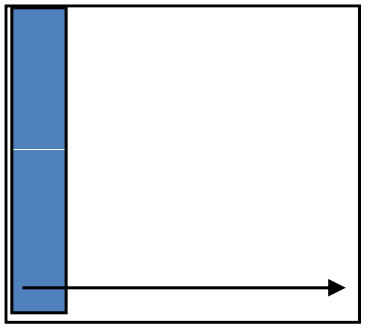
Sqrt{s}-dependence

2008/07/30

Manabu Togawa

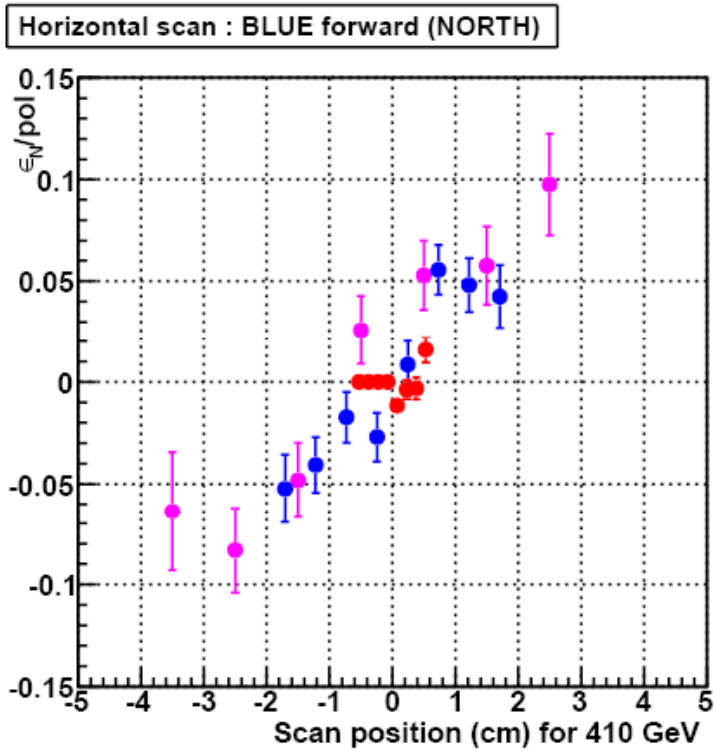
ZDC trig. Horizontal scan

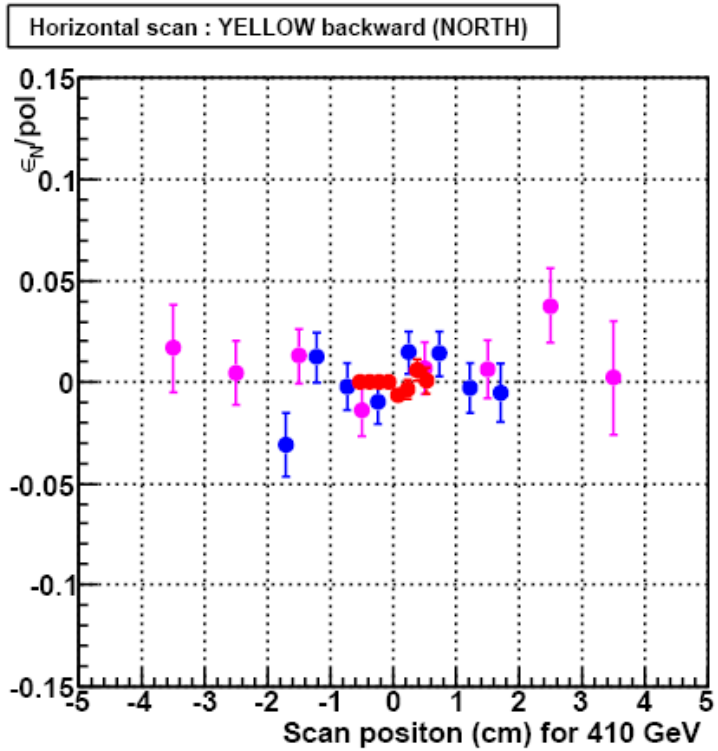
ZDC detecor

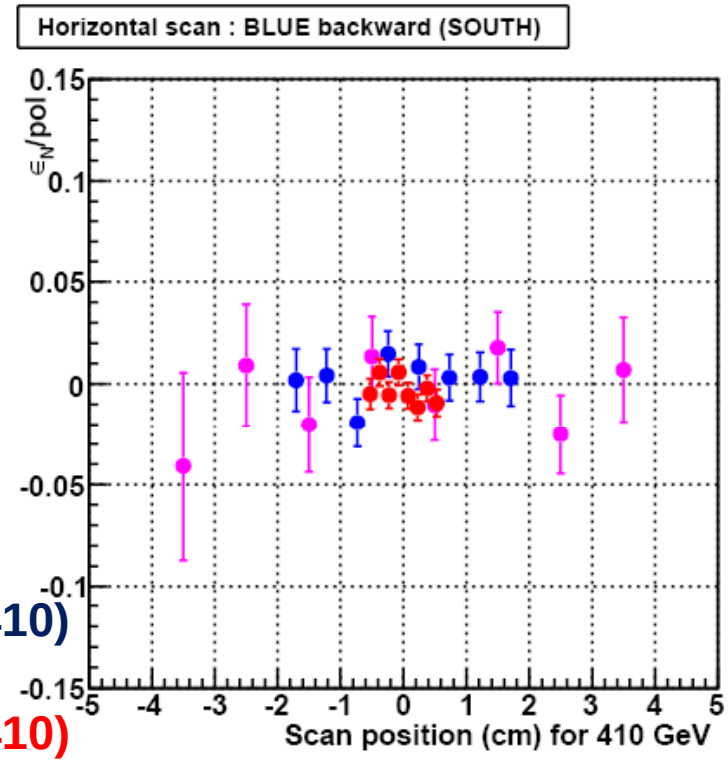


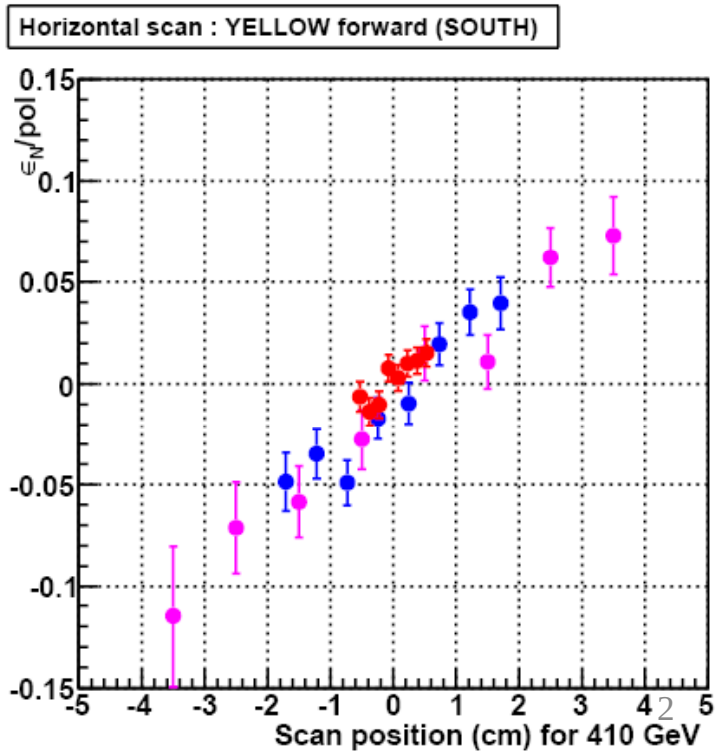
-5cm 5cm

$$A = \frac{N_+ - RN_-}{N_+ + RN_-}$$





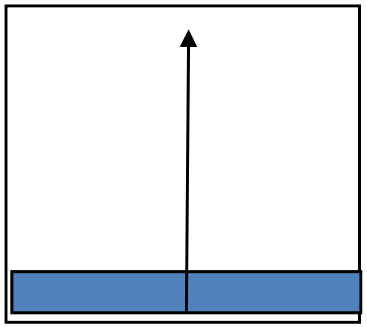




Magenta : 410 GeV
Blue : 200 GeV
(x axis is scaled by 410)
Red : 62.4 GeV
(x axis is scaled by 410)

ZDC trig. vertical scan

ZDC detecor



-5cm 5cm

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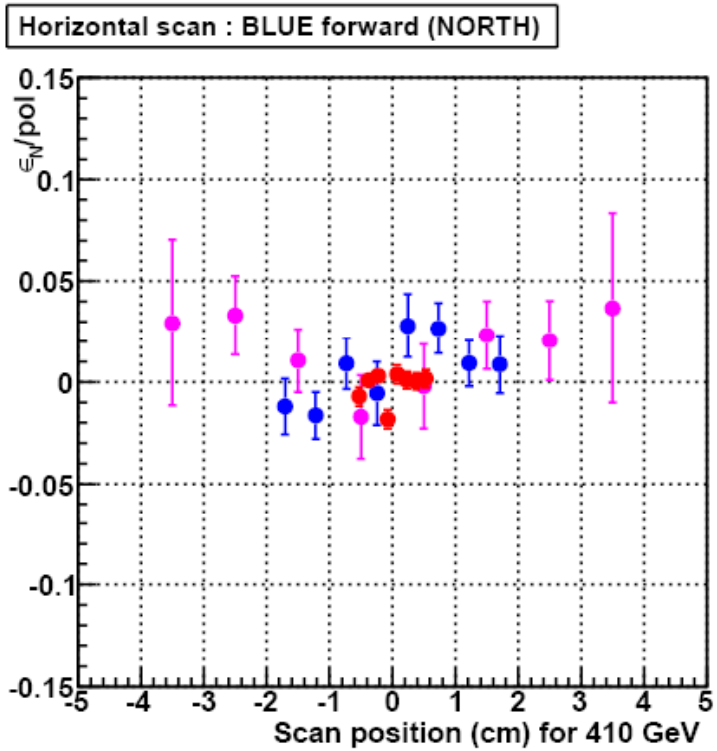

