

Status of FDC Geometry Options

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Motivation

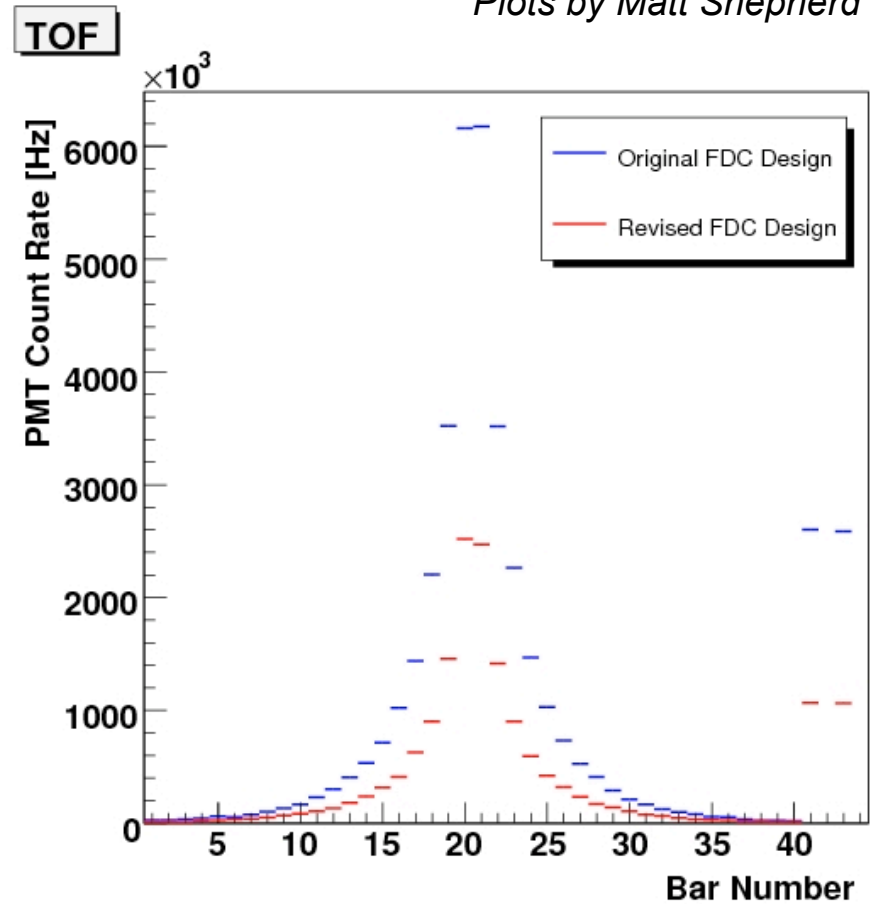
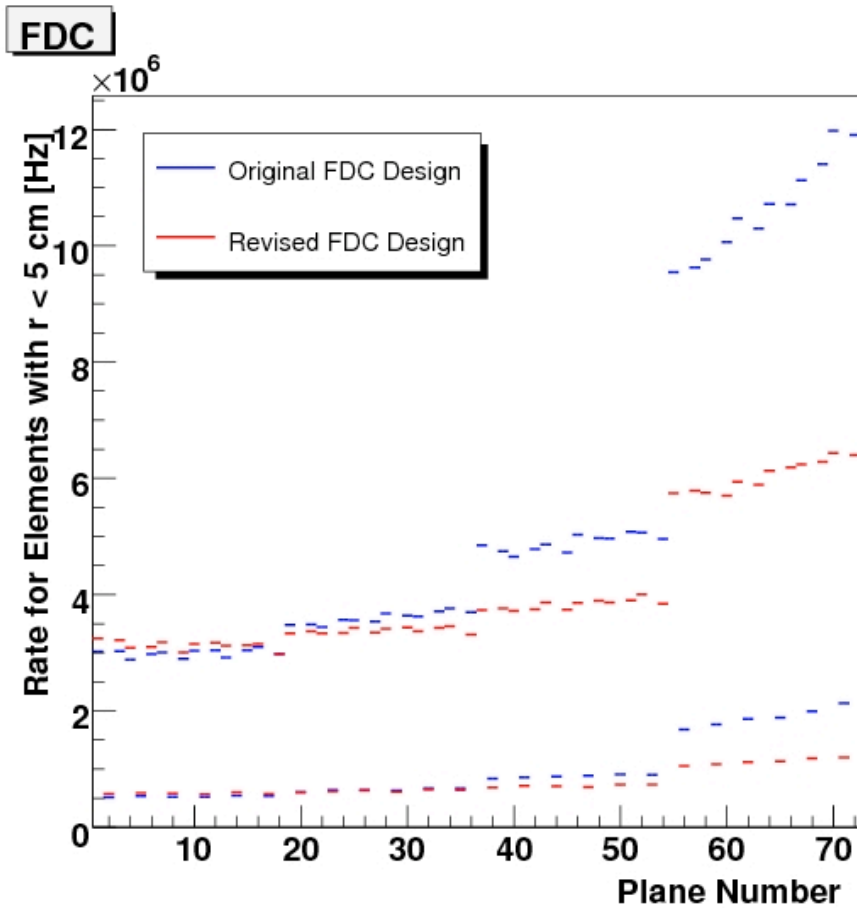
- The committee of the March, 2007 drift chamber review made a strong recommendation to try and reduce the amount of material in the FDC.
- Immediately after, the FDC group began working on new designs to address this recommendation...

