

Spoiled B-Field Studies

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Spoiling the Magnetic Field as a function of Z

Nominal TOSCA generated field spoiled by:

$$B' = B * [1 + A \sin(\omega z)]$$

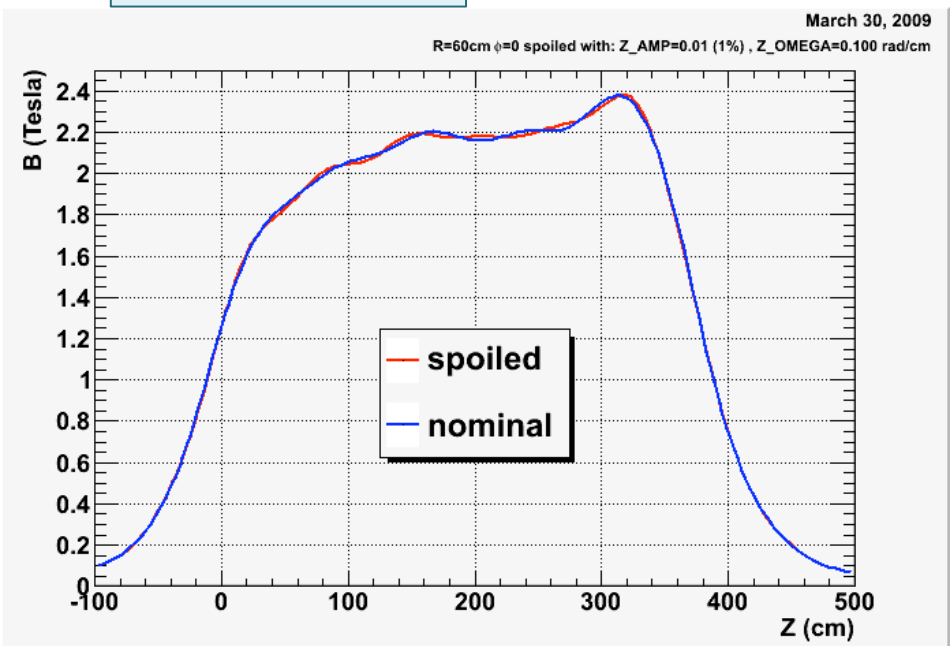
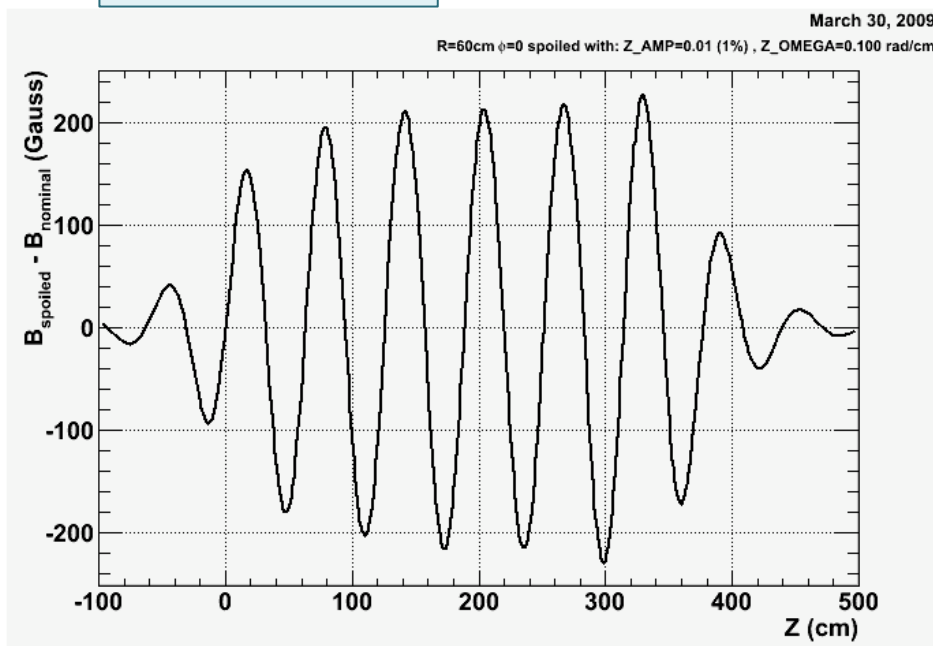
$$A = 0.01 \text{ (1\%)}$$

$$\omega = 0.100 \text{ rad/cm}$$

(angle not changed, just magnitude of field)