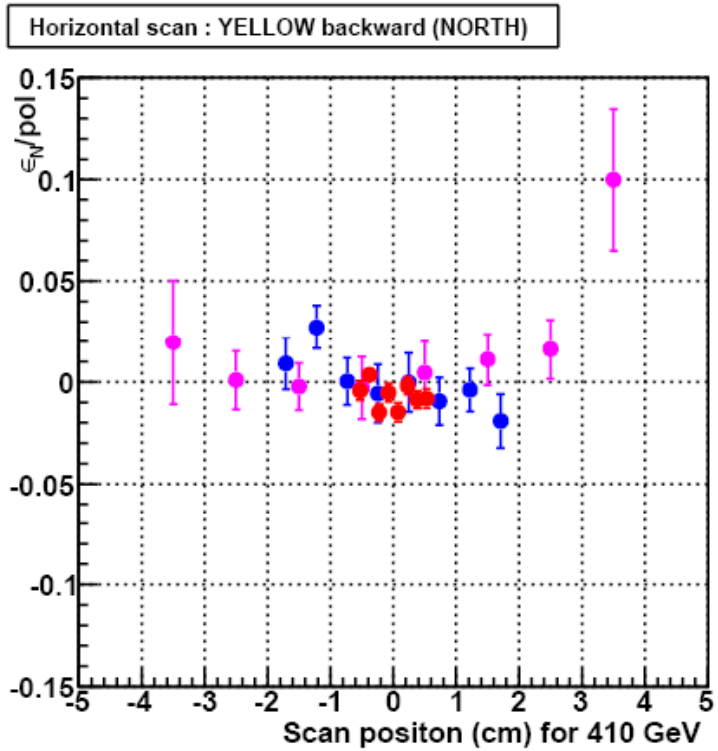

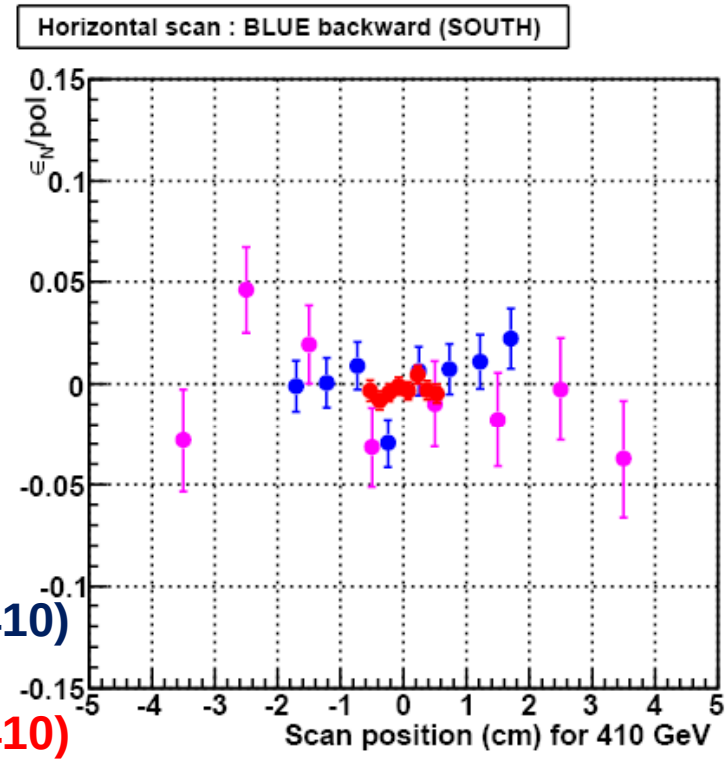

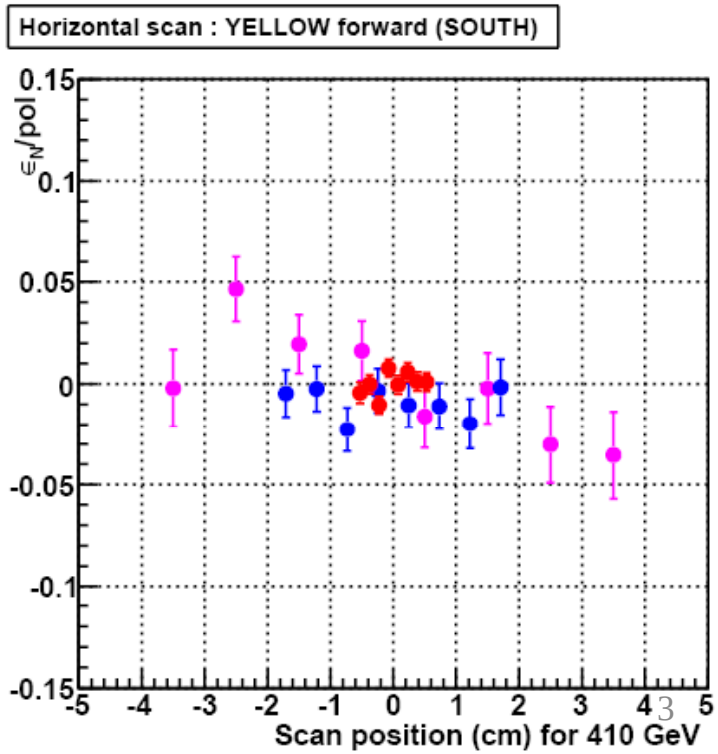

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(x axis is scaled by 410)
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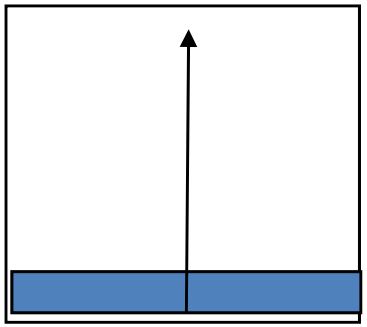
LP trig. Horizontal scan

ZDC detecor



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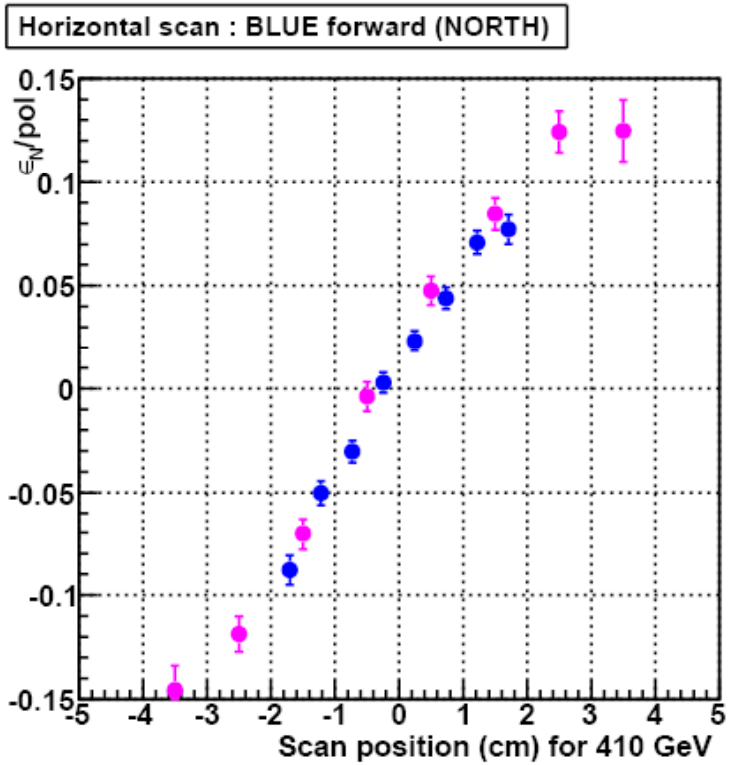