Timeline

- May 16 - Richard commits revised FDC geometry to repository
- May 17 - Matt posts new rate studies to wiki based on “Revised FDC Design”
- May 18 - Dan and Simon post 2 options for FDC to the Wiki
- June 1 - David tweaks geometry to “fully” implement options 1 and 2 in hdds
- June 4 - David posts plots of momentum resolution for FDC geometry options to Wiki
- June 5 - Mihajlo presents results of clustering efficiency in FCAL for 2 options. Things look funny and Richard is asked to have a look

Background Rate Studies

Plots by Matt Shepherd

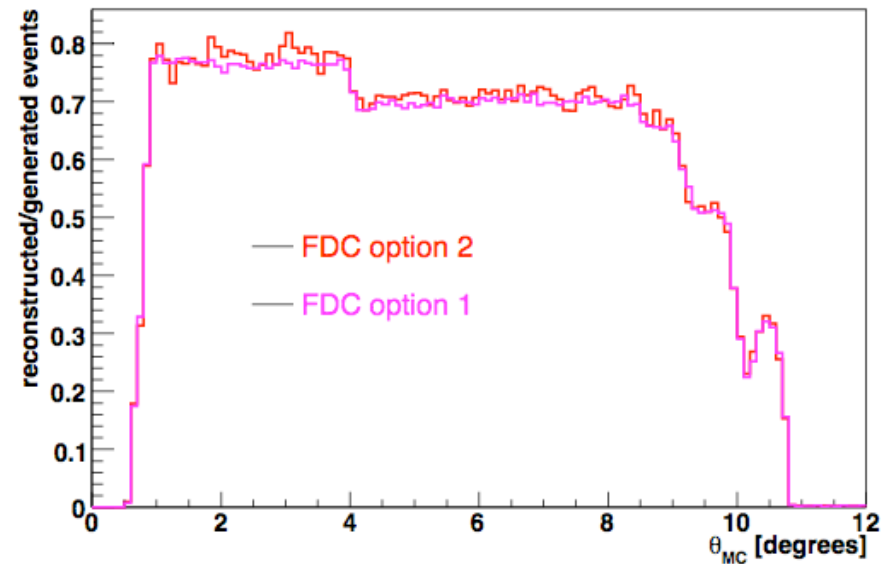
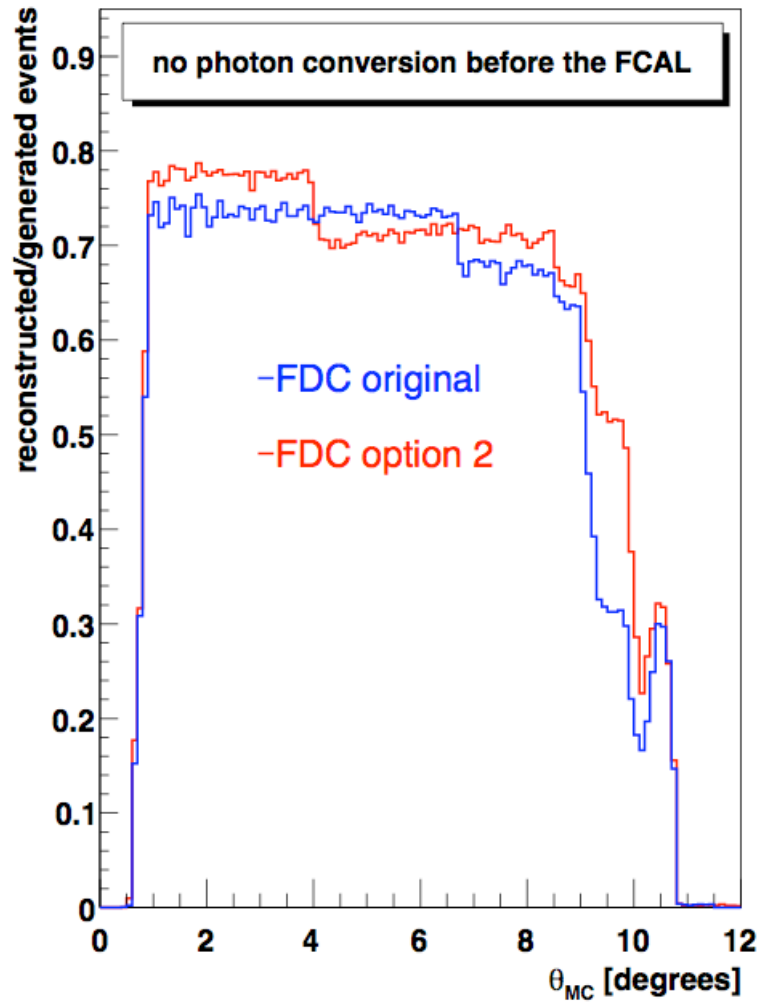