Field difference

Field Magnitude



Spoiling as a function of R and ϕ

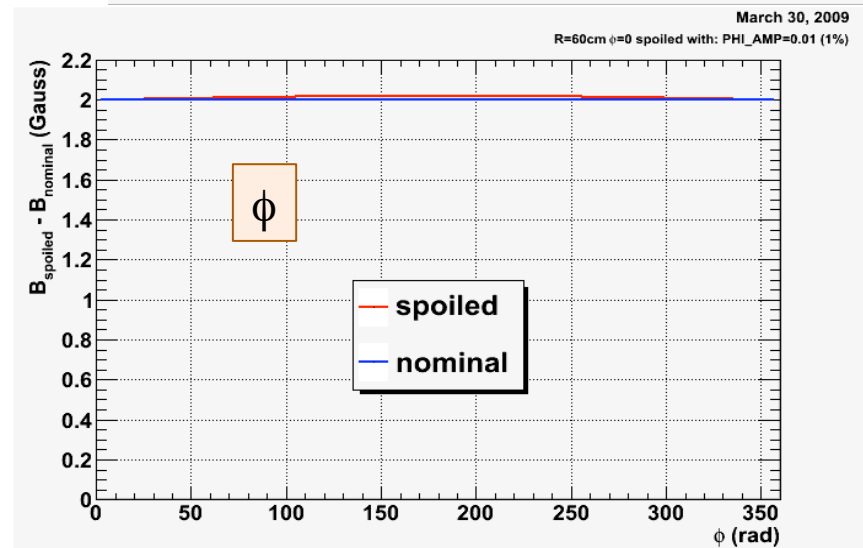
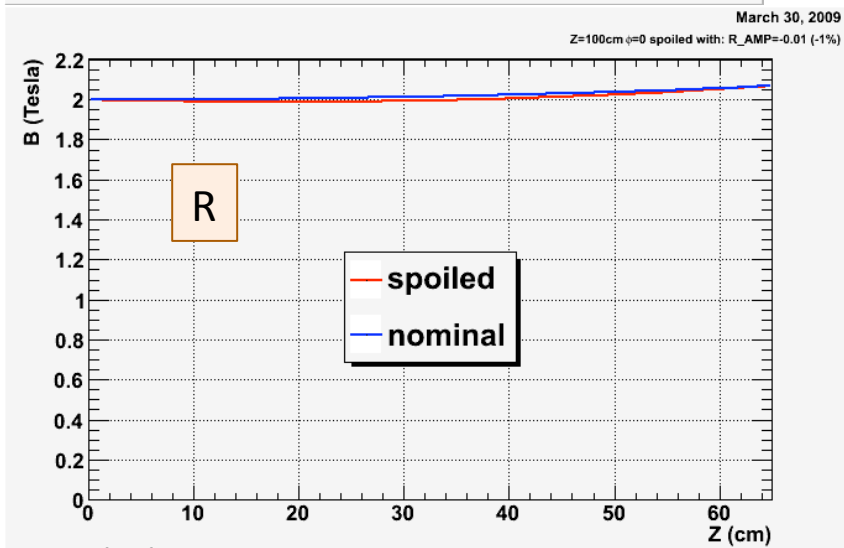
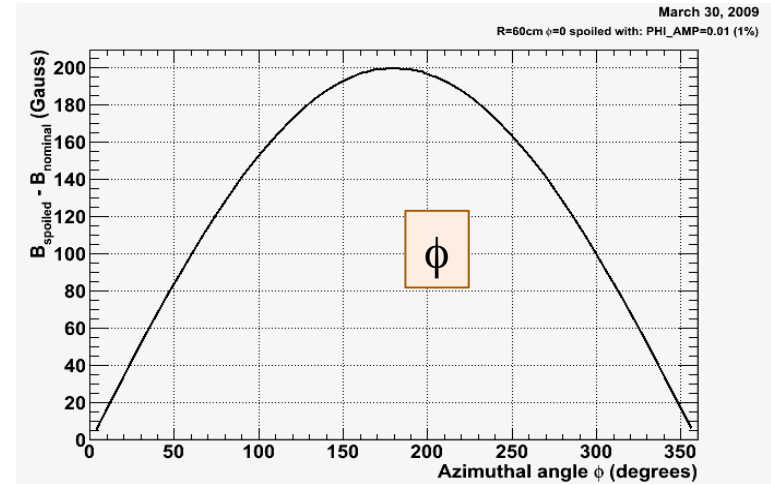
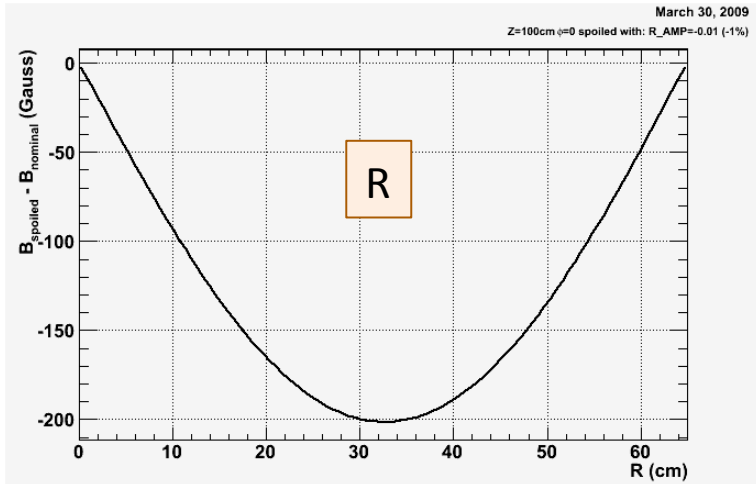
$$A = +/-0.01 \text{ (1\%)}$$

