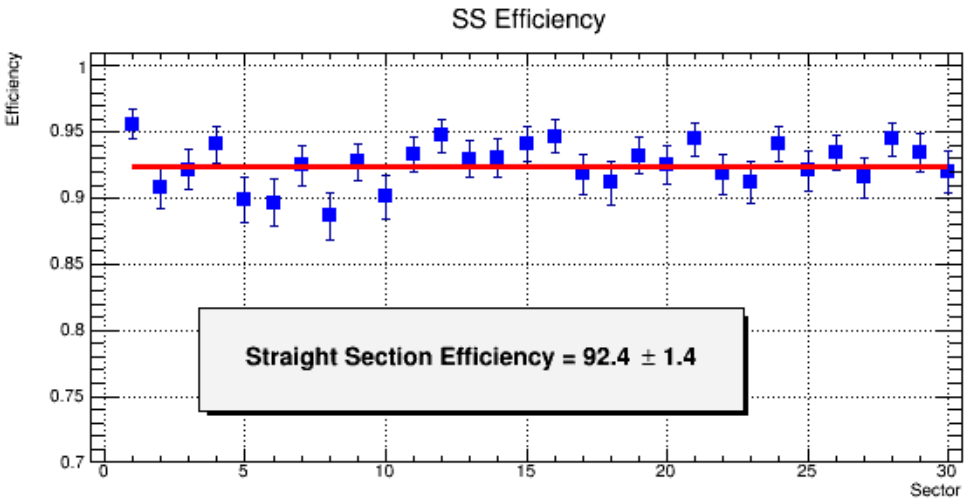


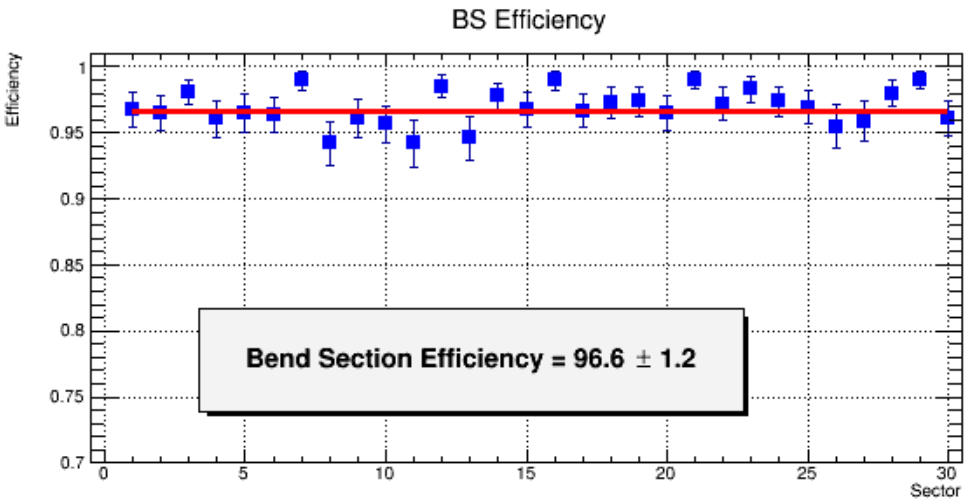


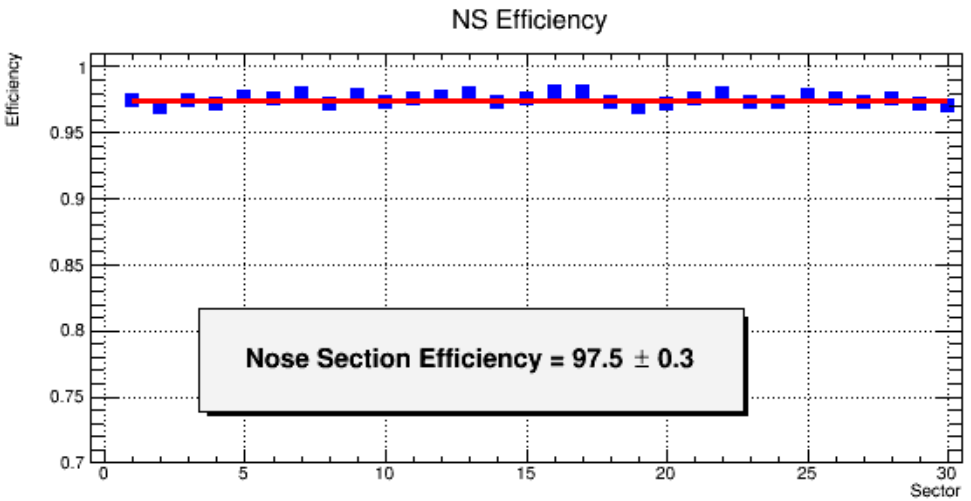
Simulation

SC hit efficiency with -10/+20 ns Timing cut taking into consideration the nearest paddles





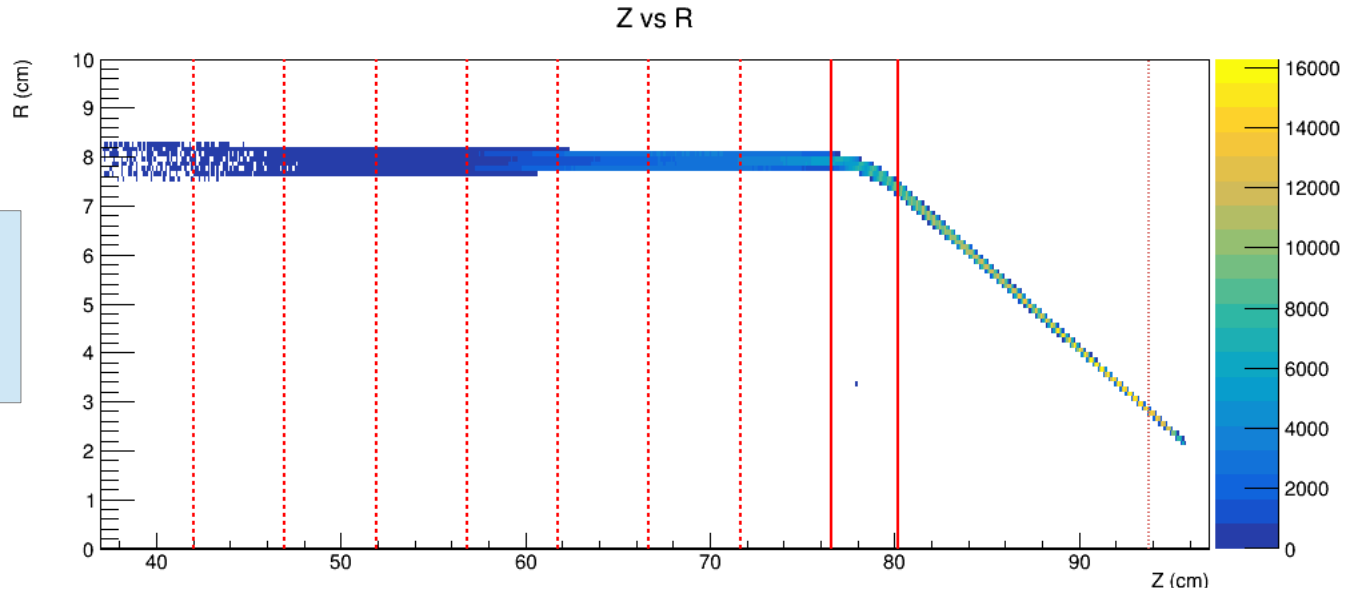




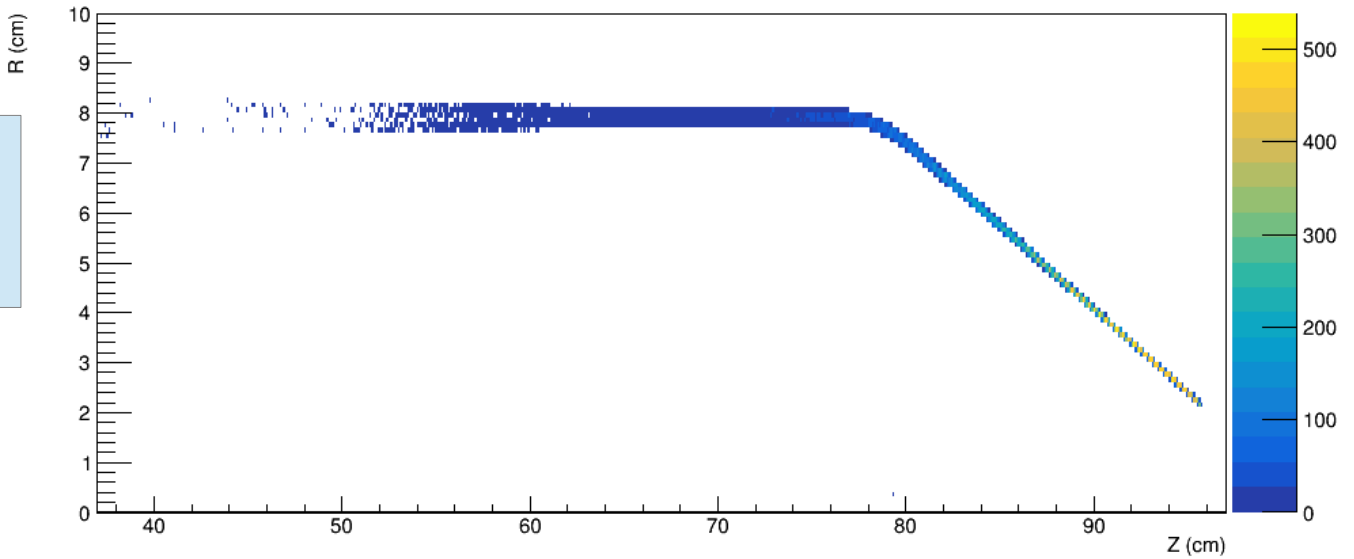
SC efficiency by intervals along Z

Straight section divided into 8 interval of ~5 cm
Bend section is divided into 4 intervals of ~0.9 cm
Nose section is divided into 8 intervals of ~2cm