FCAL Efficiency

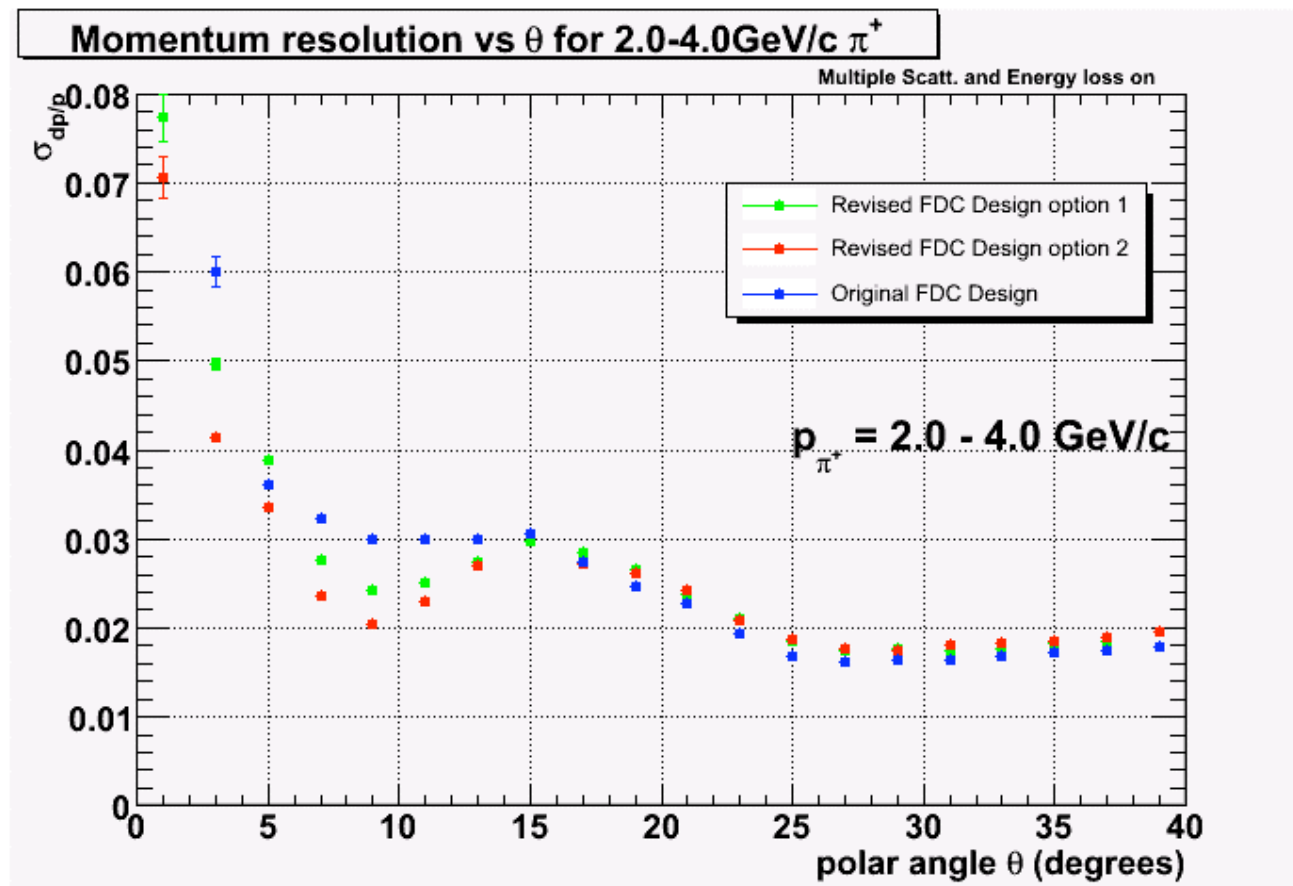
(with bug)