$$\omega = \pi \text{ rad}/65\text{cm}$$

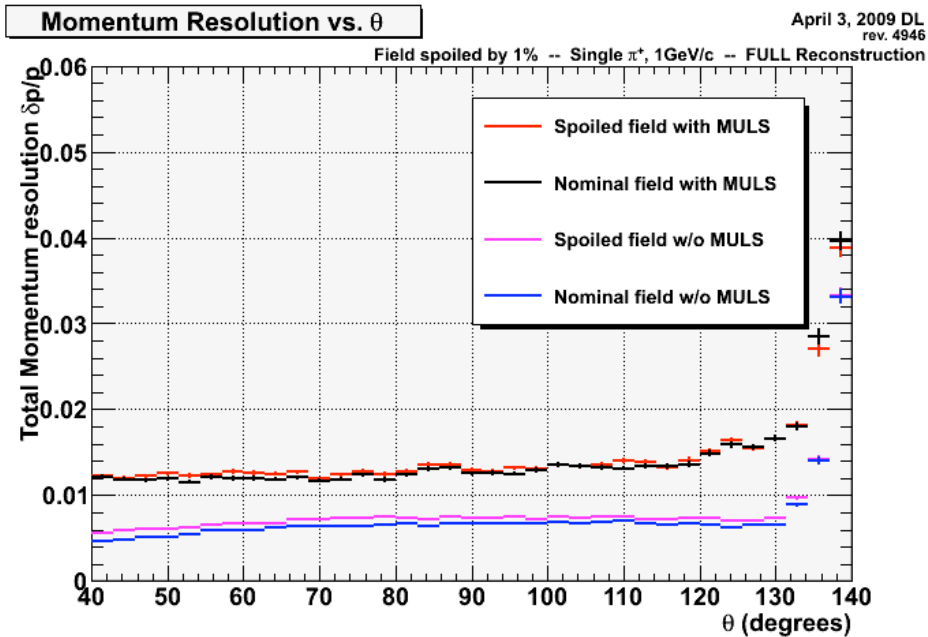
$$B' = B*[1 + A \sin(\omega z)]$$

$$A = +/-0.01 \text{ (1\%)}$$

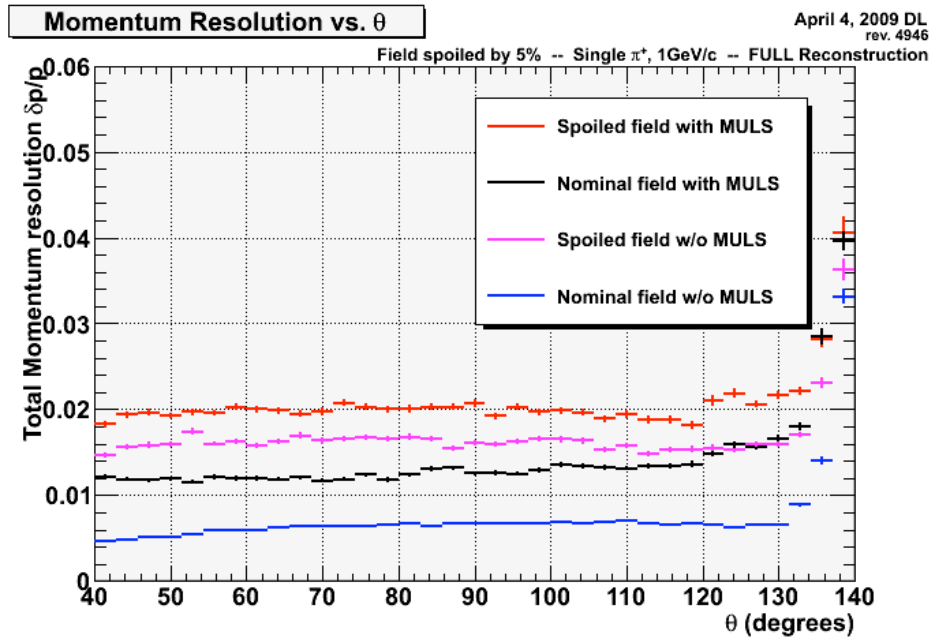