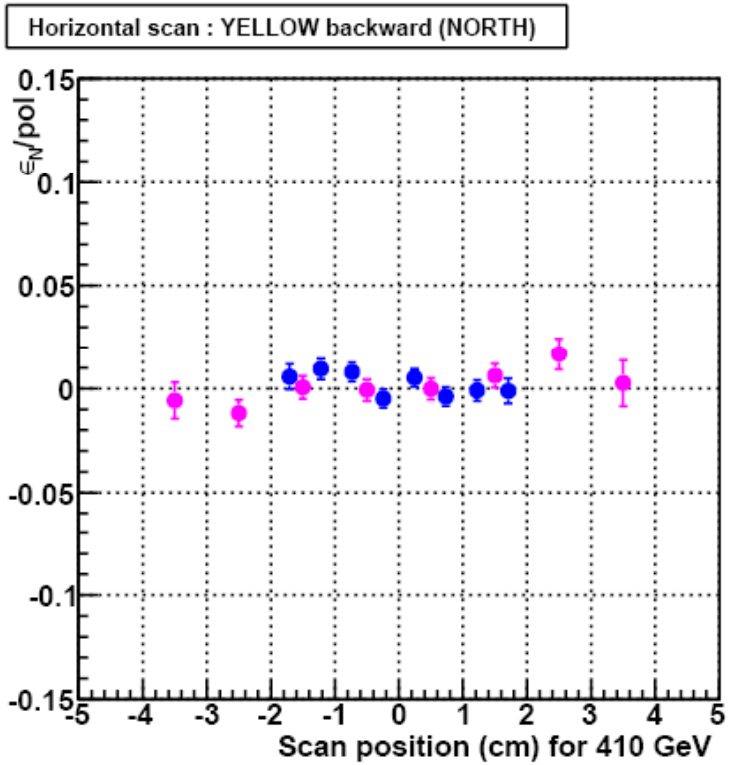

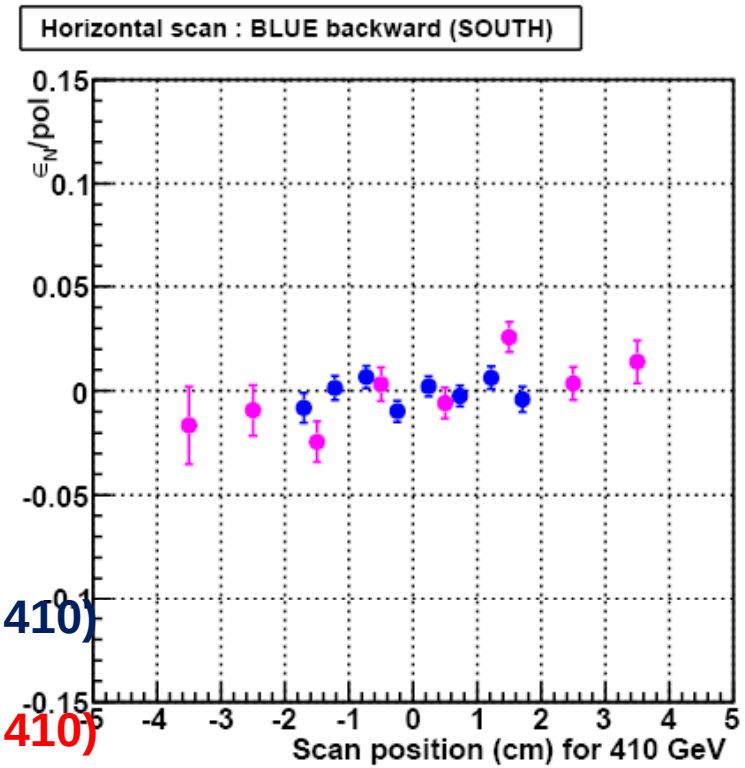

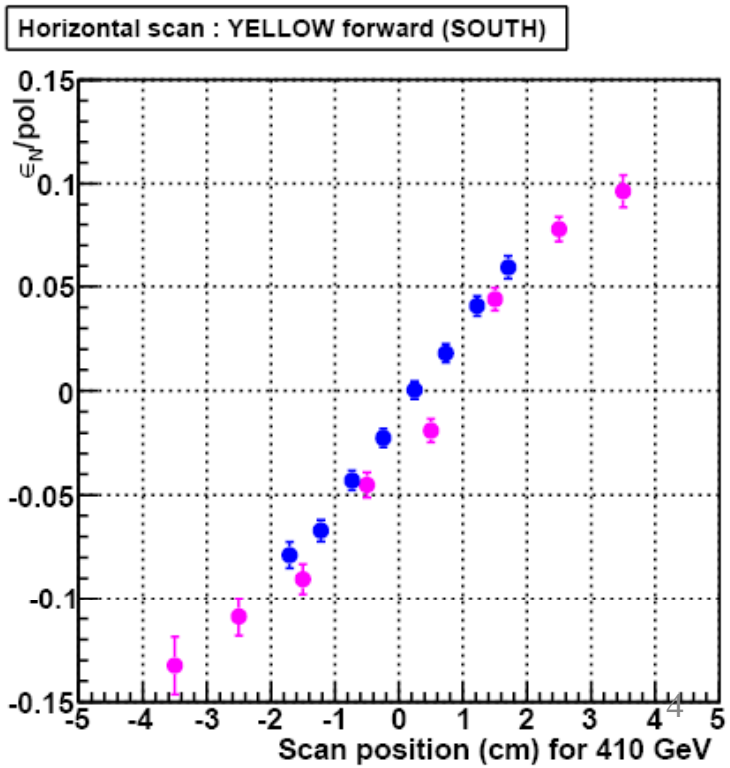

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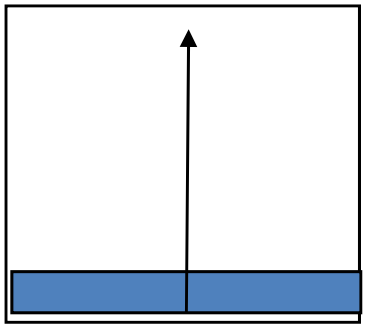
LP trig. vertical scan

ZDC detecor



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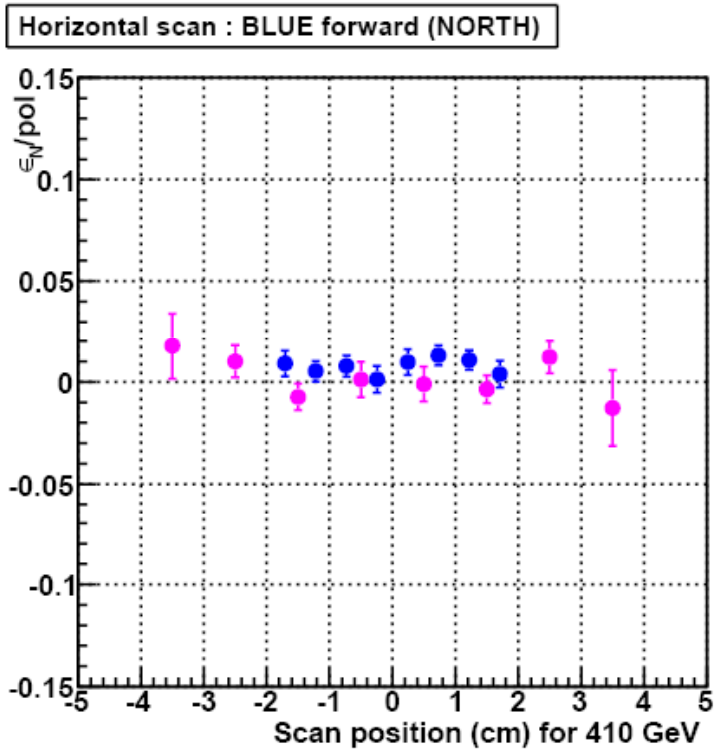
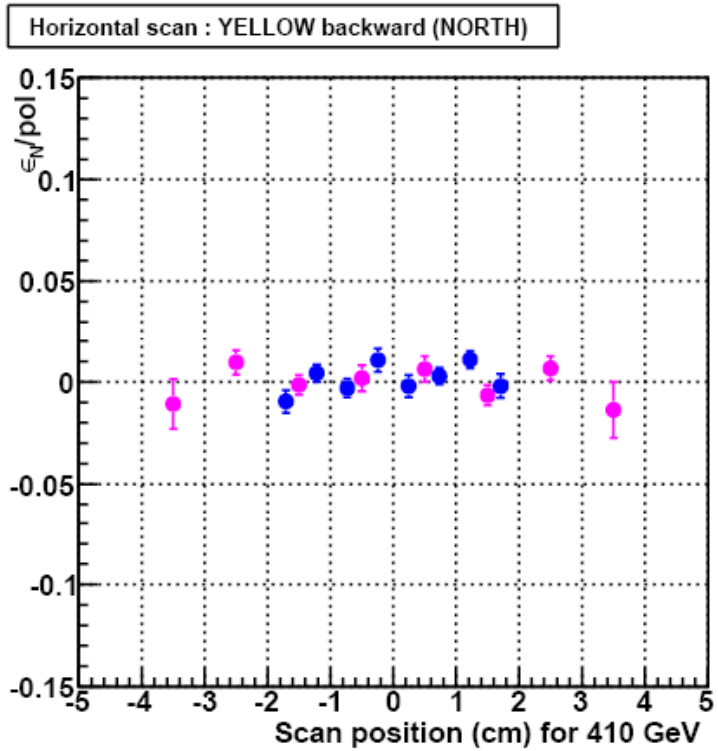
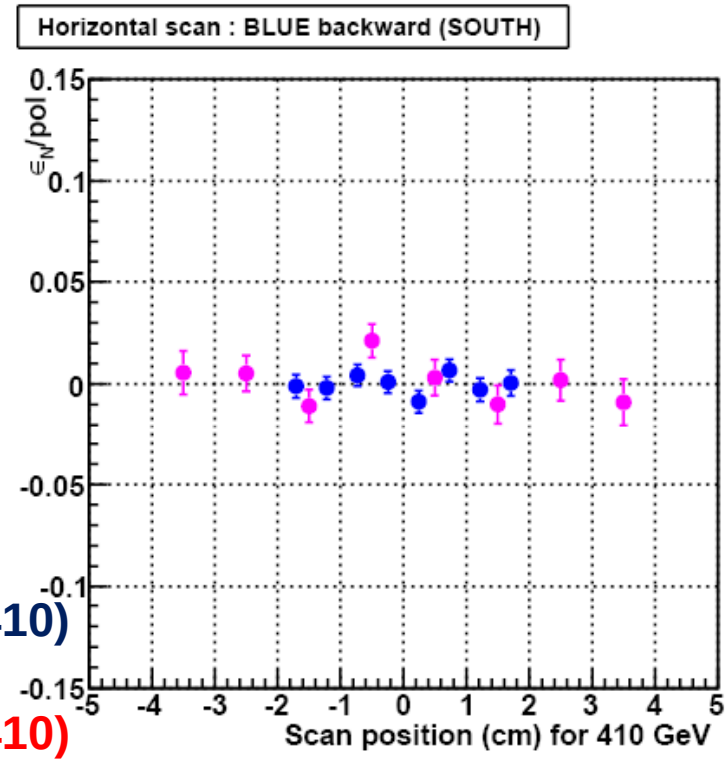
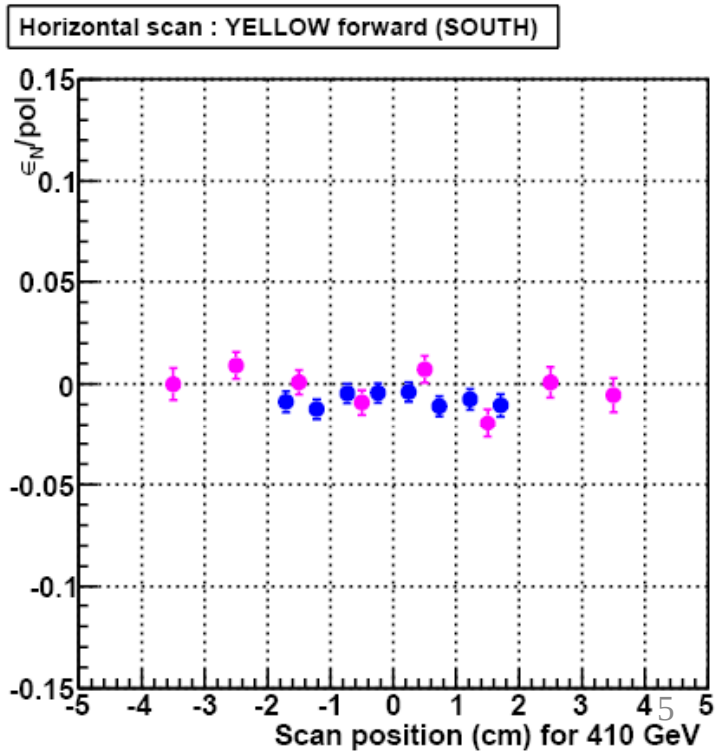