Data

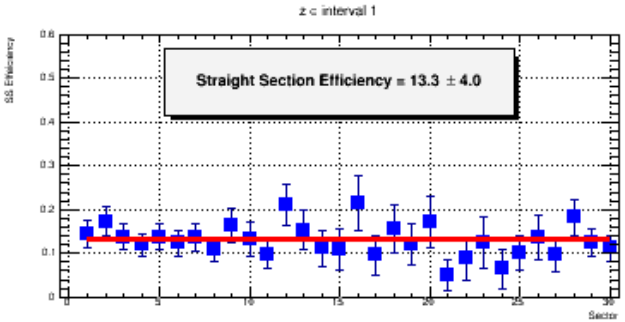


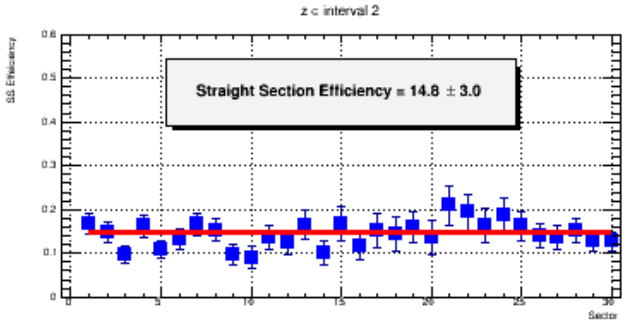
Simulation

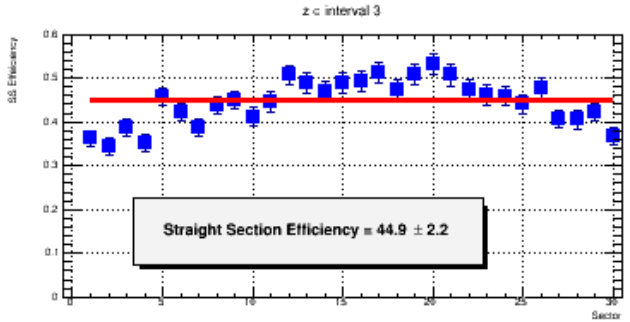


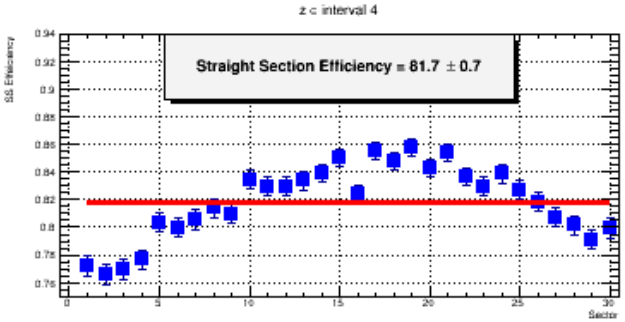
Data

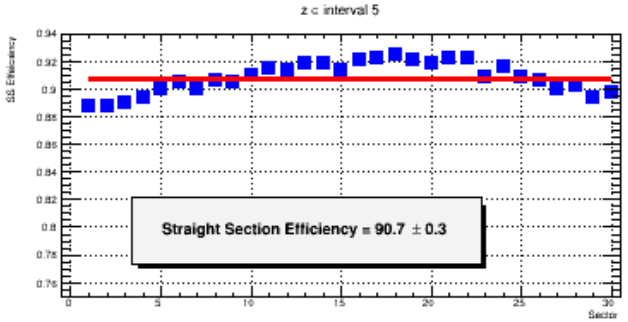
Straight section hit efficiency with -10/+20 ns Timing cut

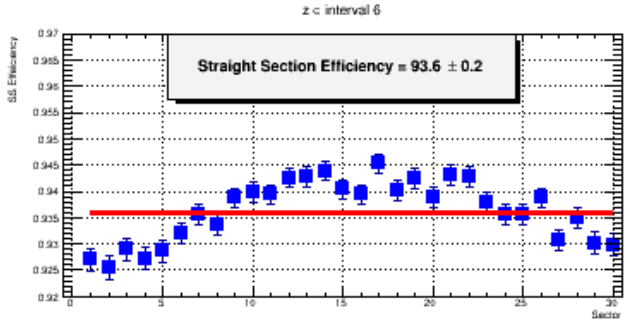


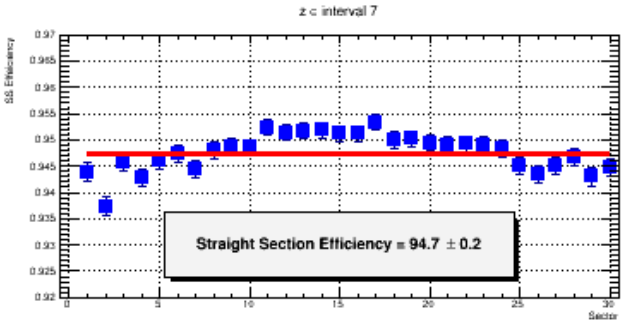


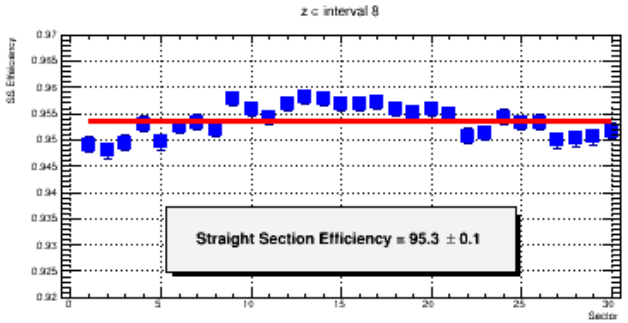






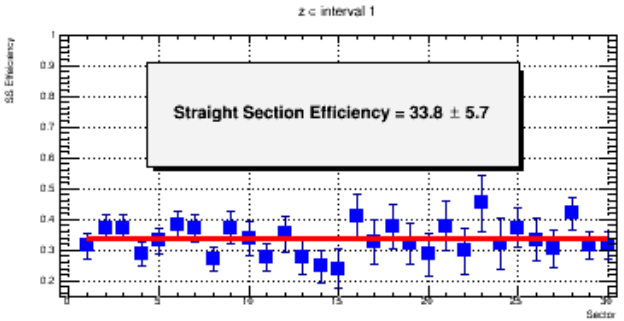


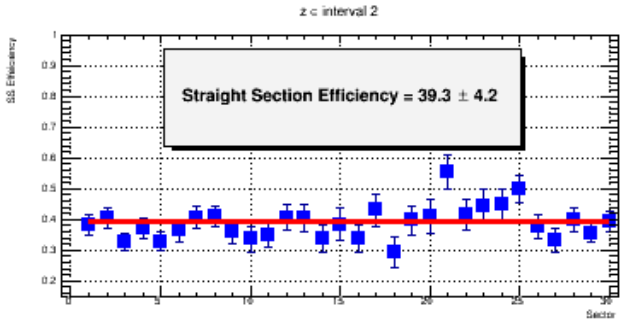


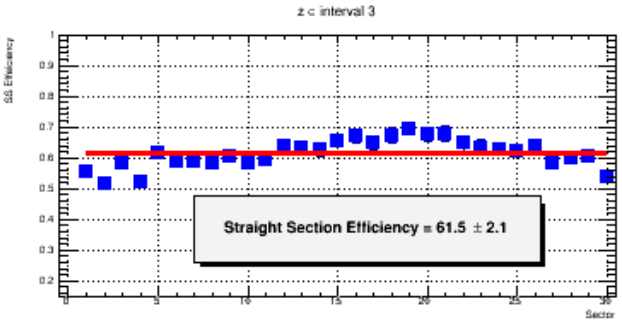


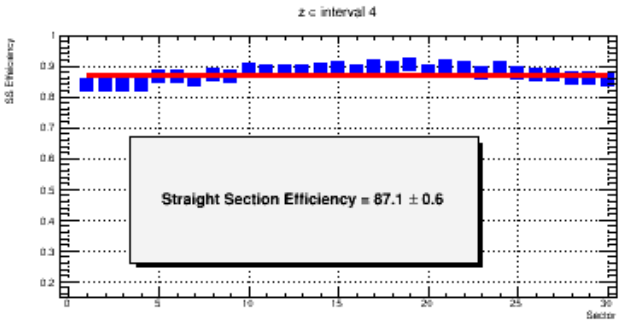
Data

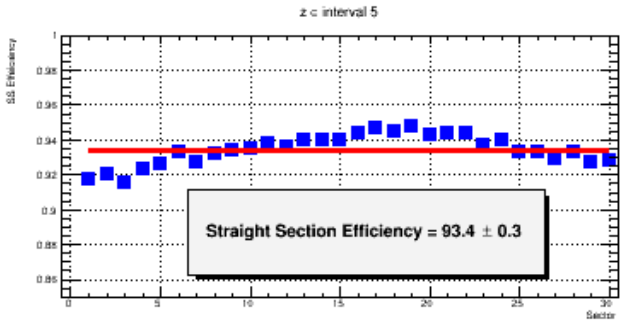
Straight section hit efficiency with -10/+20 ns Timing cut taking into consideration the nearest paddles