$$\omega = \pi \text{ rad}/360^\circ$$



Momentum Resolution for CDC

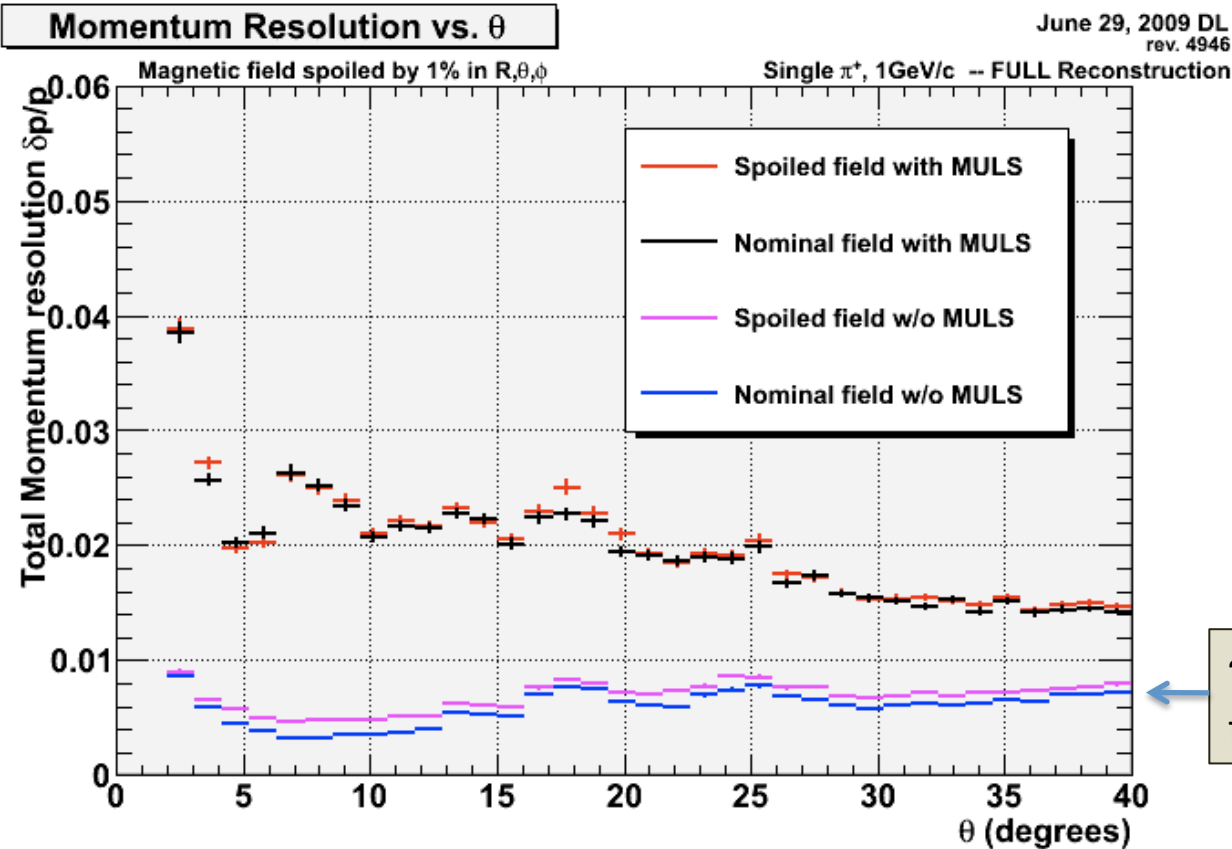


No change in resolution for
1% change in B-field



~1% change in resolution for
5% change in B-field