Plots by Mihajlo Kornicer

Single cluster reconstruction efficiency



Momentum Resolution (with bug, no Lorentz effect)

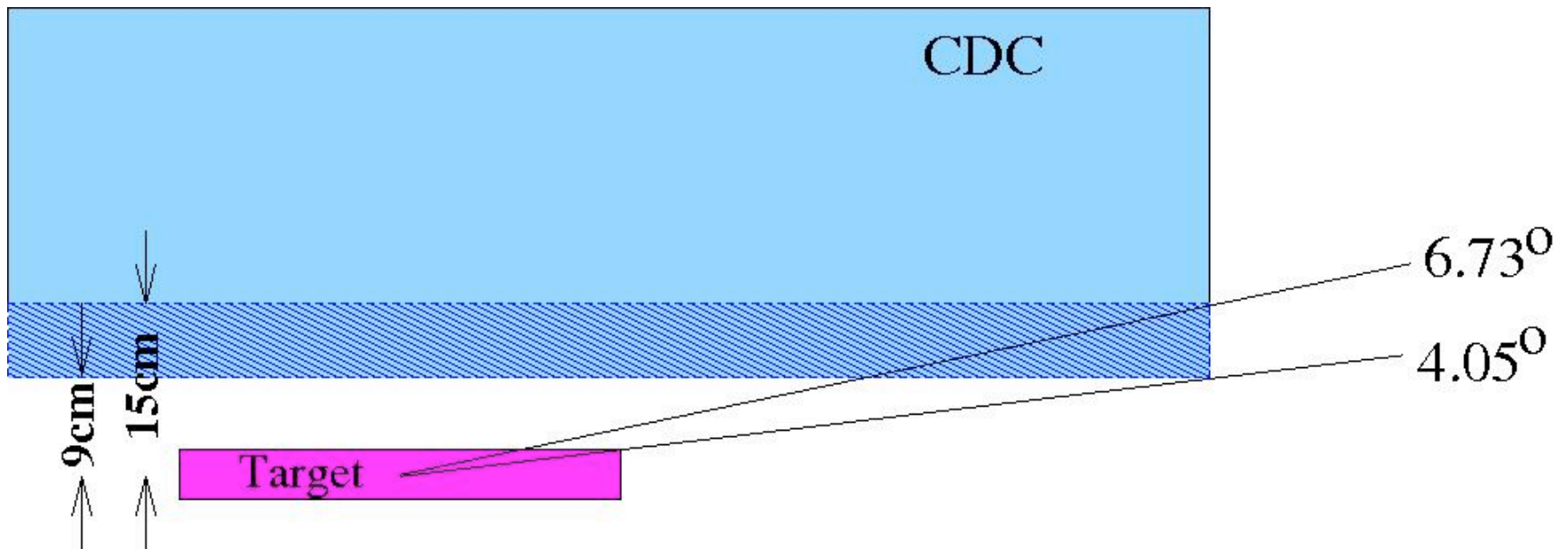


Plot by David Lawrence

Timeline

- June 15 - Richard commits geometry changes to repository. Radiation Scans are posted to the wiki
- June 25 - Matt asks about status and Richard responds that “Bugs were found, the corrections applied, and corrected geometry validated”
- June 26 - David asks Mihajlo to repeat photon conversion studies
- June 29 - Mihajlo uploads new plots to Wiki (not shown at a meeting)
 - http://www.jlab.org/Hall-D/software/wiki/index.php/Image:20070728_photon_efficiency.gif
 - http://www.jlab.org/Hall-D/software/wiki/index.php/Image:20070628_photon_conversion.gif

“The Bug”