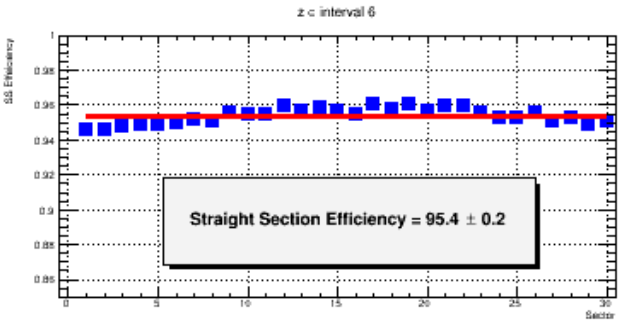


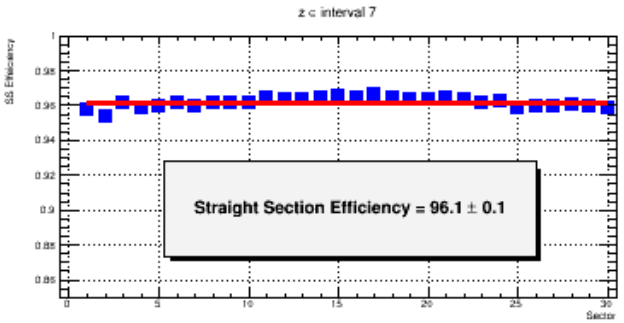


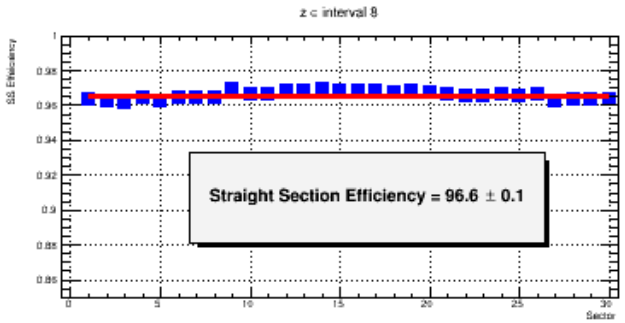






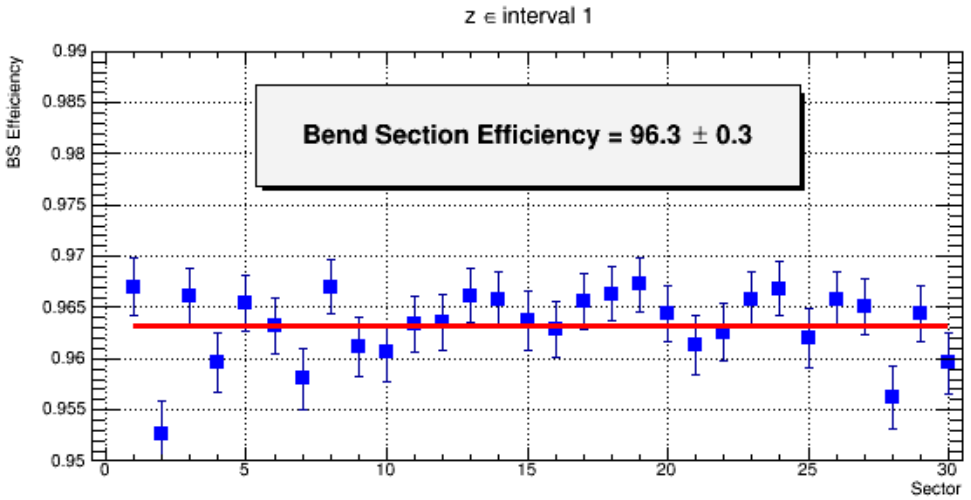


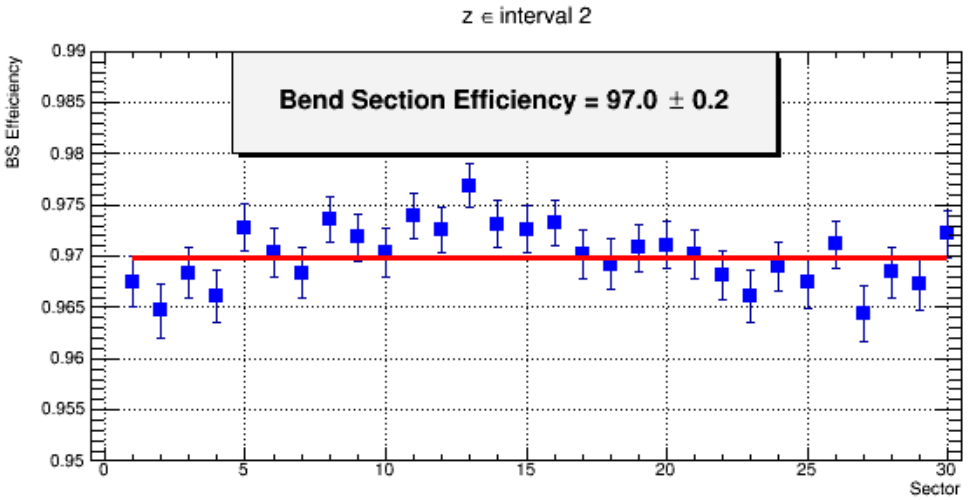


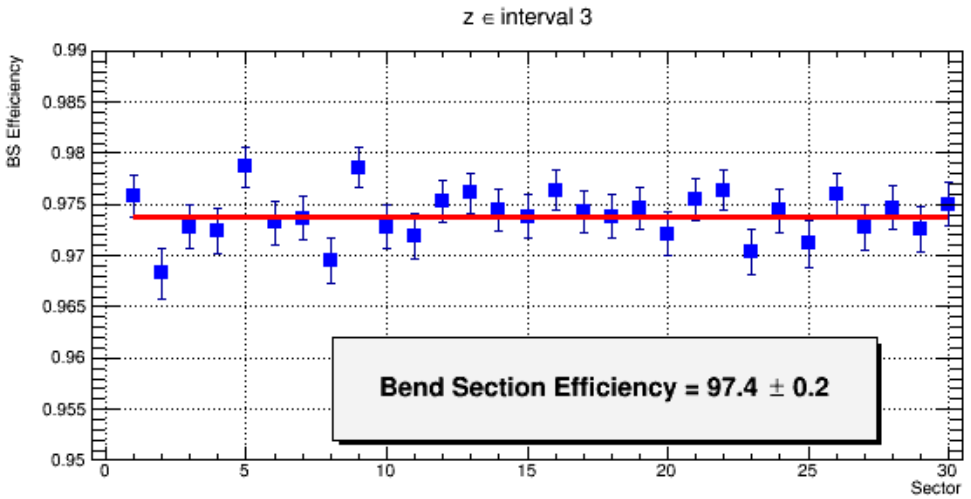


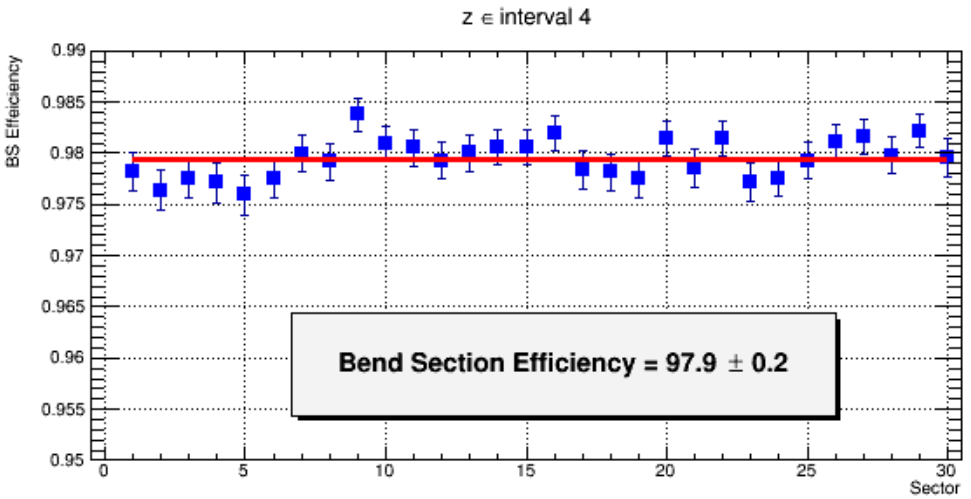
Data

Bend section hit efficiency with -10/+20 ns Timing cut



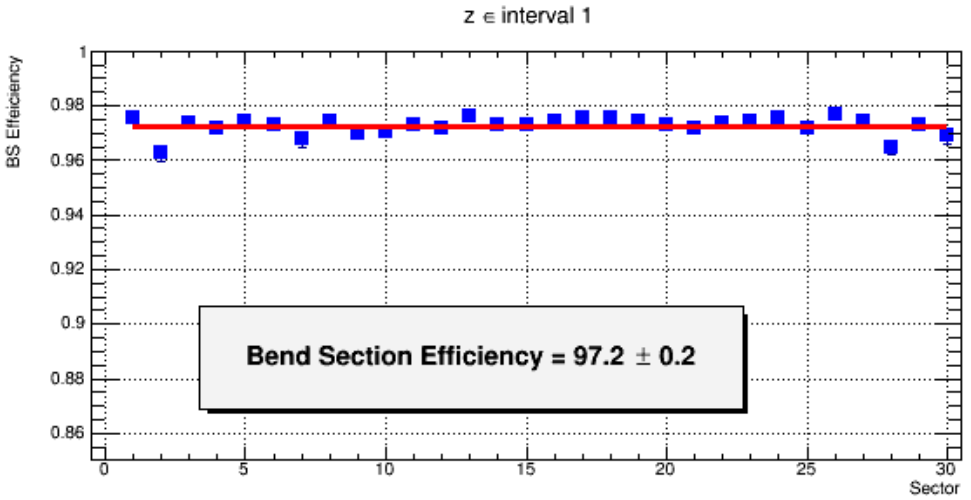


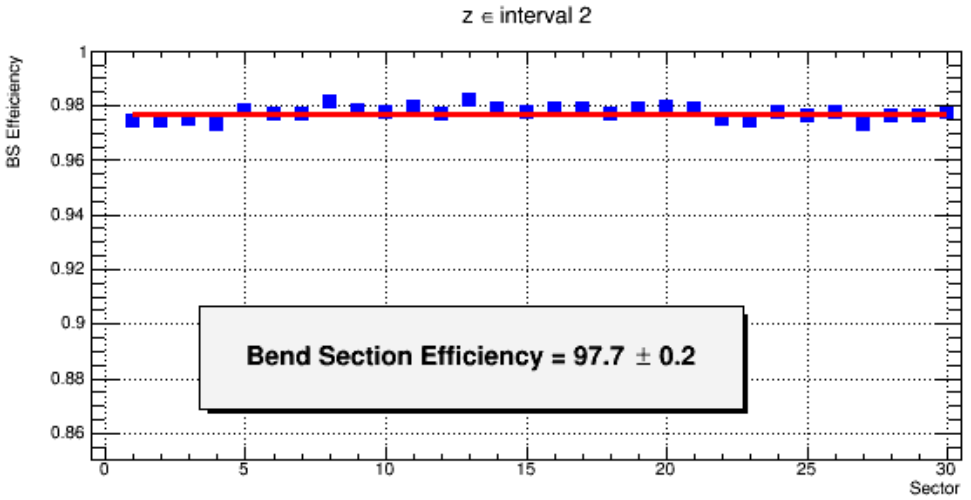