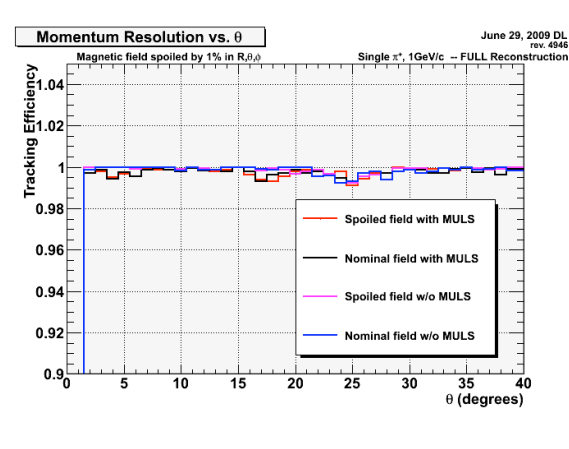
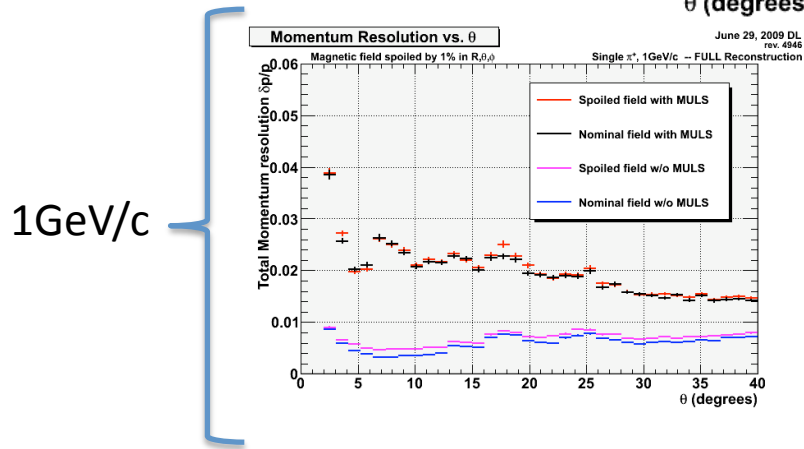
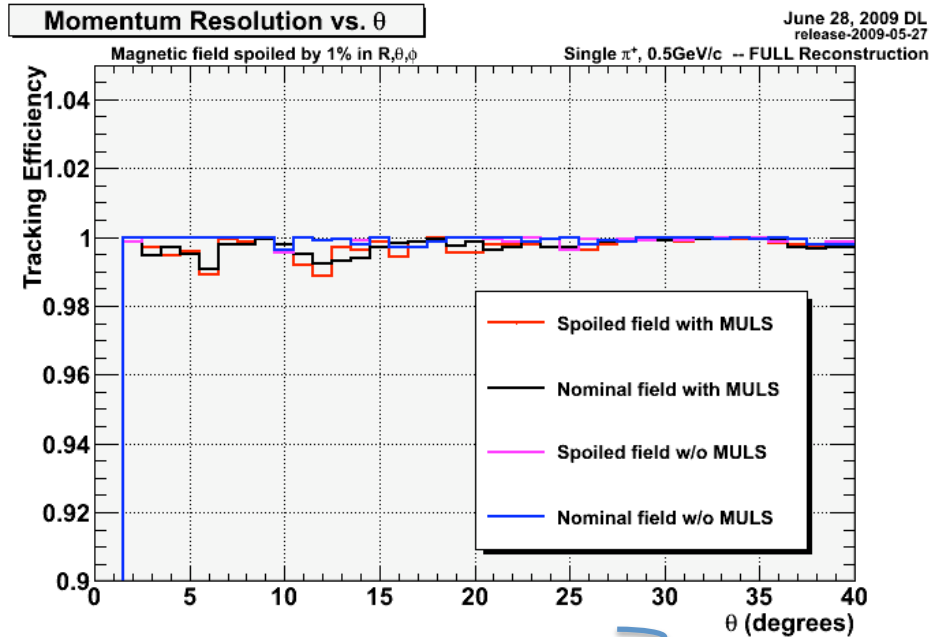
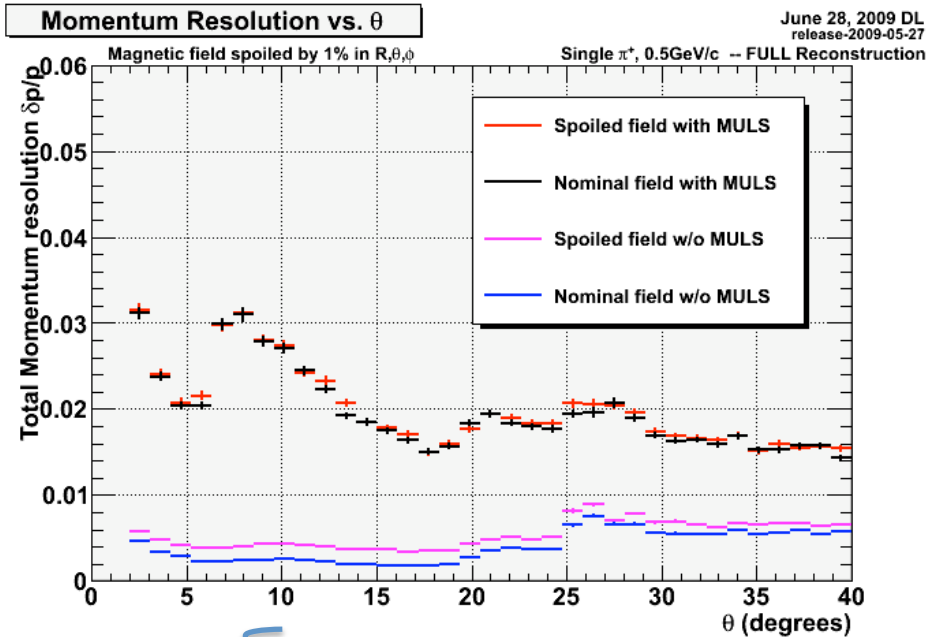
Momentum Resolution with and without Spoiling the Field