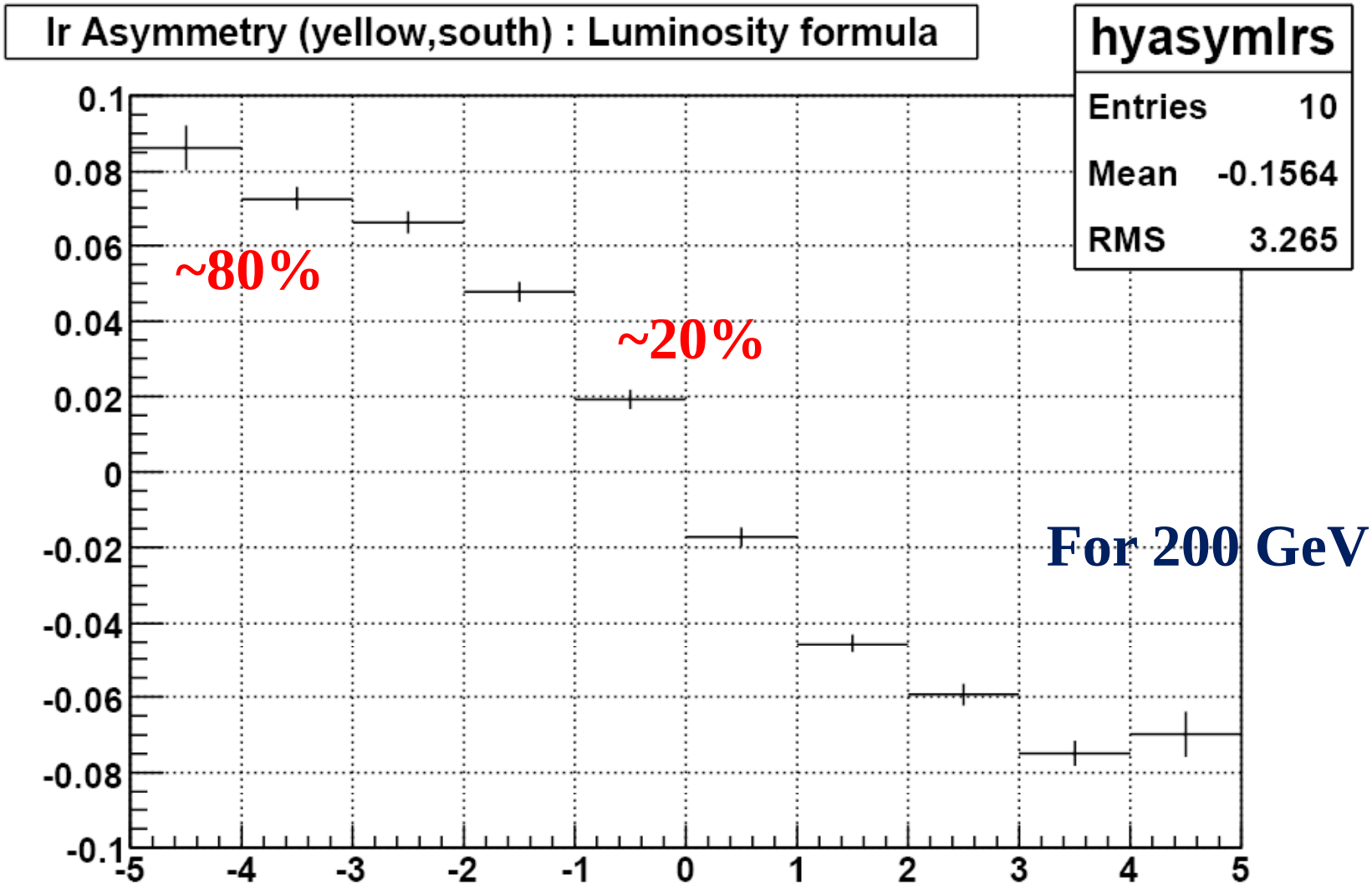




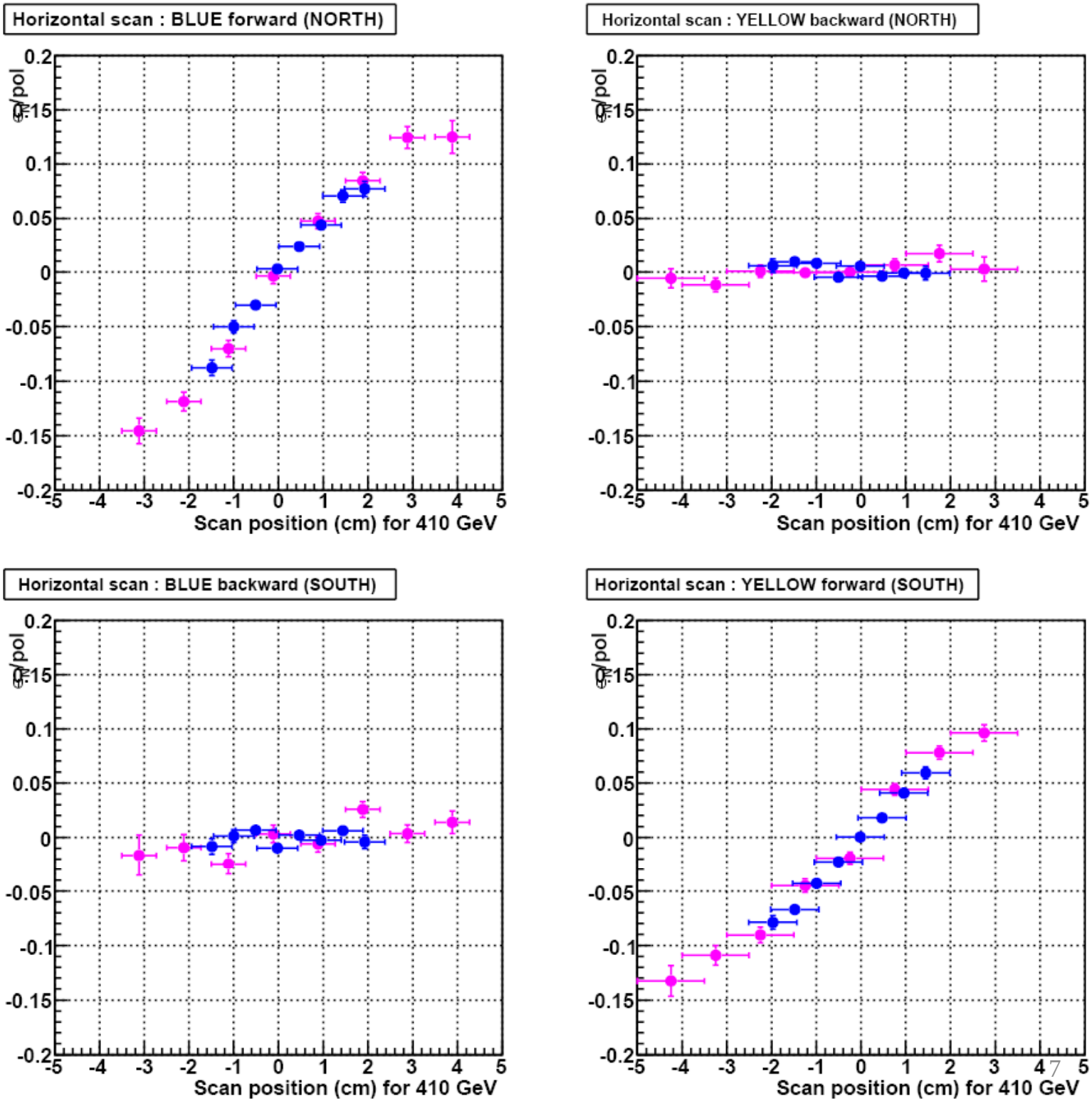
Magenta : 410 GeV
Blue : 200 GeV
(x axis is scaled by 410)
Red : 62.4 GeV
(x axis is scaled by 410)

Smearing effect

- Input is 0.1 for all region. (step function)
  - Including sine modulation and position resolution.



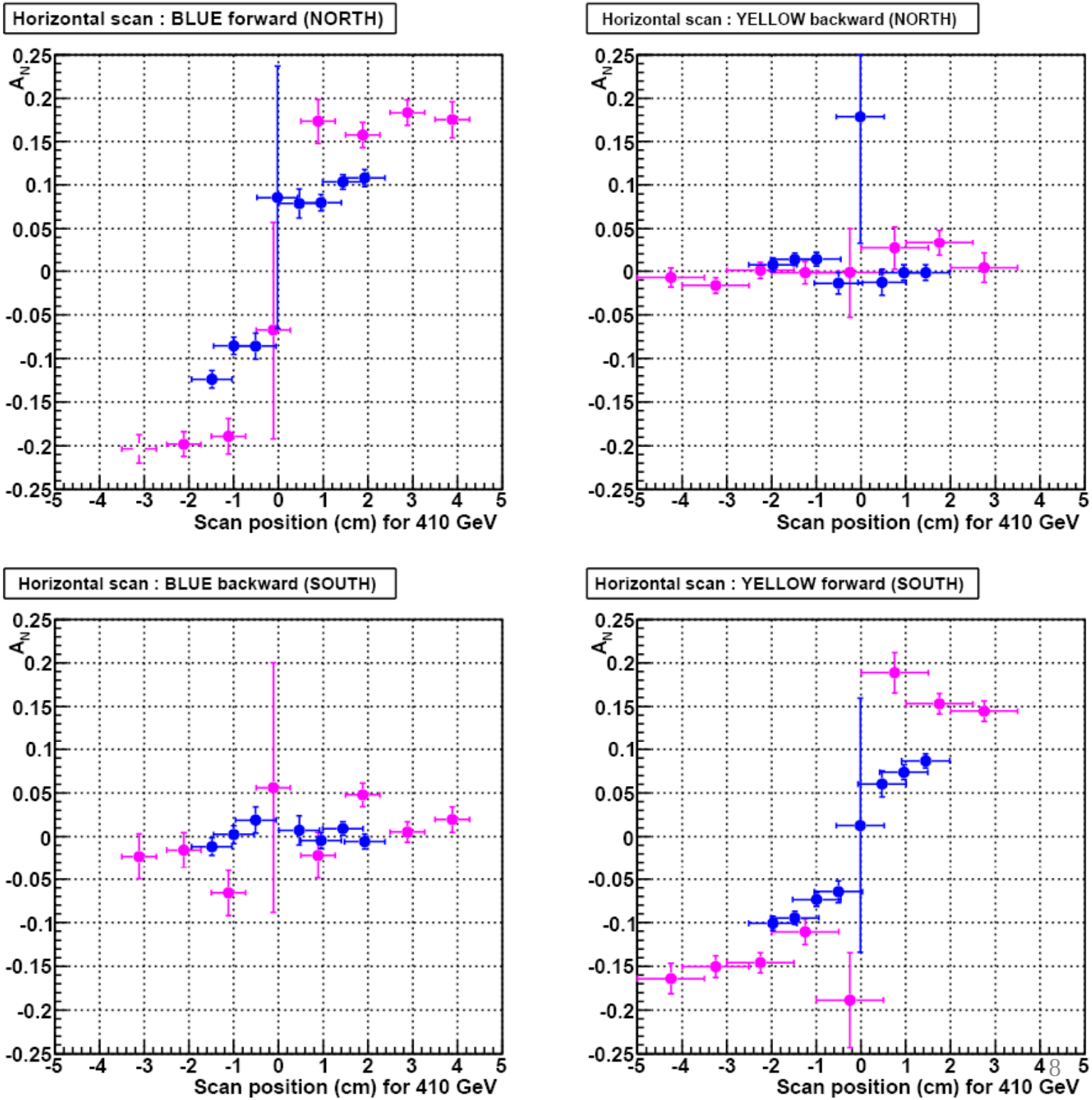
Center shift is corrected for LP trig. LR