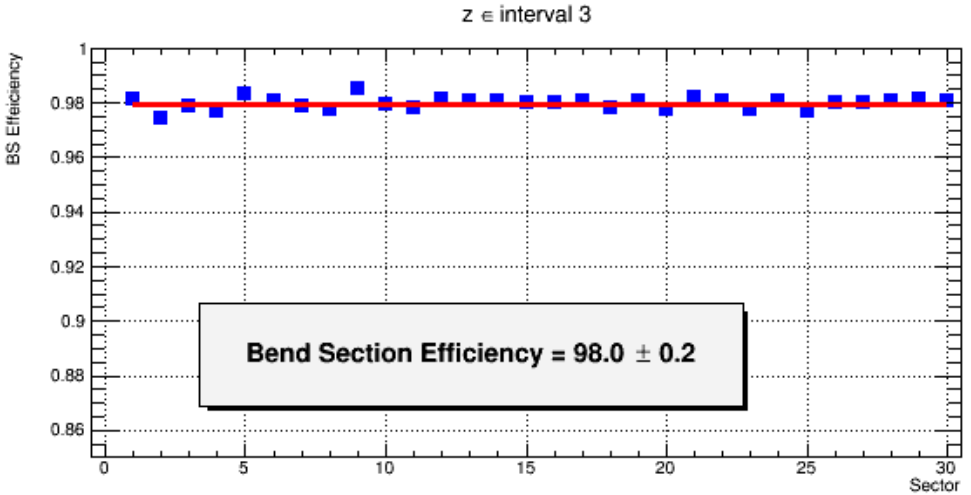


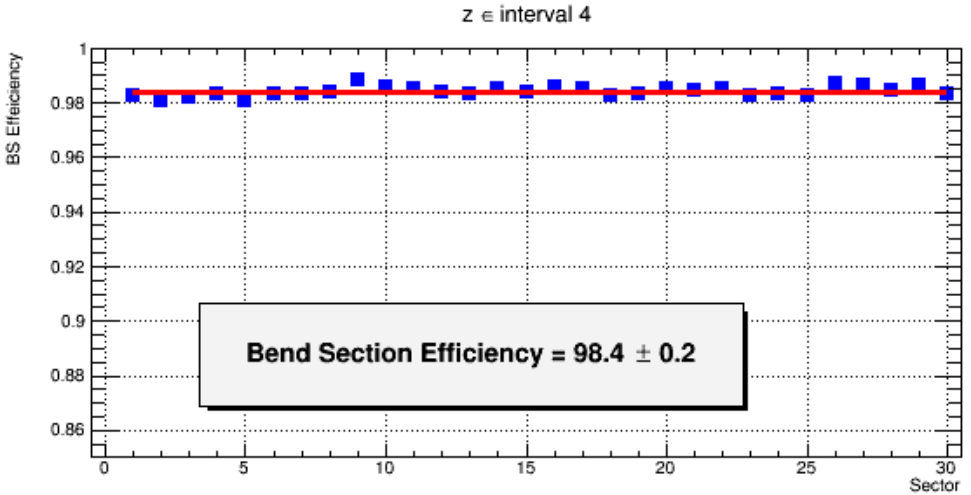
Data

Bend section hit efficiency with -10/+20 ns Timing cut taking into consideration the nearest paddles



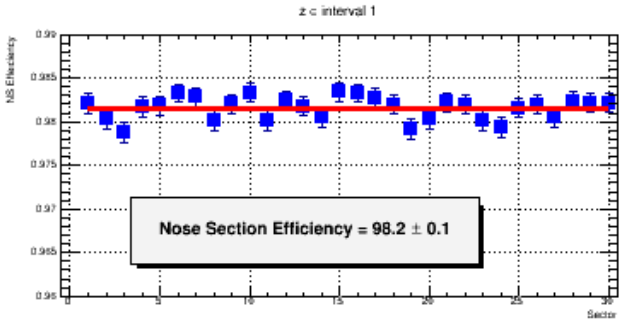


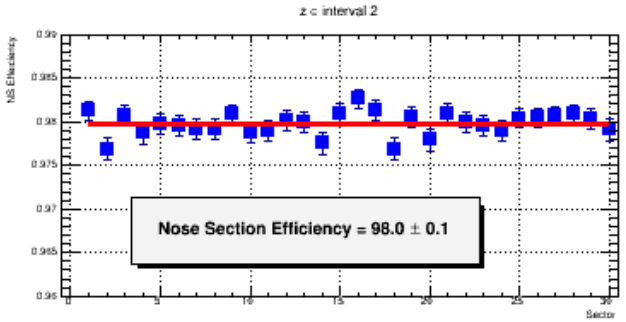


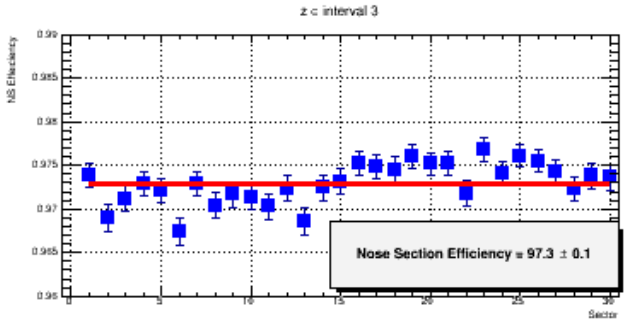


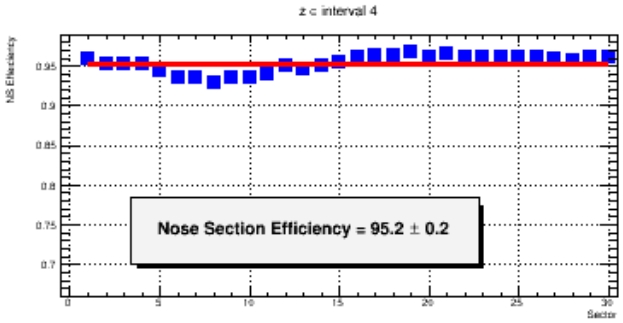
Data

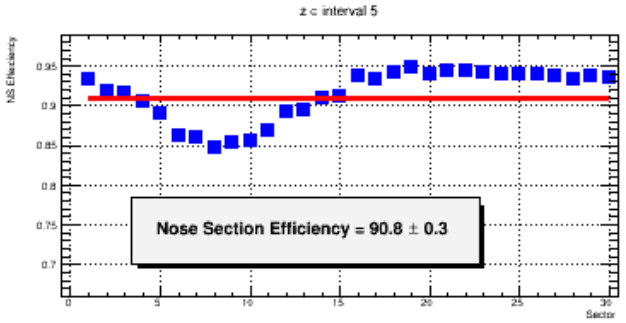
Nose section hit efficiency with -10/+20 ns Timing cut