200 μm position resolution for FDC
150 μm position resolution for CDC

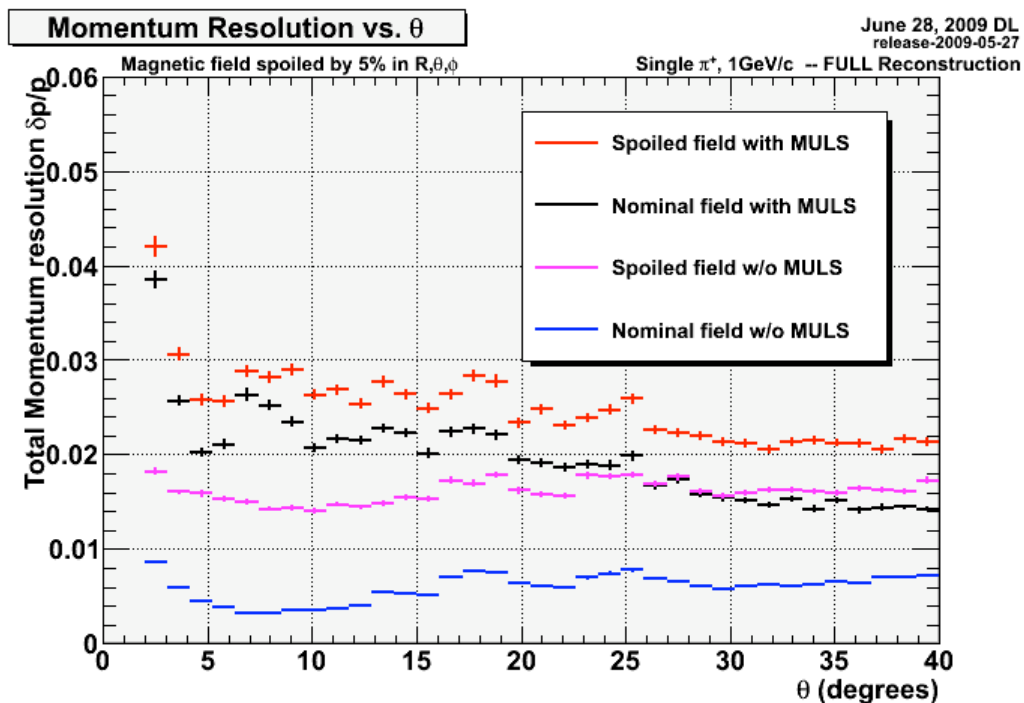
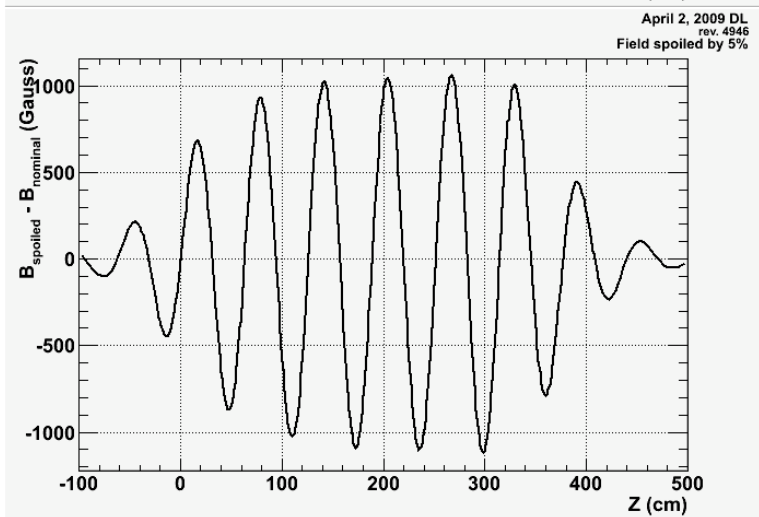
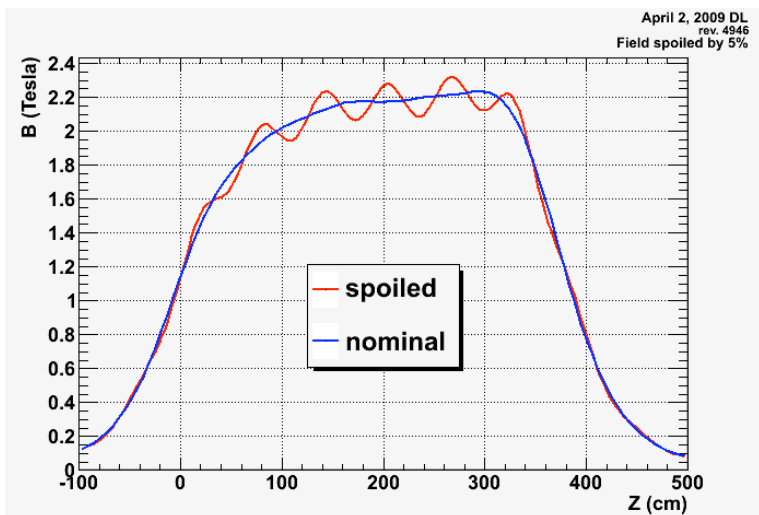
$\sim 0.2\%$ change in resolution for 1% change in B-field