Correction is done assuming that the A_N for beam center should be zero.

Horizontal errors indicate the shift. Is it possible to do it?

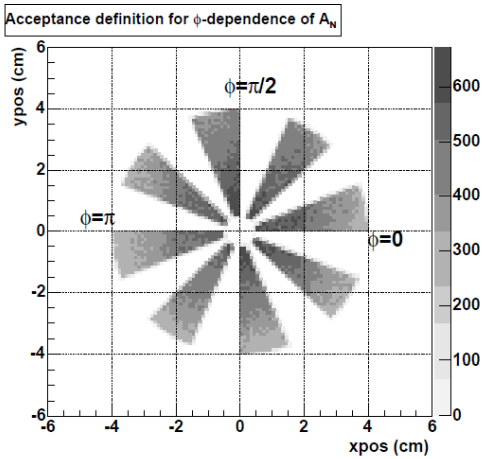
Smearing correction



Corrected shape looks step function. It would highly depends on the input function…

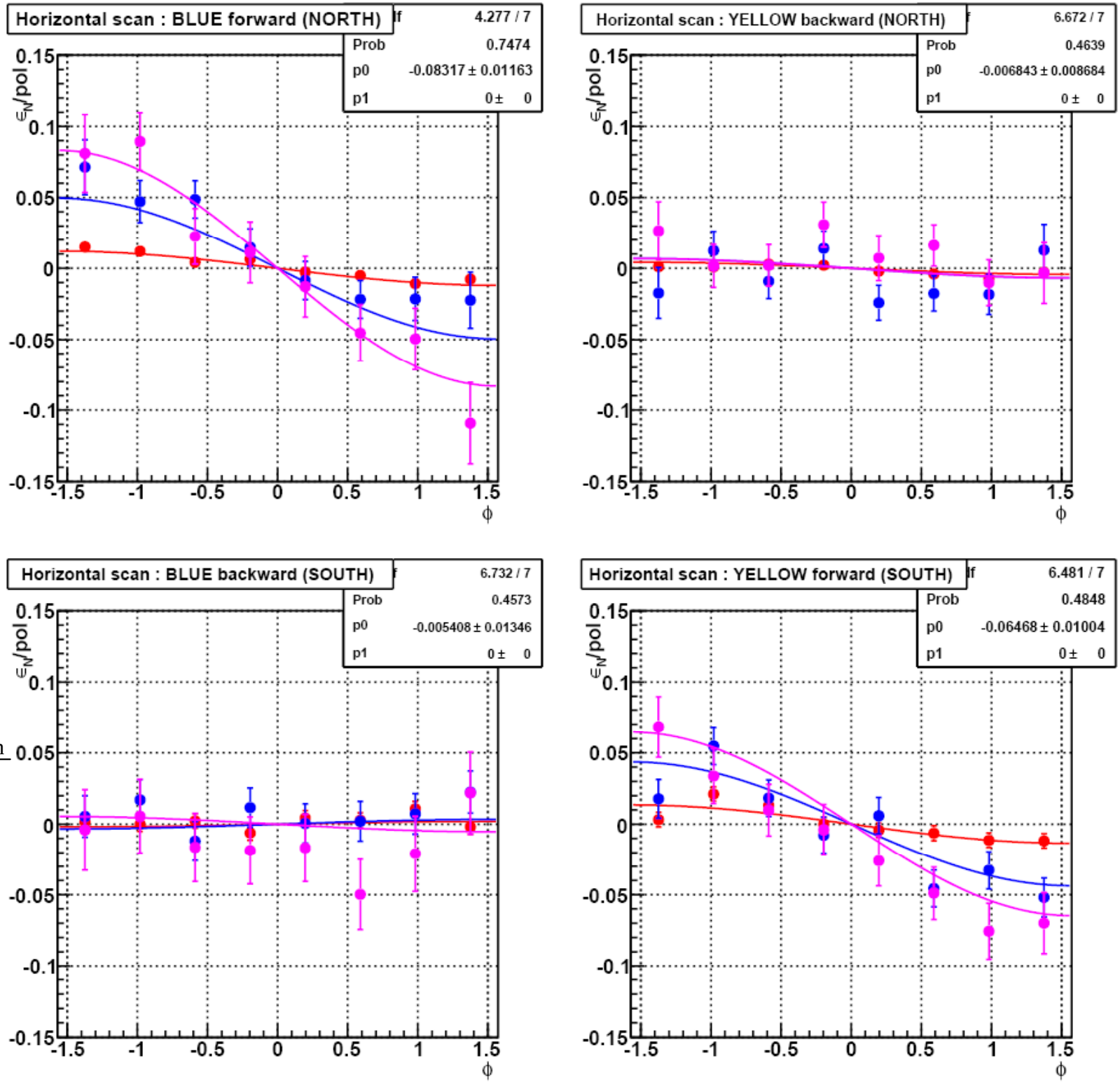
Phi-dep. for ZDCN|S trig.

Acceptance

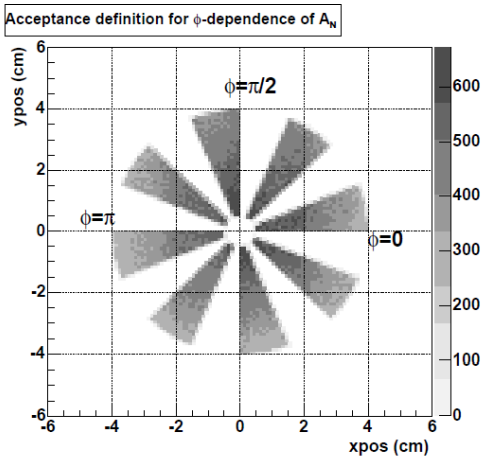


$$M(x_F) \equiv \frac{\text{Measured } E_n}{\sqrt{s}/2}$$

$0.4 < M(x_F) < 1.2$



Phi-dep. for LP trig.