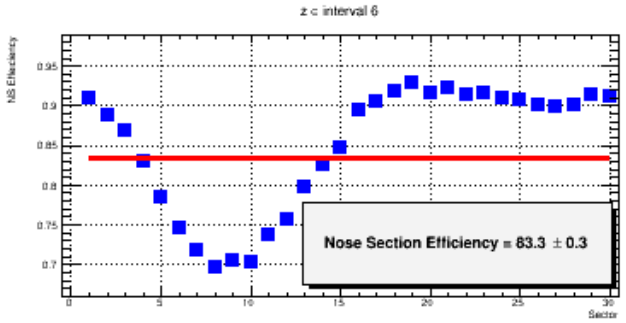


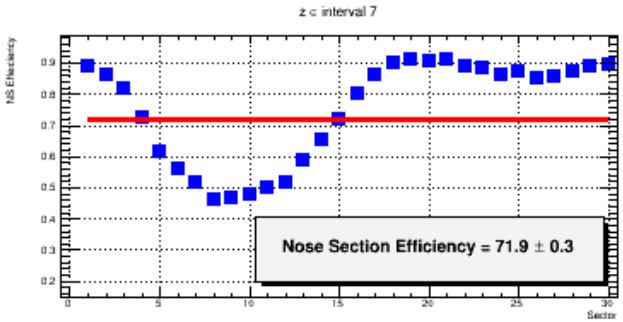


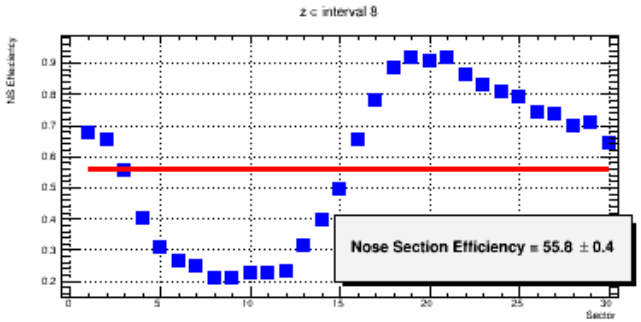












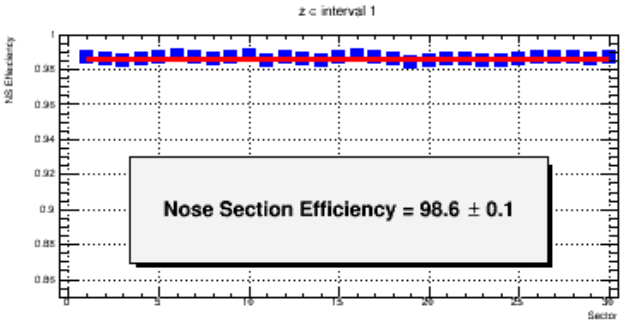
FIU FLORIDA INTERNATIONAL UNIVERSITY

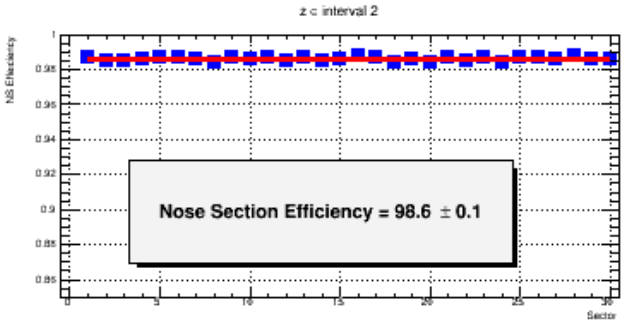
GLUEX

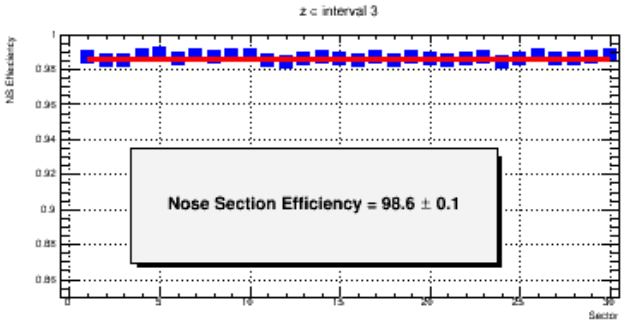
Jefferson Lab

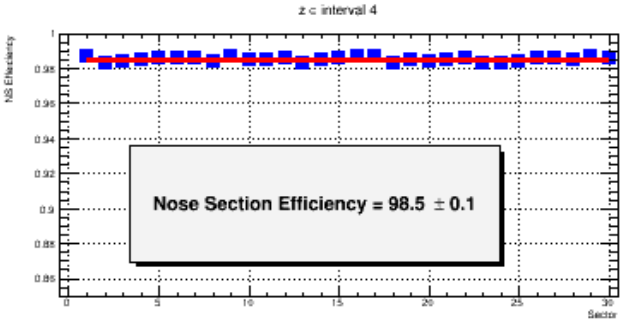
Data

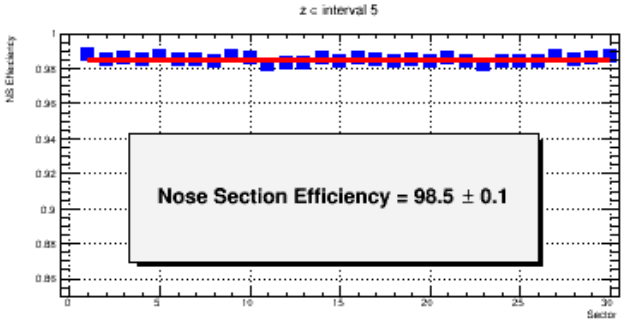
Nose section hit efficiency with -10/+20 ns timing cut taking into consideration the nearest paddles

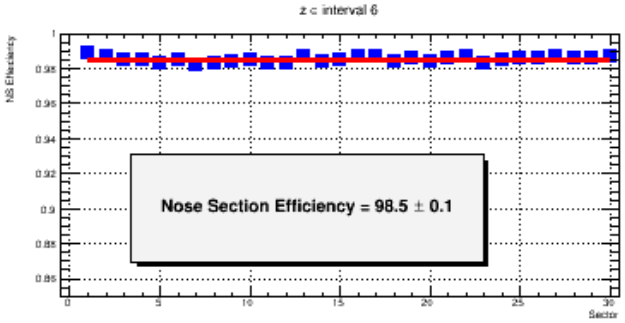


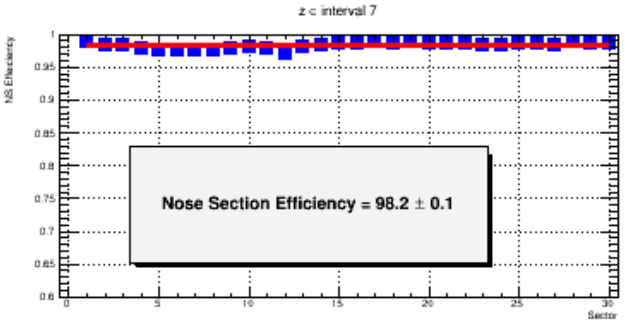


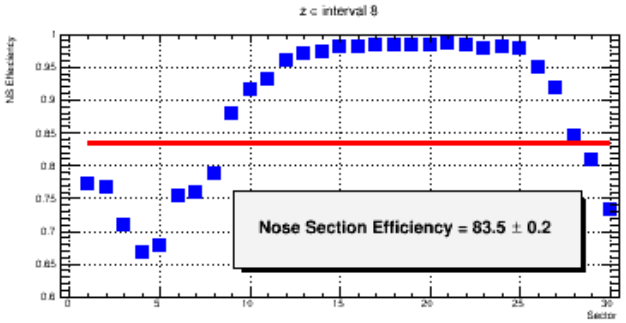






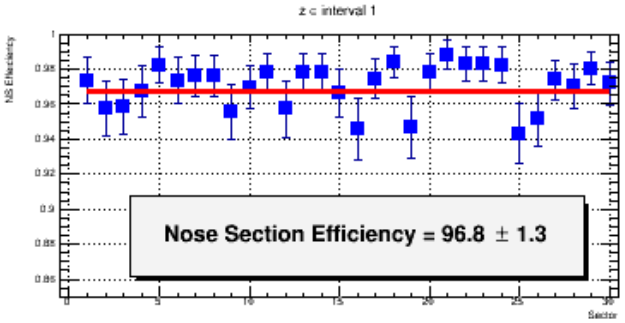


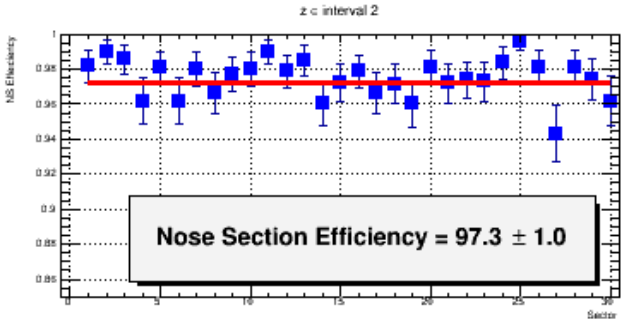


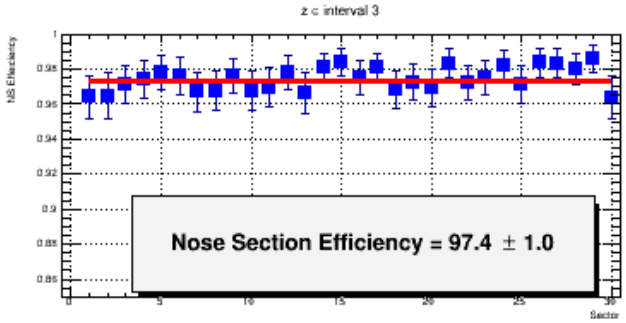


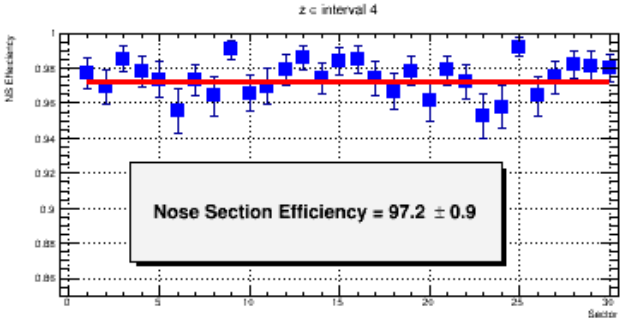
Simulation

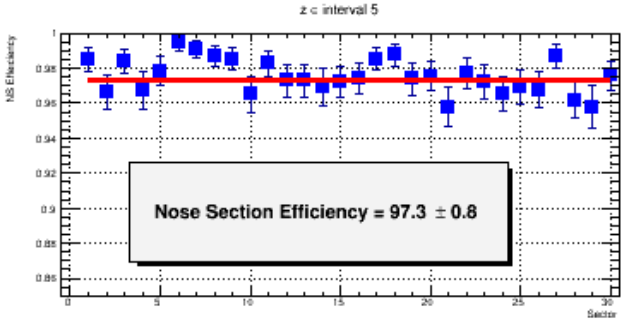
Nose section hit efficiency with -10/+20 ns timing cut taking into consideration the nearest paddles