0.5 GeV/c π^+



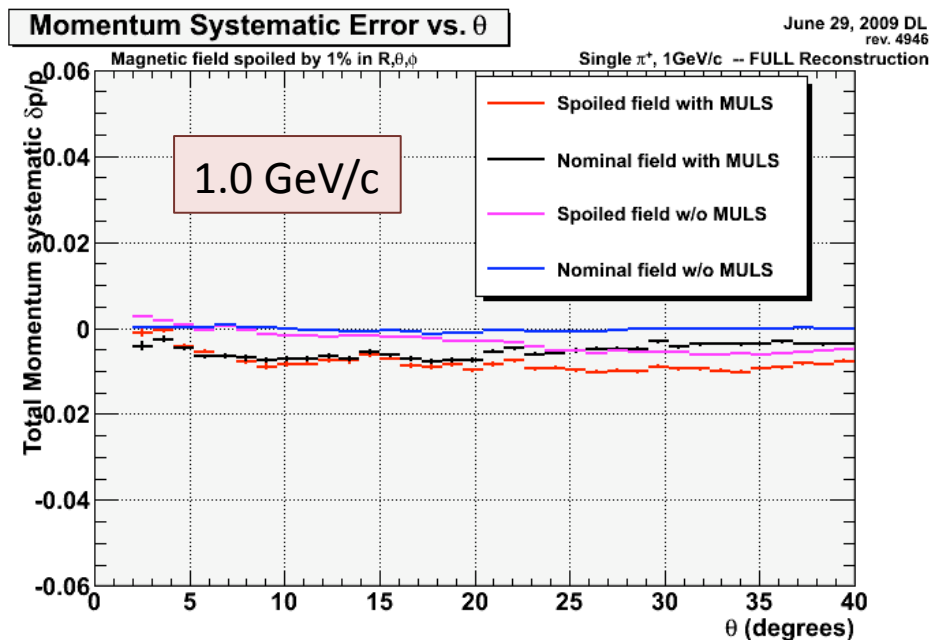
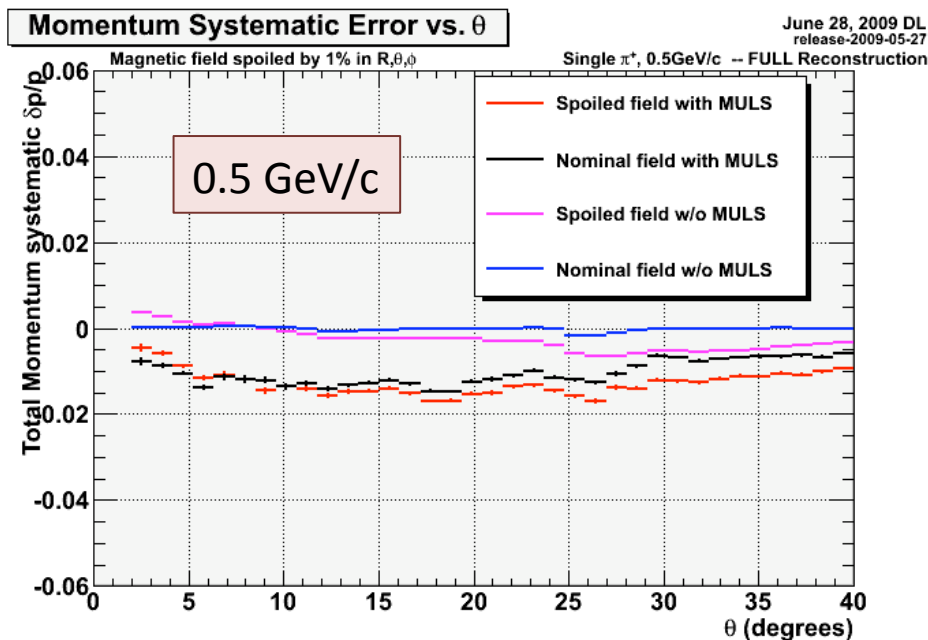
1GeV/c