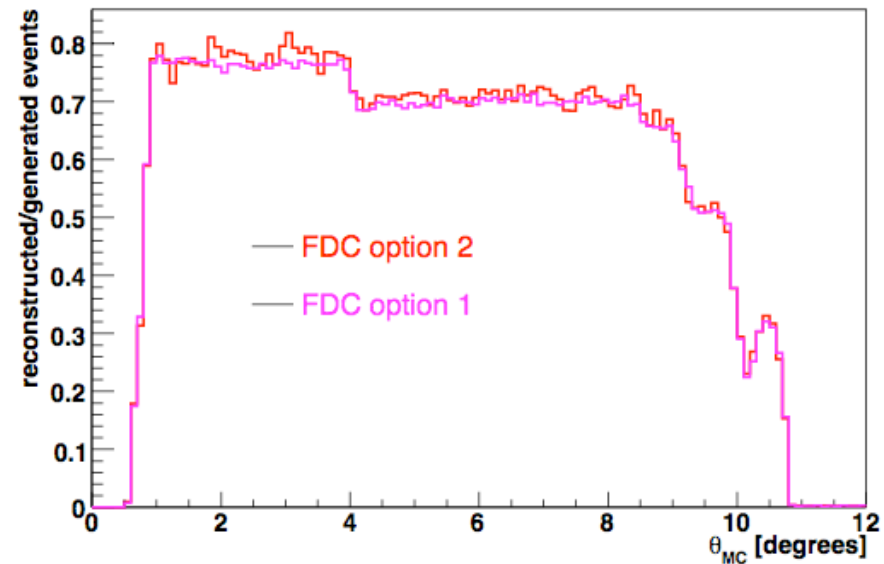
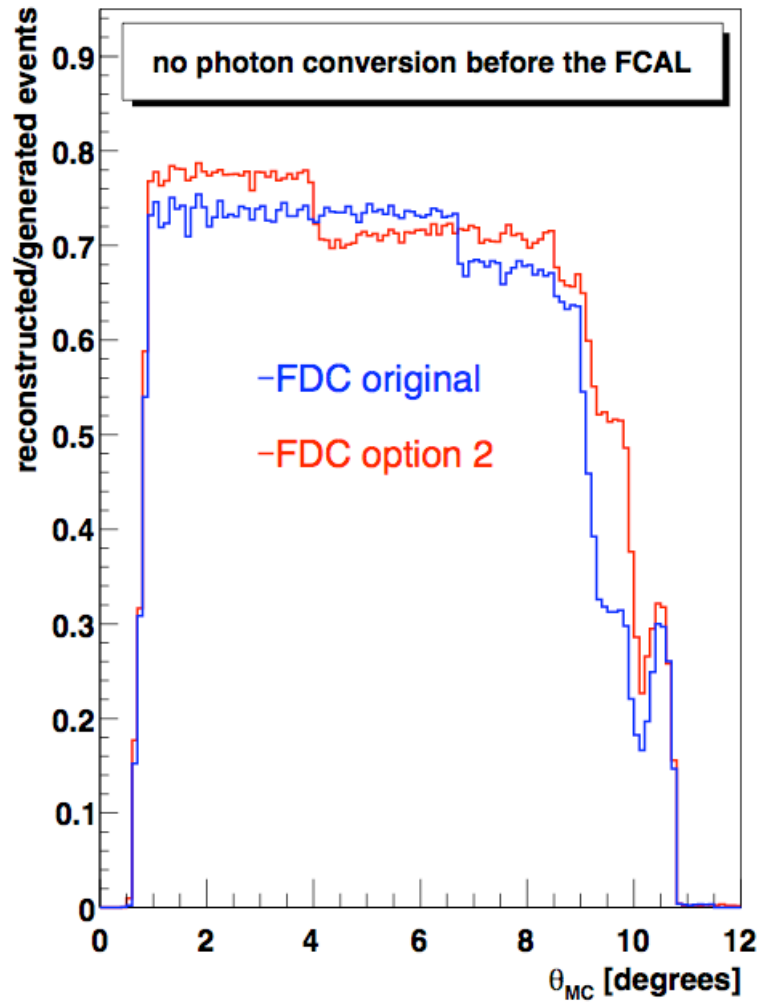
The bug was that the inner radius of the CDC was set at 9 cm instead of 15 cm. This placed additional material in the detector for tracks between 4.05 and 6.73 degrees.

FCAL Efficiency

(with bug)