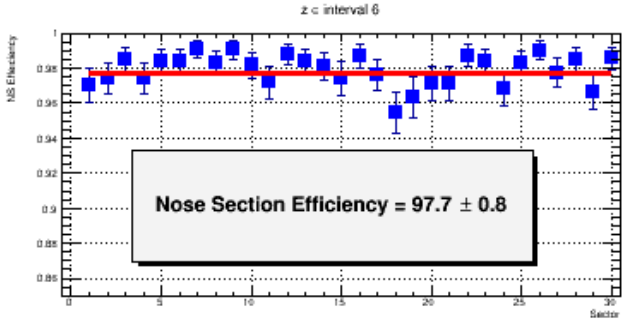


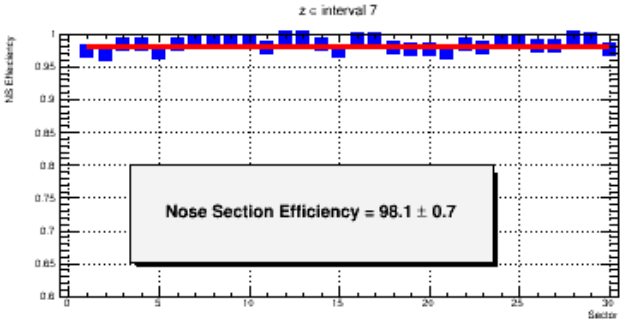


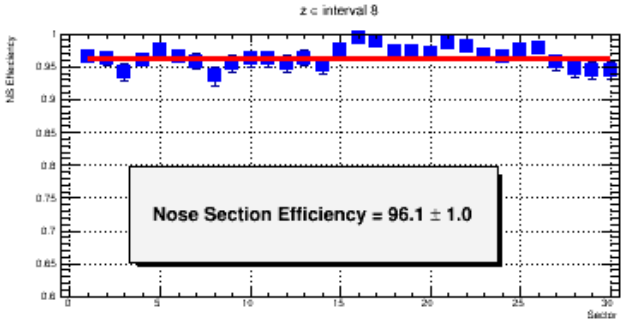










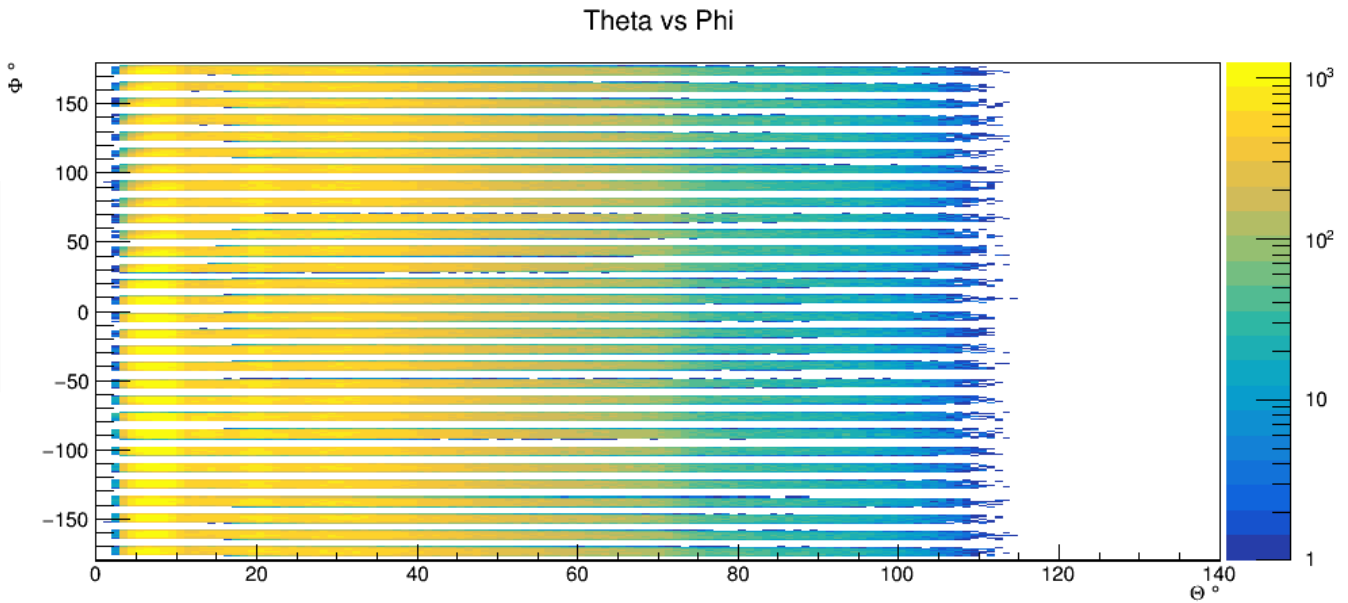


Back Up Slides

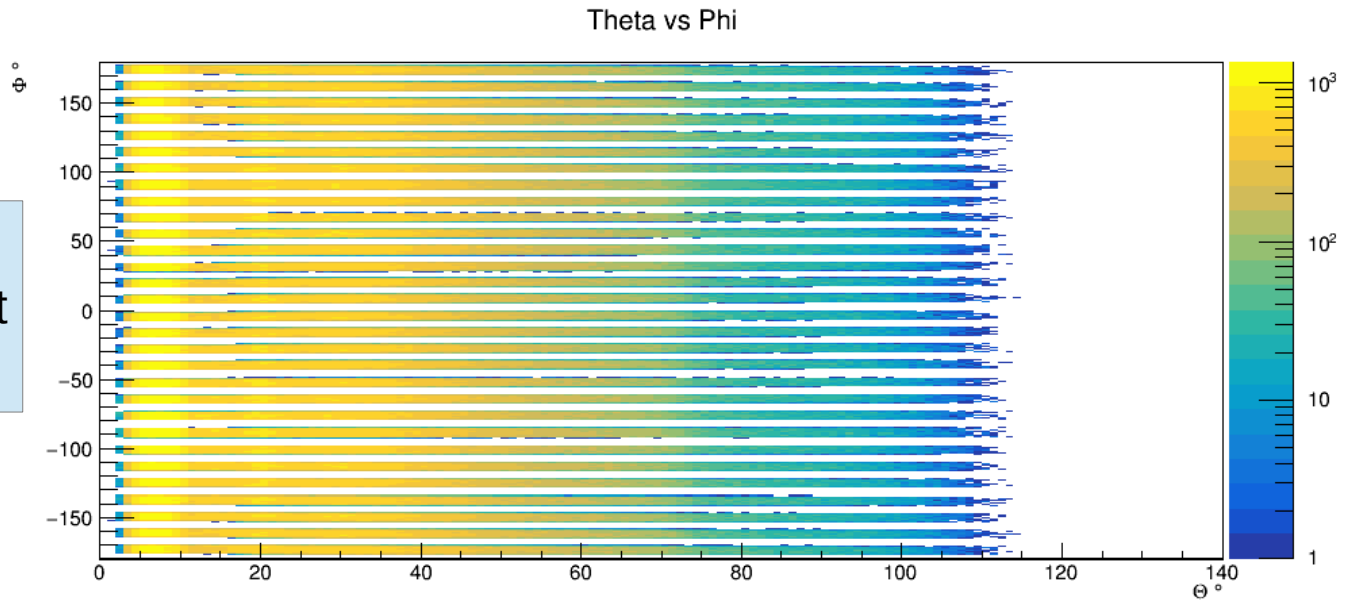
Data

Track momentum theta Vs Phi of the track intersection with SC

Same



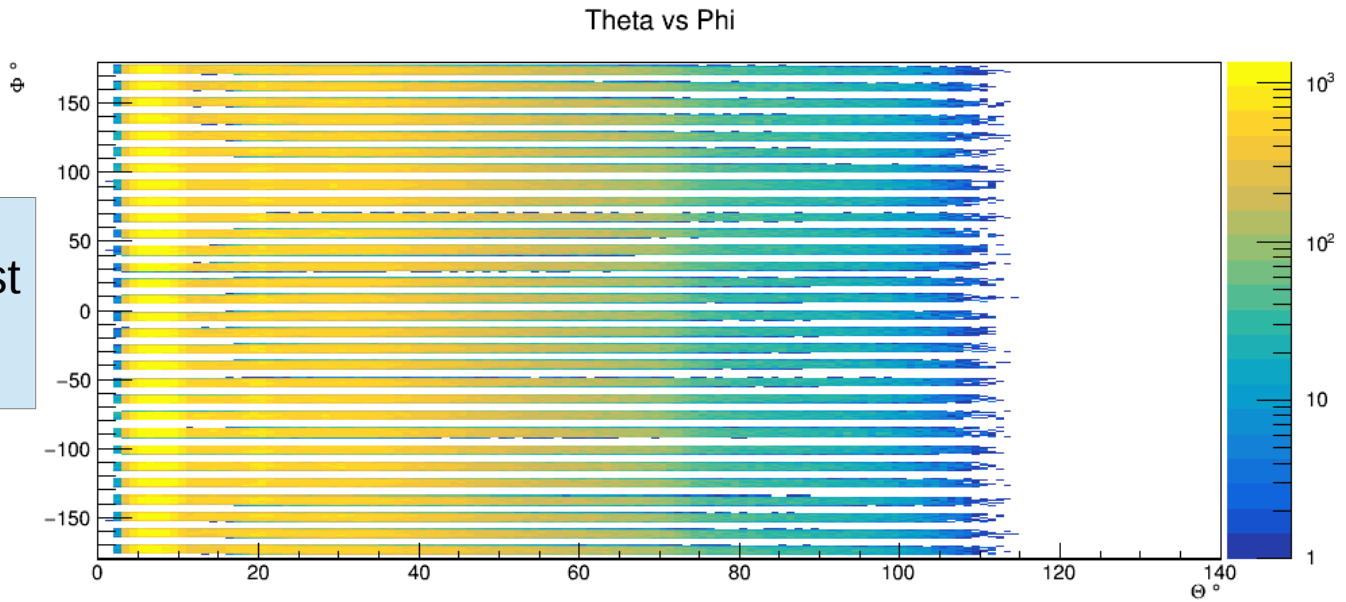
Same or nearest



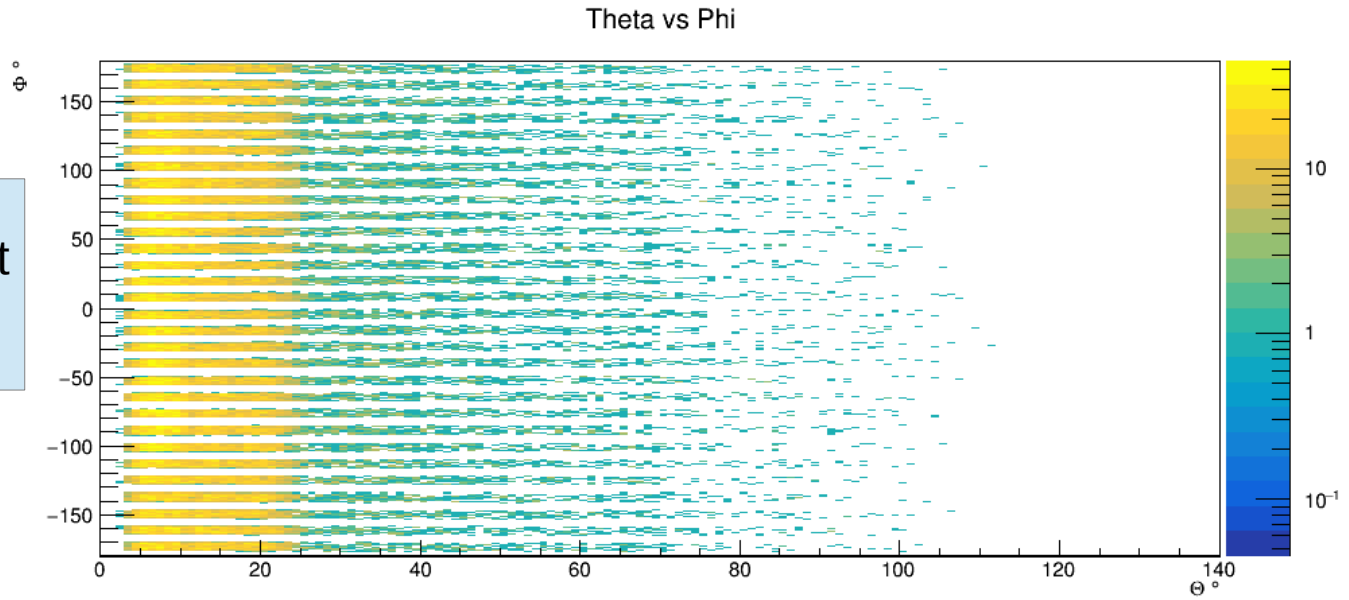