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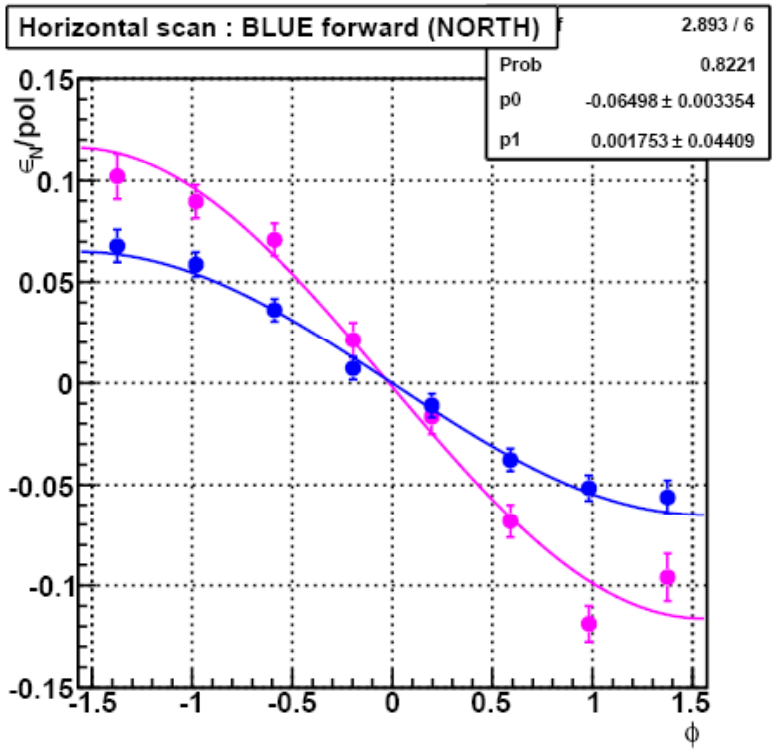
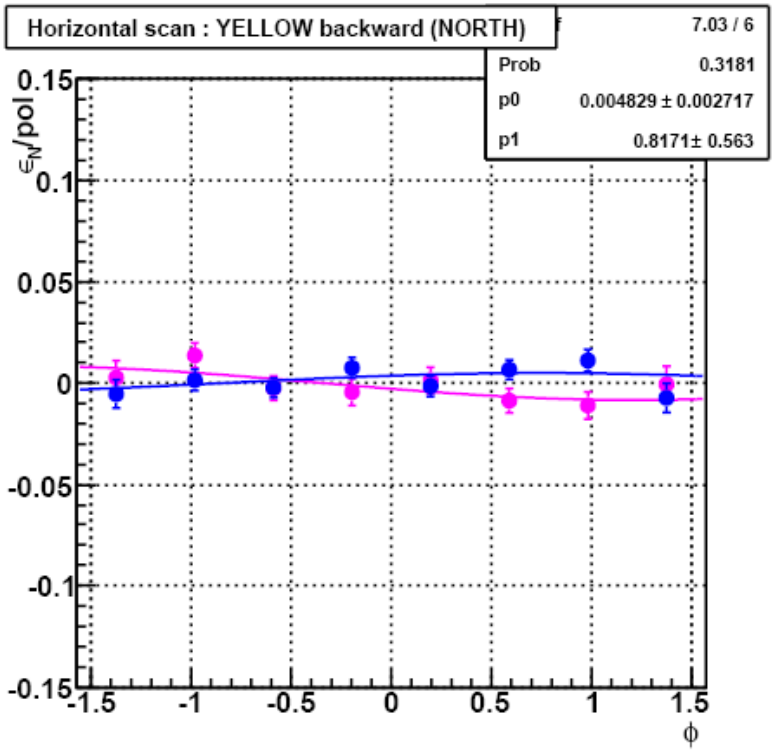
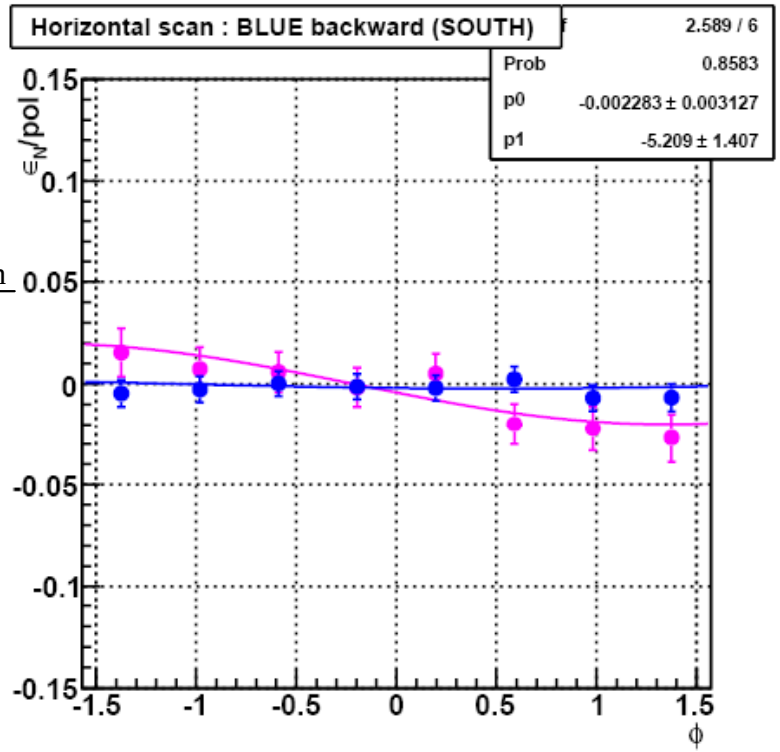
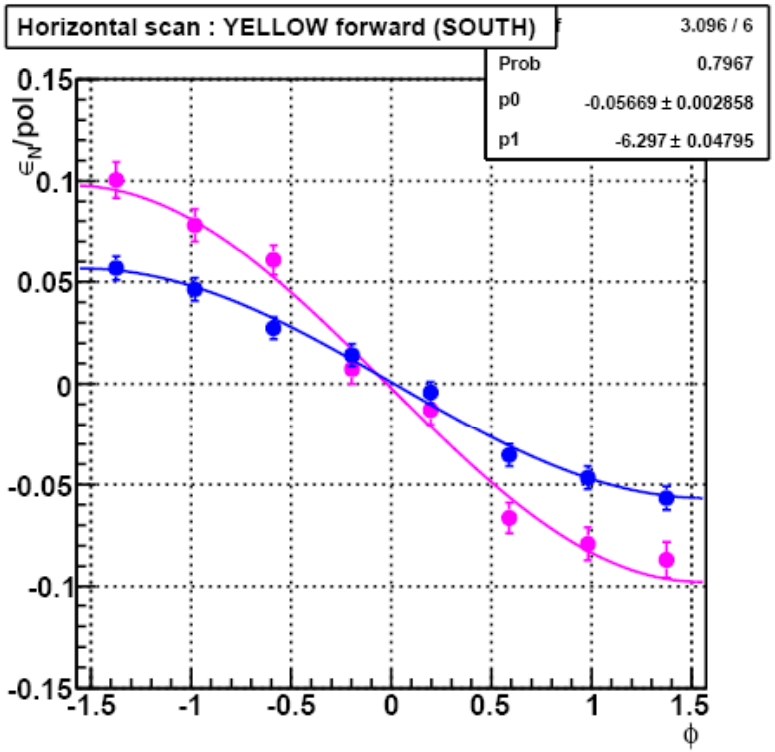
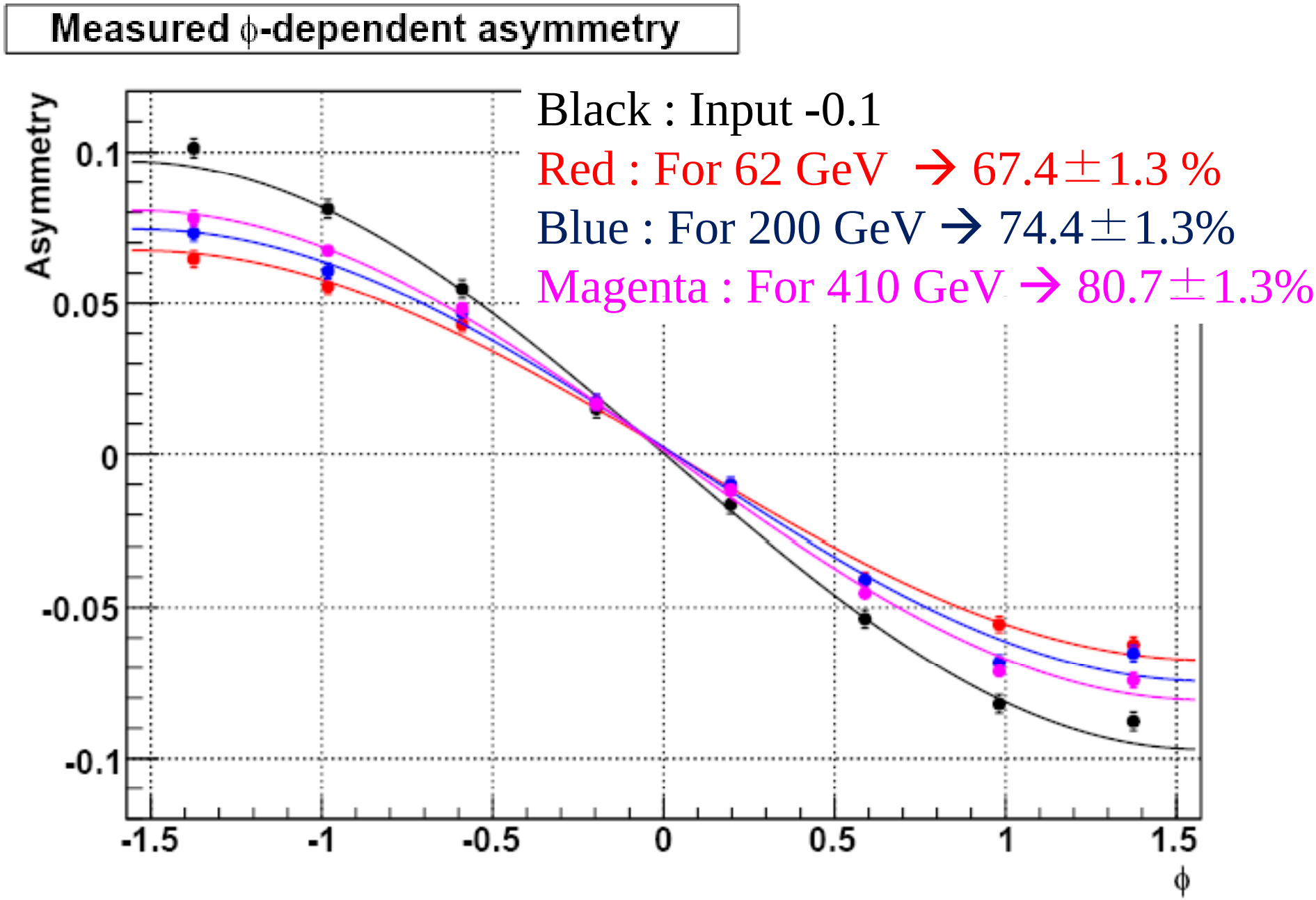