Plots by Mihajlo Kornicer

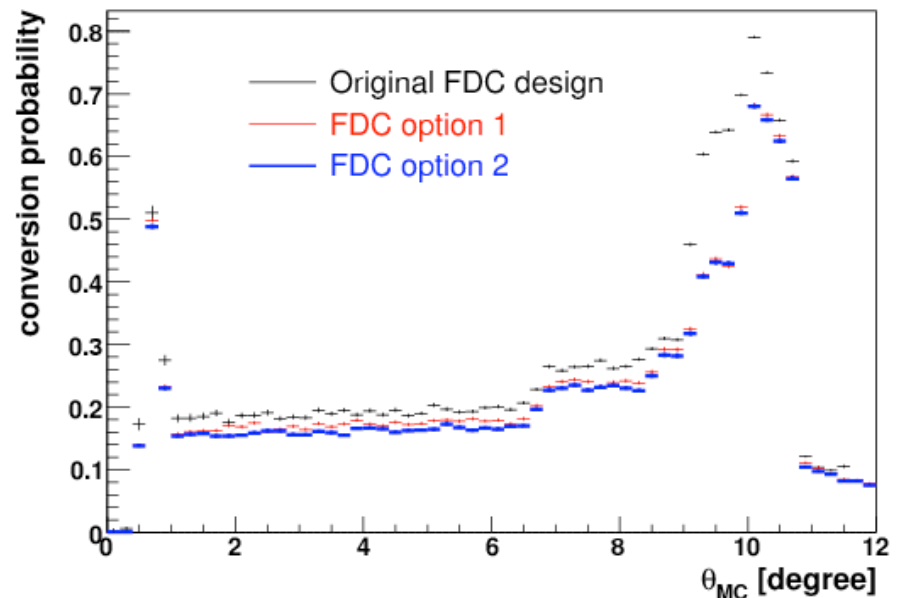
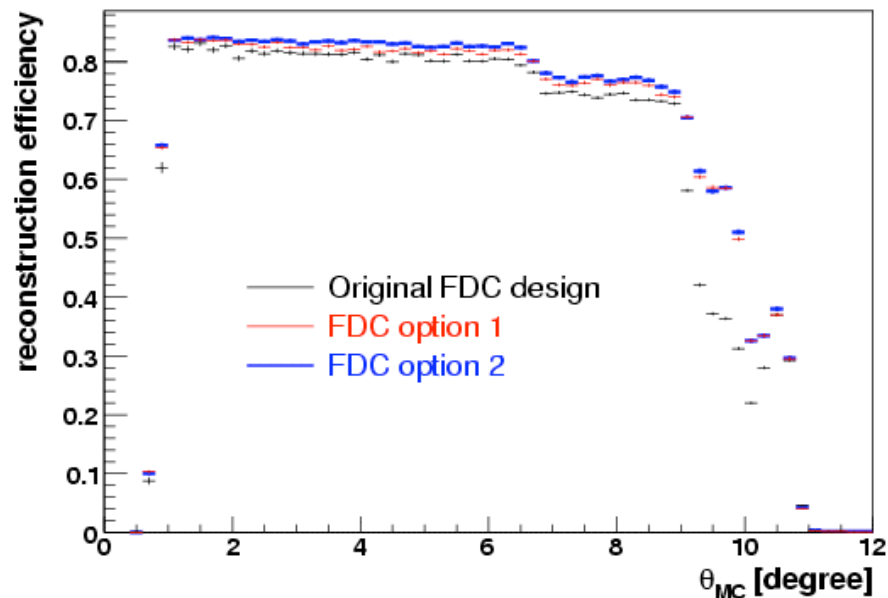
Single cluster reconstruction efficiency



FCAL Efficiency

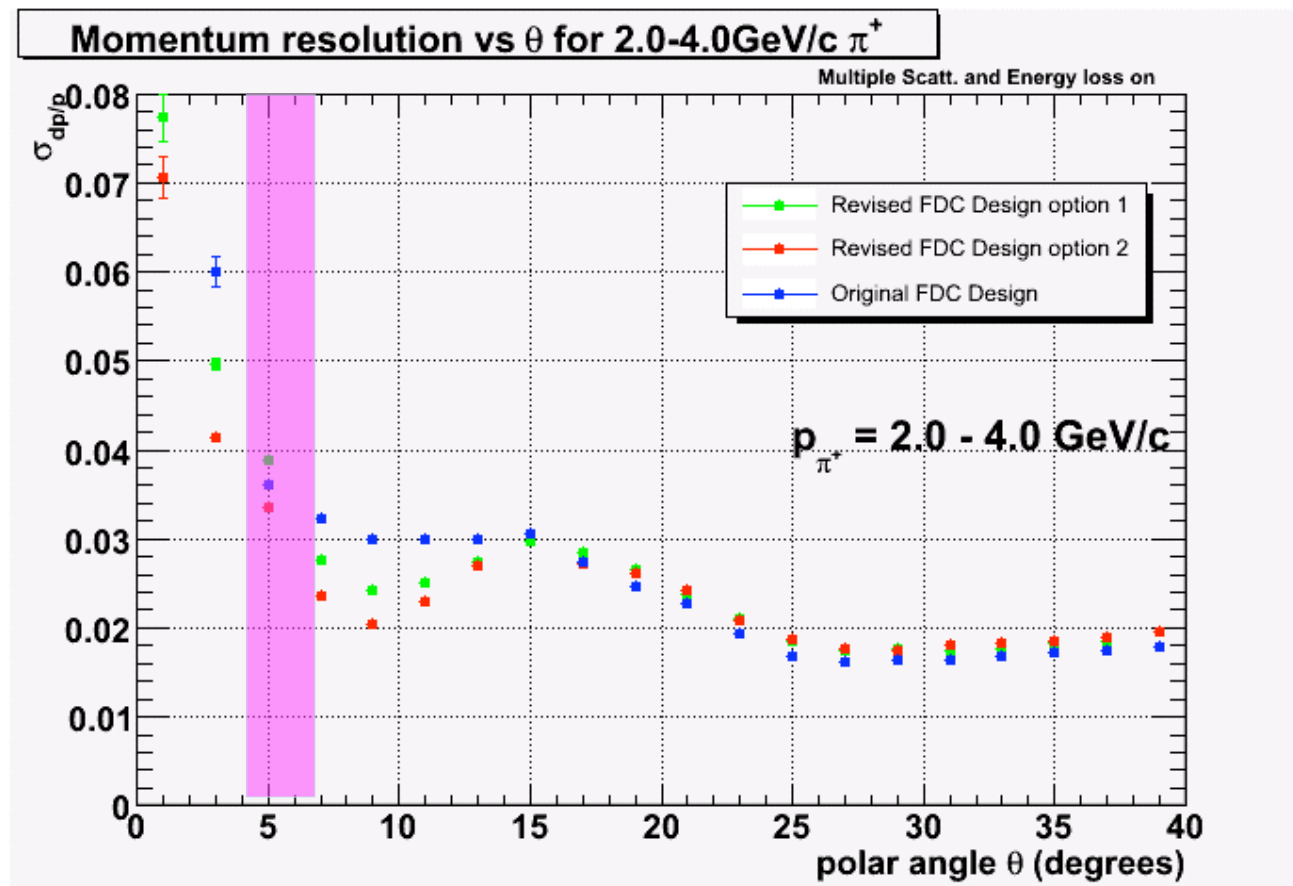
(without bug)