Data and Simulation

Track momentum theta Vs Phi of the track intersection with SC

Same or nearest Data

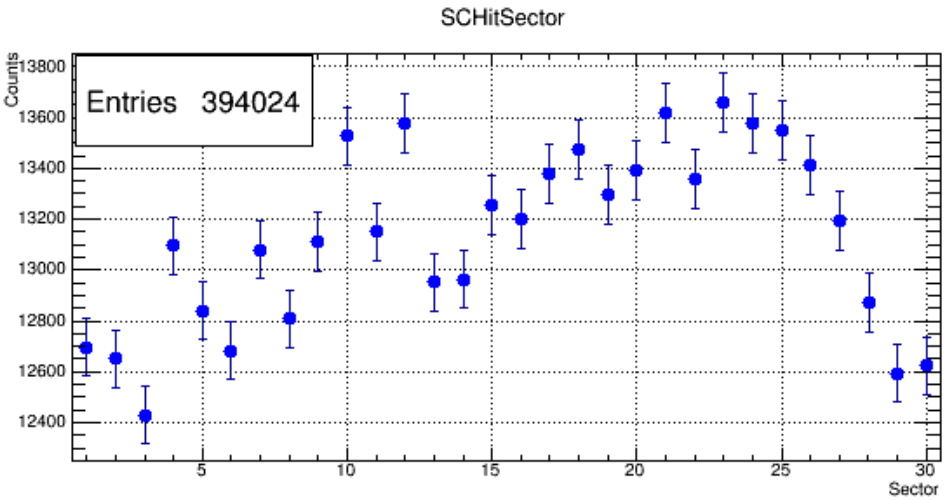


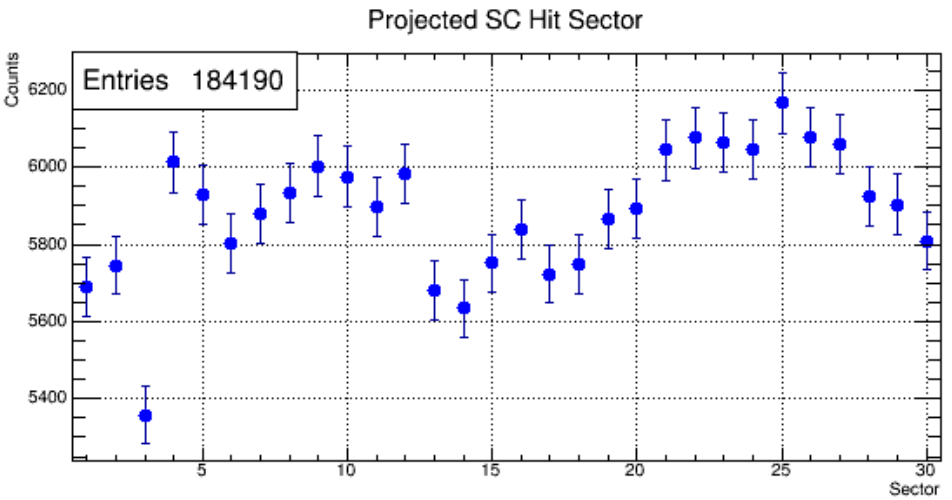
Same or nearest Simulation

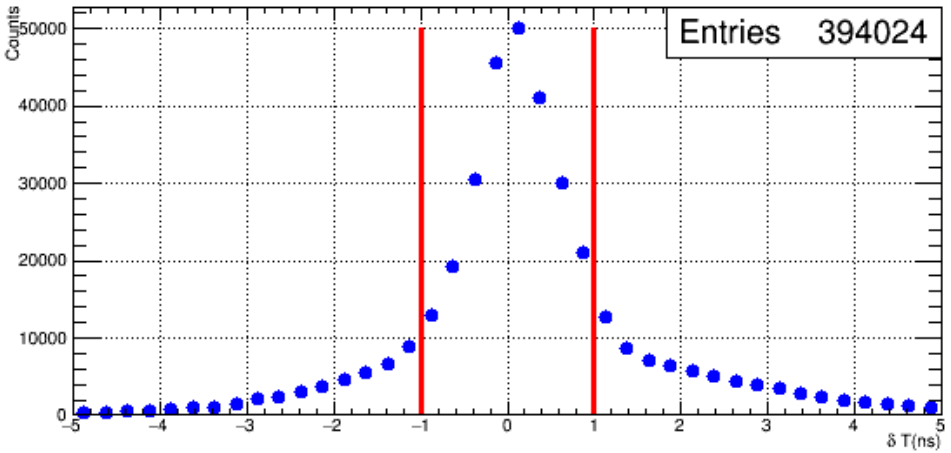


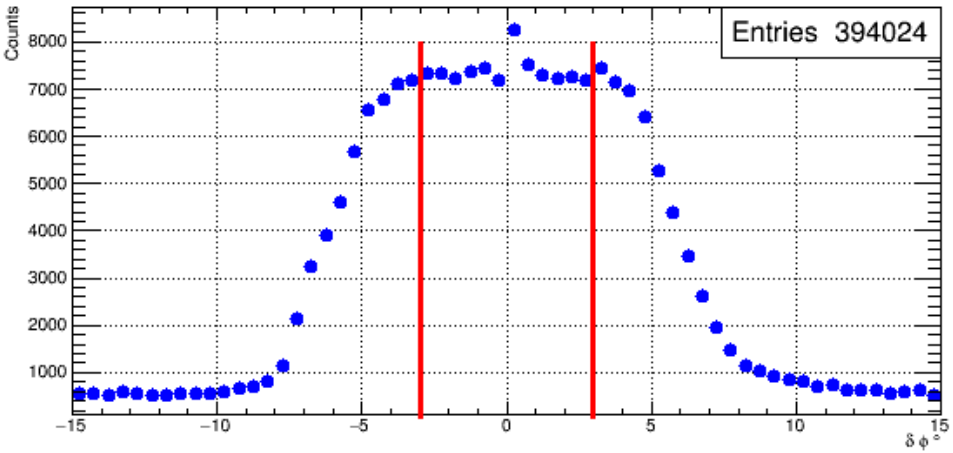
Data

1 file of run 11366 from the tree created in the reconstruction launch



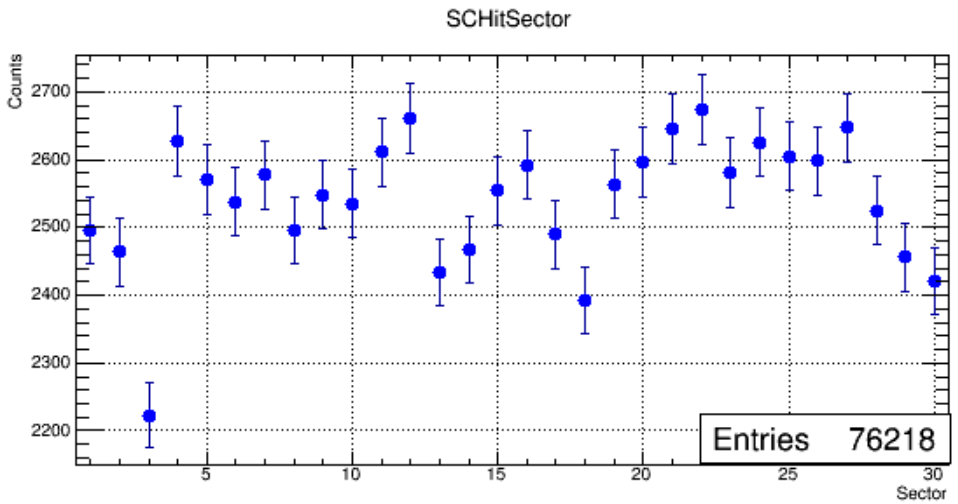