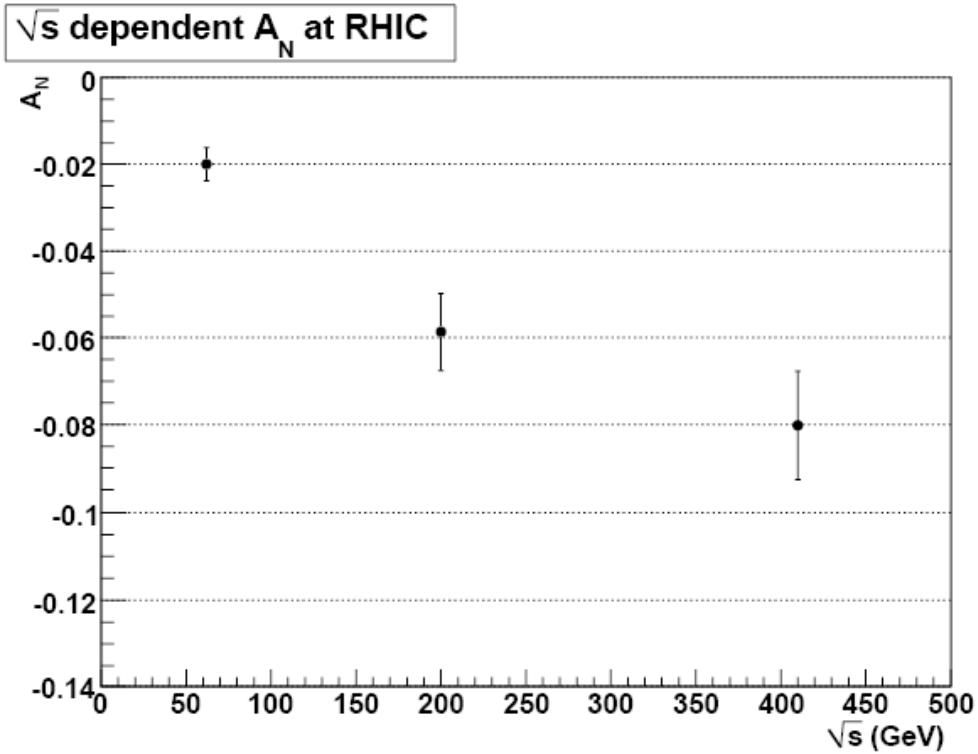


Smearing effect

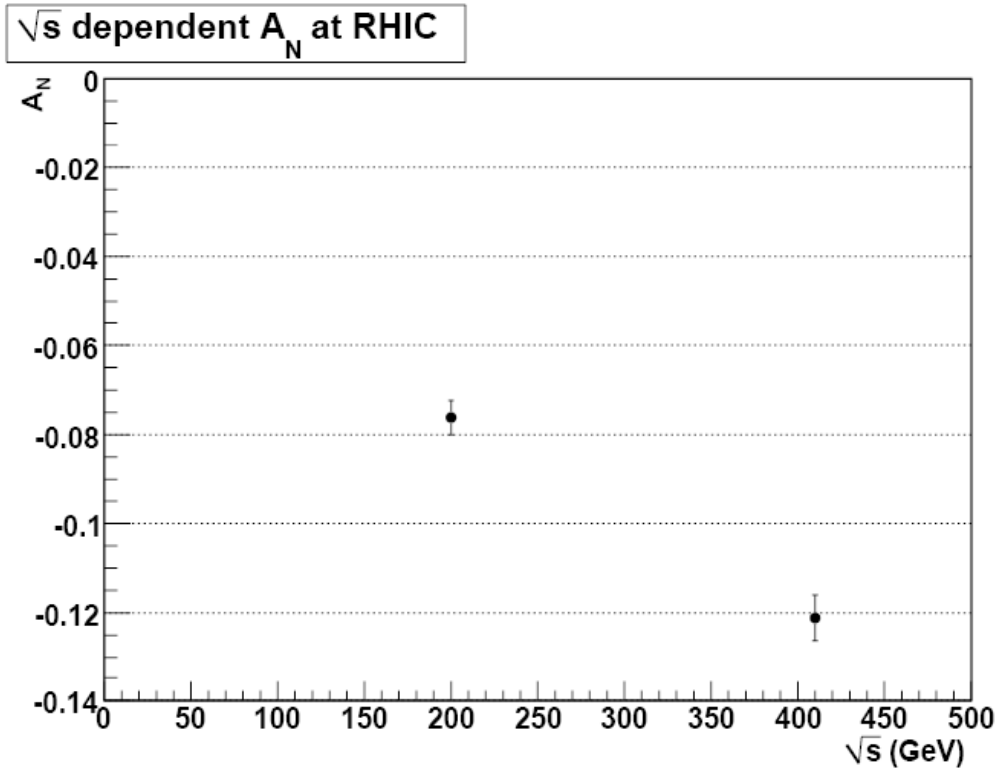


Sqrt{s}-dependent A_N

- Smearing correlations are applied.



ZDCN|S trigger



BBCLL1&(ZDCN|S) trigger

Systematic uncertainty

- Basically same method as 200 GeV analysis
  - Beam axis shift
    - 5.2% for LP trig. 6.6% for ZDCN|S trig.
  - BG
    - Estimated by pythia+GEANT3
    - Also estimation of multi hit component (e.g. n+γ)
  - Beam gas
    - Look at abort gap after neutronID
  - Smearing correction
    - 4.2%
  - Polarization
    - 410 GeV is big.

BG

ZDCN|S

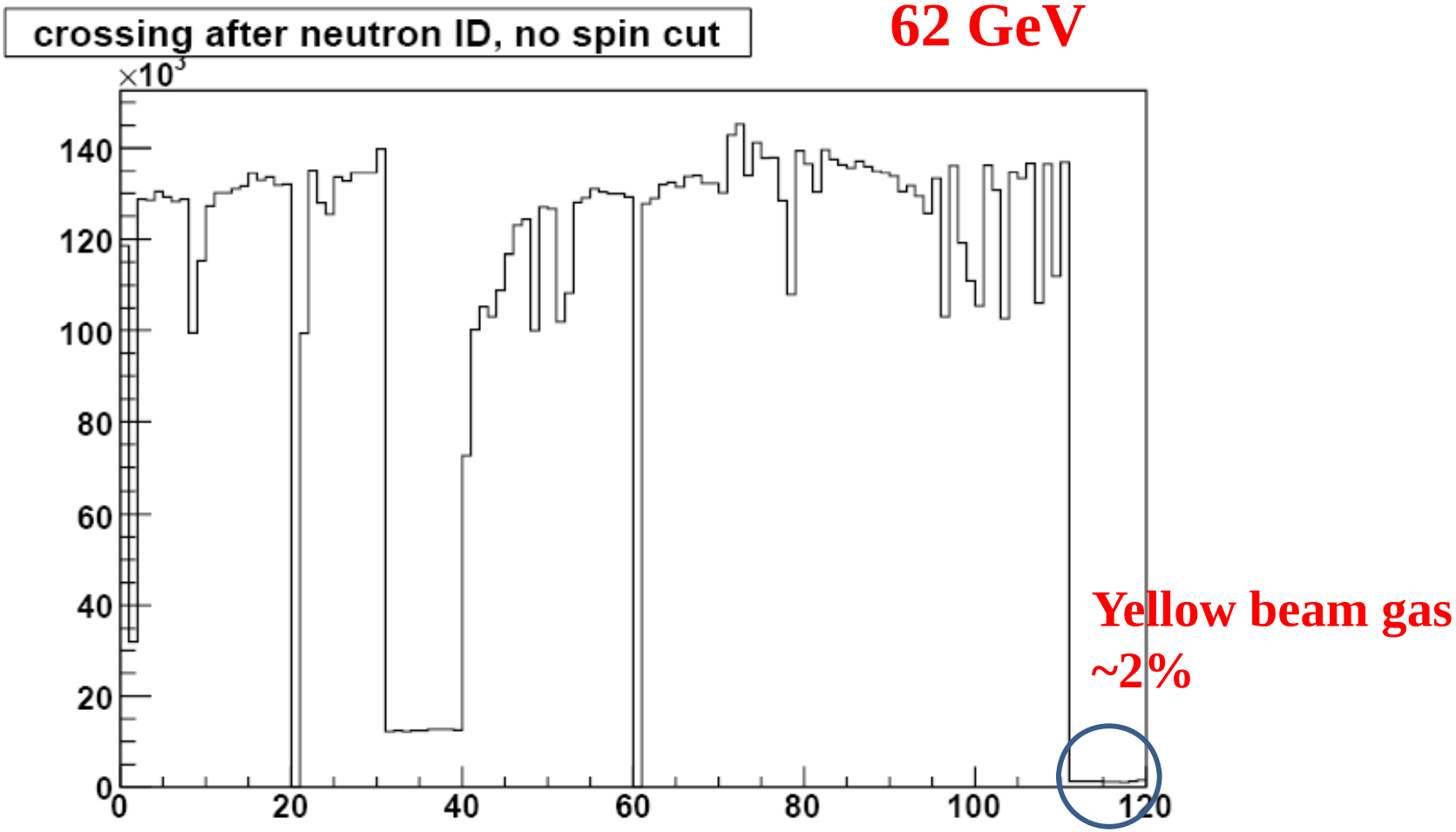
Sqrt{s} (GeV)	BG (proton) %	BG (Kaon) %	Multi hit %
62	12.1	0.6	0.5
200	1.6	1.0	6.7
410	0.3	1.2	19.2

BBCLL1&(ZDCN|S)

Sqrt{s} (GeV)	BG (proton) %	BG (Kaon) %	Multi hit %
200	1.2	1.0	6.0
410	0.2	1.4	18.9

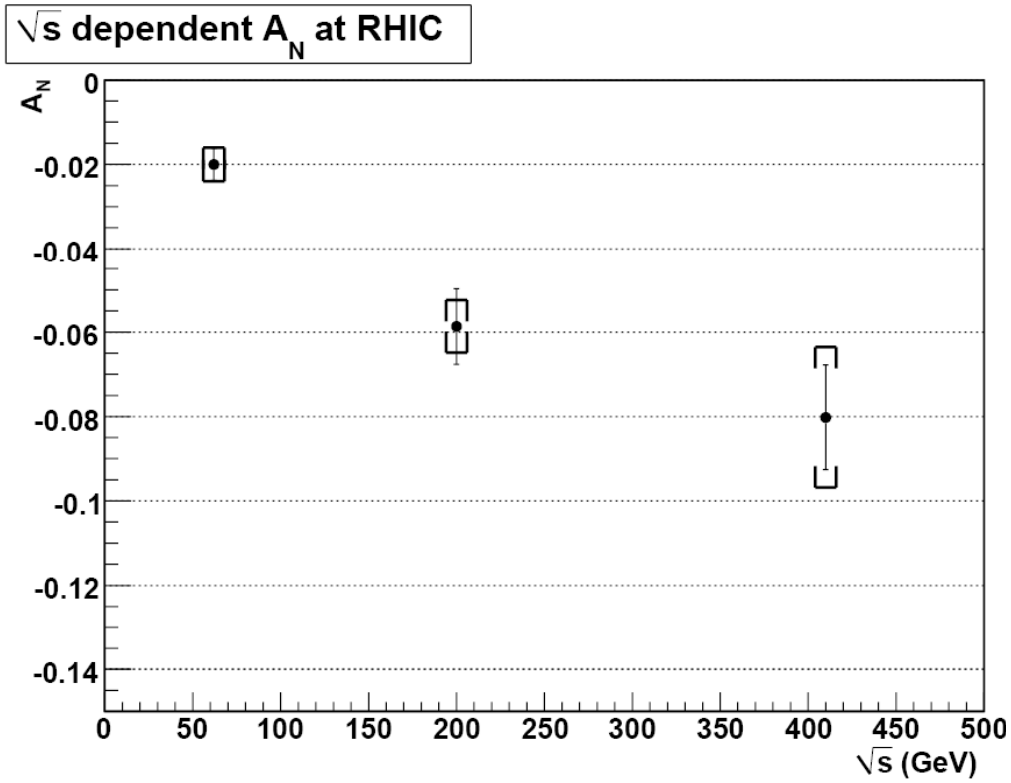
Beam gas estimation

- Plot crossing distribution after neutronID.