Momentum Resolution with a field Spoiled by 5% (magnitude only)



~1% change in resolution for 5% change in B-field

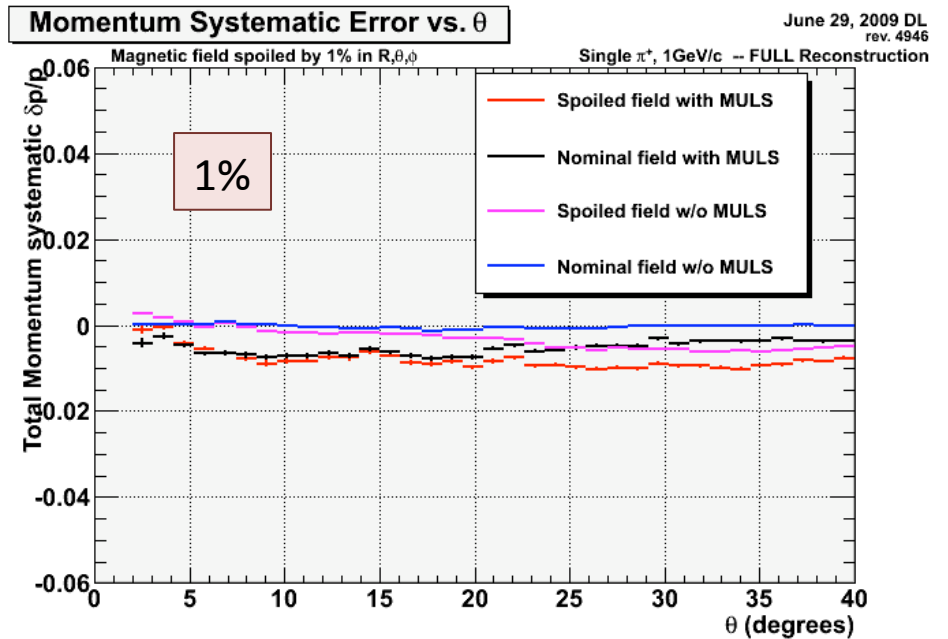
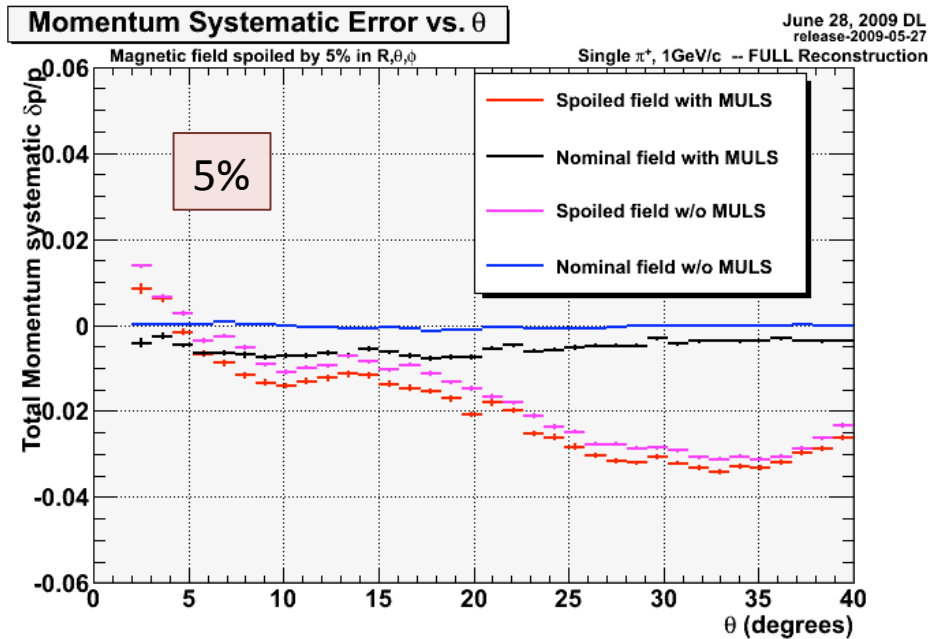
Systematic Uncertainty for 1% spoiled field



Multiple Scattering appears to introduce a 1%-1.5% systematic uncertainty in the total momentum resolution (using the current ALT1 fitter).

The 1% uncertainty of the B-field introduces an additional systematic of $\sim 1\%$

Systematic Uncertainty for 5% and 1% spoiled field



The 1% uncertainty of the B-field introduces an additional systematic of $\sim 1\%$

The 5% uncertainty of the B-field introduces an additional systematic of $\sim 3\%$

Systematic Uncertainty for 5% and 1% spoiled field in CDC