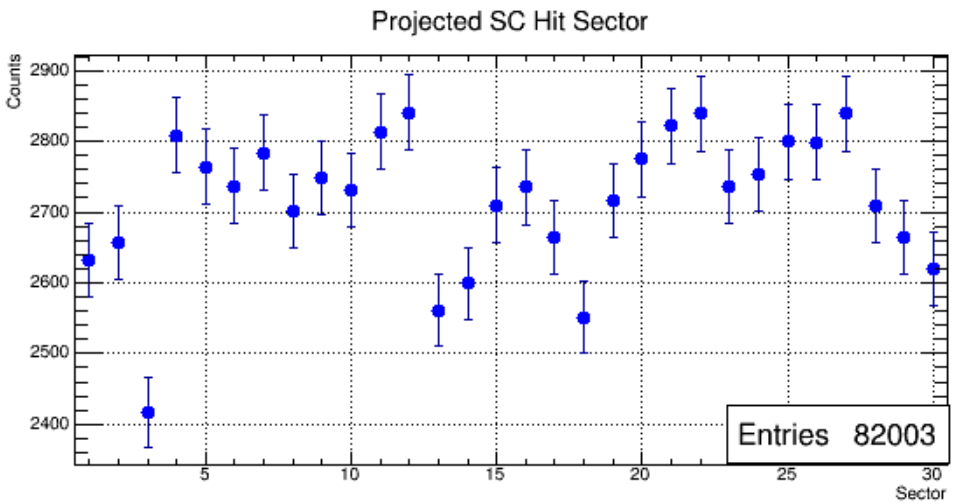


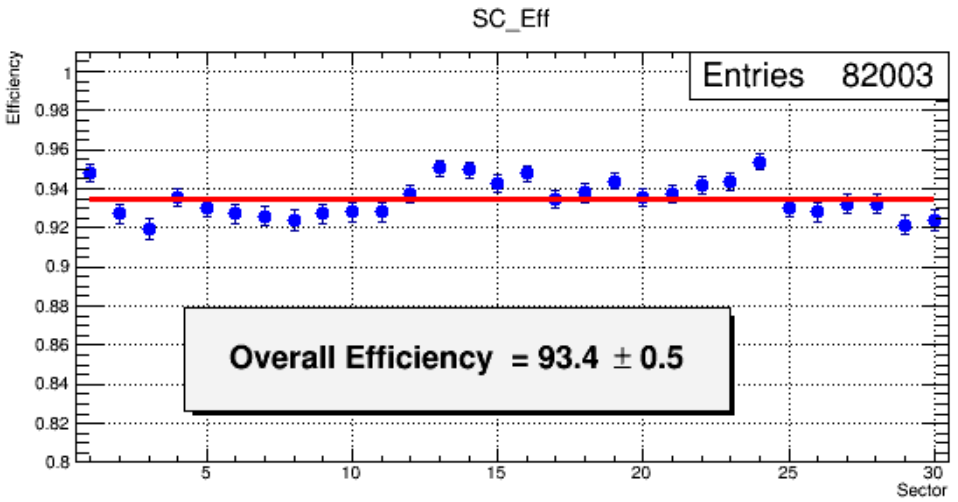


Data

Calculating the efficiency with $\delta\varphi$ cut = $\pm 3^0$

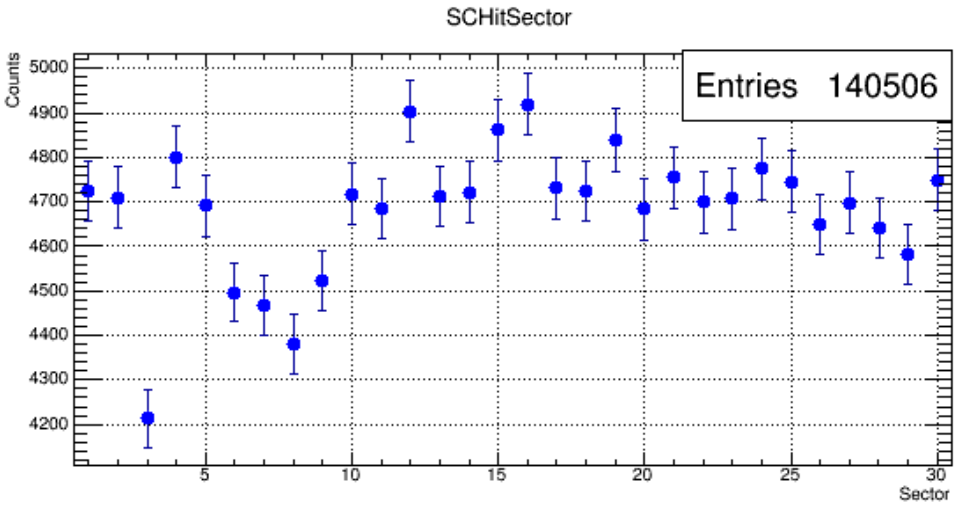


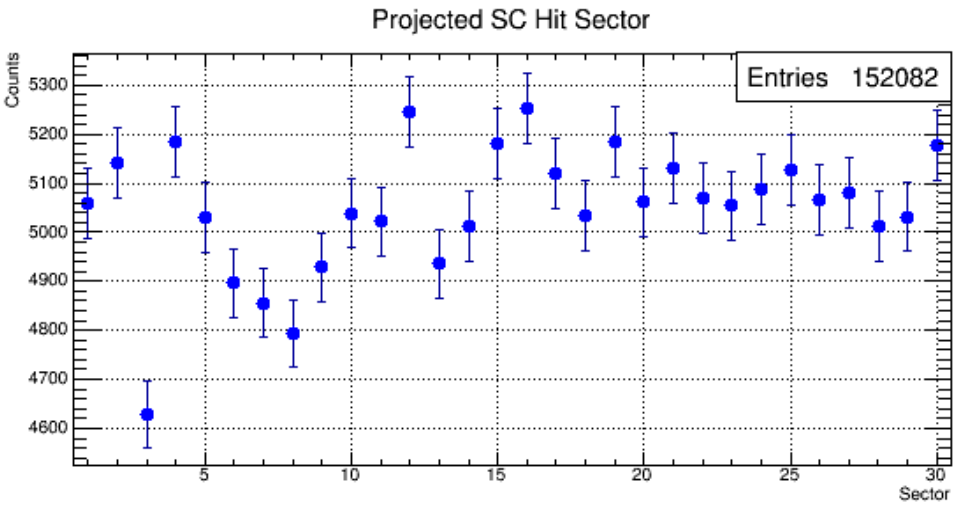


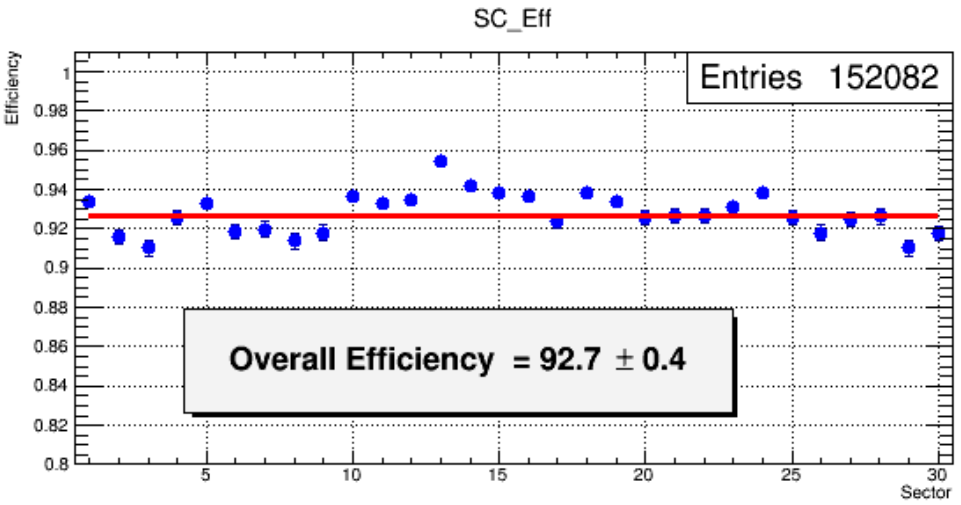


Data

Calculating the efficiency with $\delta\varphi$ cut = $\pm 6^0$







Data

Calculating the efficiency with $\delta\varphi$ cut = $\pm 12^0$