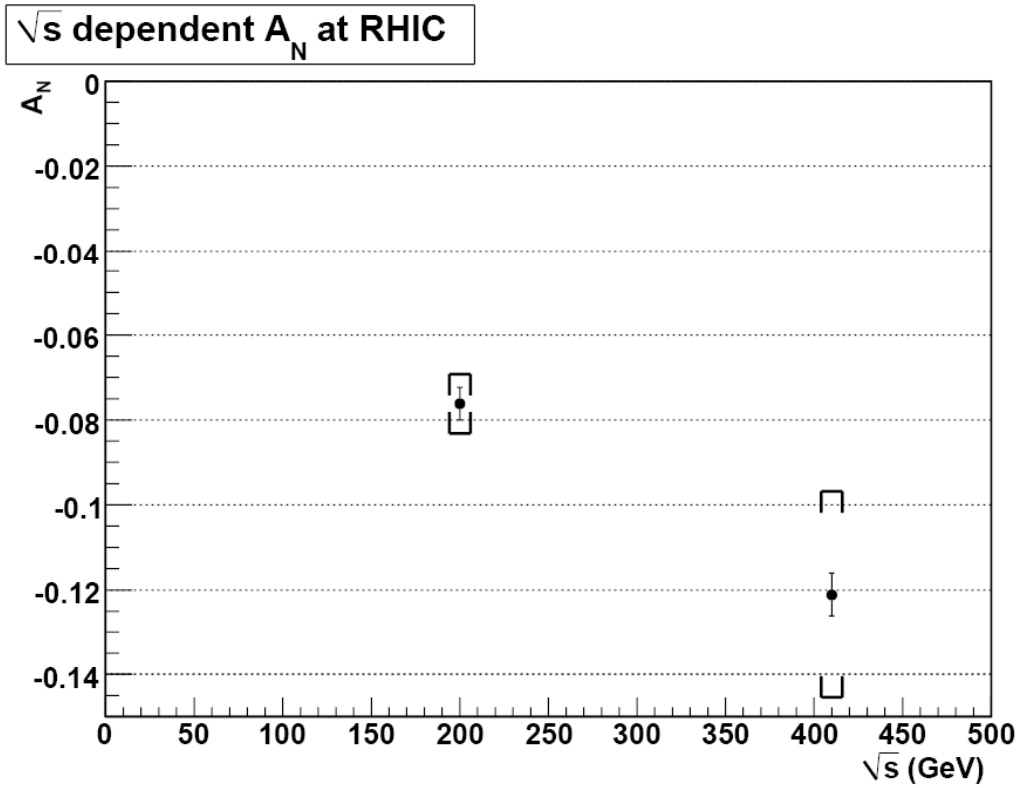


No counts in abort gap for 410 GeV data. (online monitor)

With systematics (without pol.)



ZDCN|S trigger

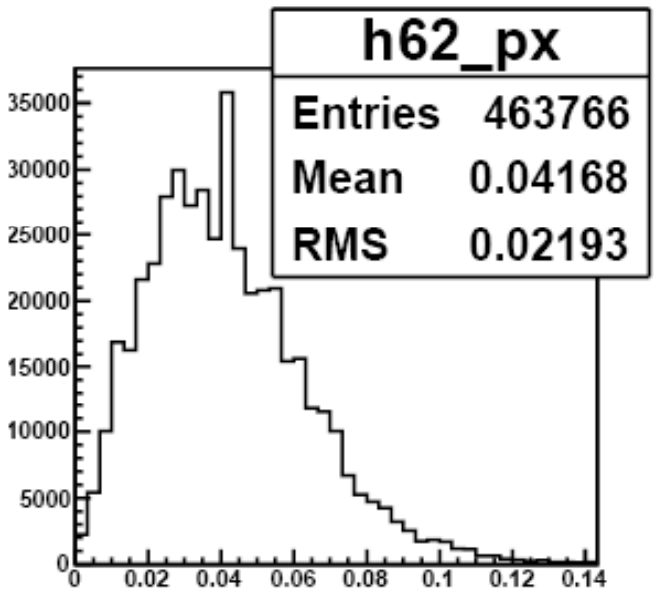


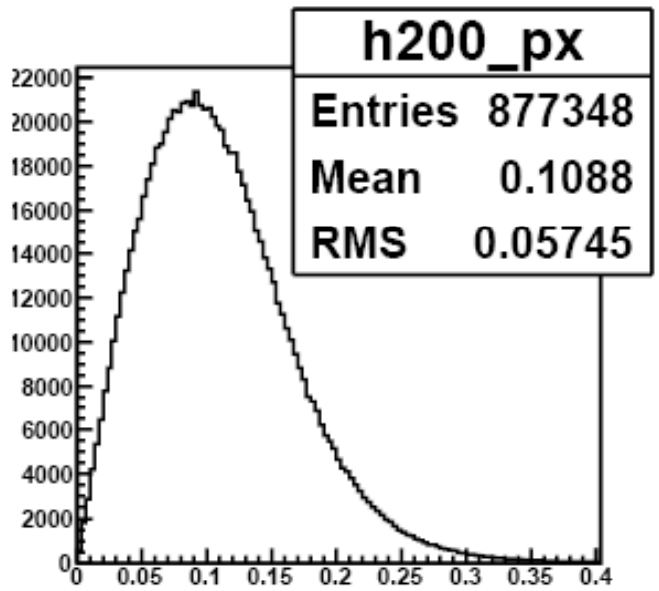
BBCLL1&(ZDCN|S) trigger

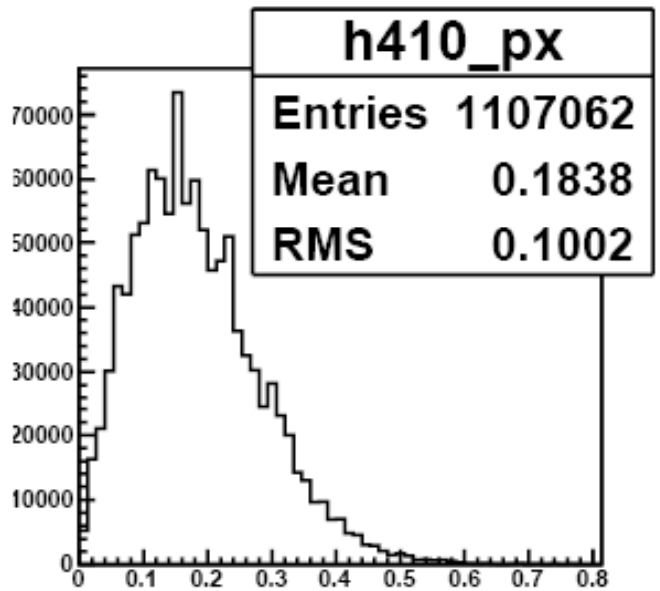
To do

- Comparison of charged events for 62 GeV.
  - Comparison FC distribution
- Bunch shuffling
  - In local pol analysis, there is big systematic for 62 GeV. (Luminosity formla)

Estimation of p_T for each s



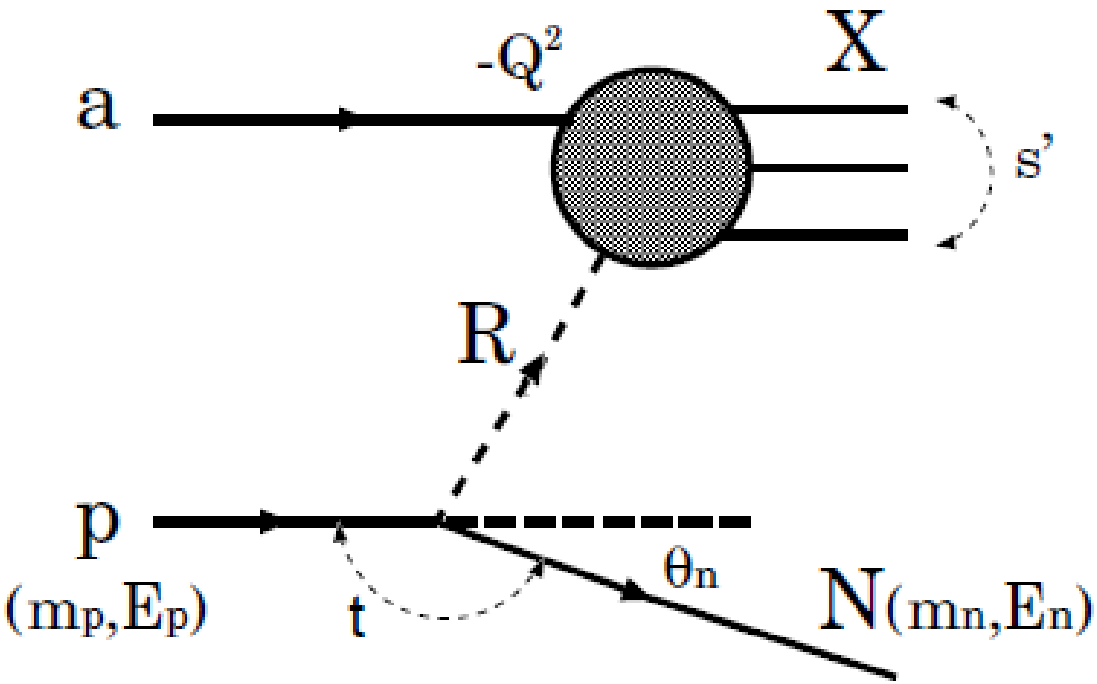




For ZDCN|S trigger

With BBC trigger → It will be 96 % due to the low x_F distribution.

Kinematics



$$x_F = p_L/p_{L(max)} = E_n \cos\theta_n / E_p \sim E_n/E_p$$

$$p_T = E_n \sin\theta_n \sim x_F E_p \theta_n$$

$$t \sim -\frac{p_T^2}{x_F} - t_0 \qquad t_0 \equiv \frac{1-x_F}{x_F}(m_n^2 - x_F m_p^2)$$