Plots by Mihajlo Kornicer

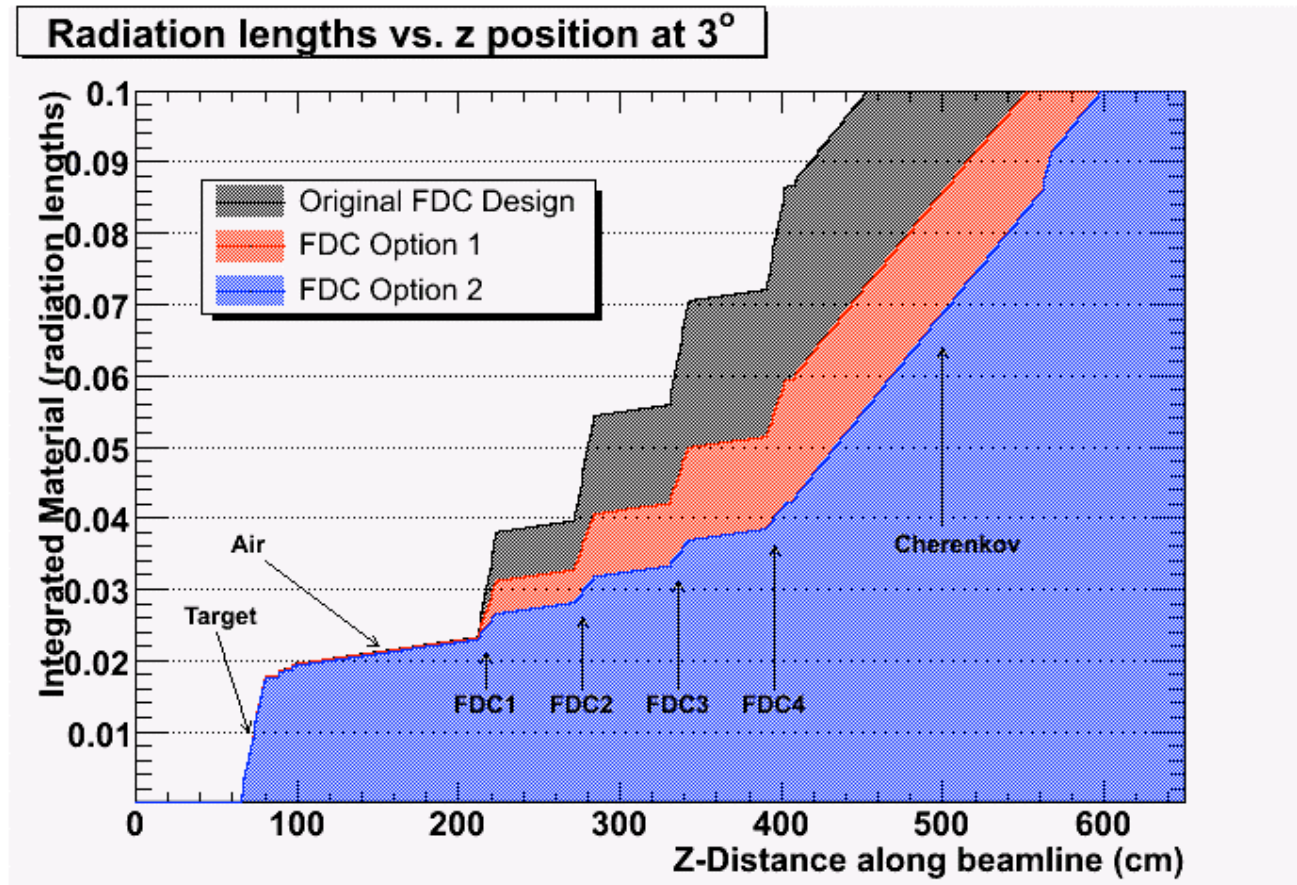


FCAL reconstruction efficiency; photon conversion probability as a function of angle.

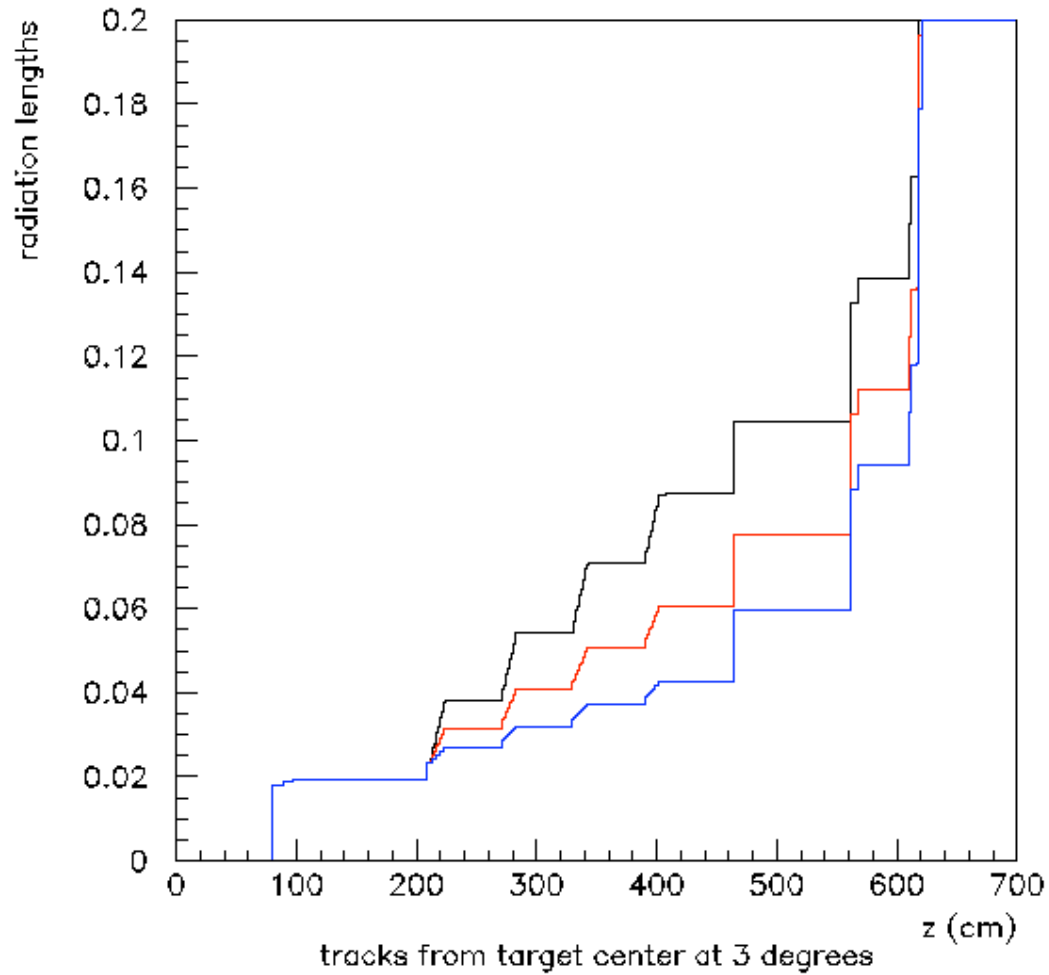
Momentum Resolution (with bug , no Lorentz effect)



Radiation Length Scans



Radiation Length Scans



Summary

- Background rate studies for a geometry close to FDC option2 have been done and compared to the original design
- Radiation length scans have been made for both FDC geometry options and compared with the original design
- Relative photon conversion probabilities have been determined for both FDC geometry options compared to the original design.
- Charged pion tracking resolutions have been determined for both FDC geometry options and compared to the original design (with the CDC inner radius bug)