#### Resolution and Focal Plane Patterns in SHMS

Jure Bericic May 12, 2016

#### Reconstruction Resolution – 1a

pointtarg\_20deg\_2gev\_wc\_msct\_cer\_sieve

-20

-10

10

20

-10

0

10

20

30

delta versus deltai delta-deltai versus deltai • delta 450 400 350 300 delta 250 200 150 -0.6 10 100 -0.6 50 -01 -10deltai deltai Fitted value of par[1]=Mean Fitted value of par[2]=Sigma 0.08 0.0 0.4 0.04 0.3 -0.02 -0.02-0.04

#### Reconstruction Resolution – 1b

pointtarg\_20deg\_2gev\_wc\_msct\_vac\_sieve



#### Reconstruction Resolution – 2a

pointtarg\_20deg\_6gev\_wc\_msct\_cer\_sieve

xytar

yptar-yptari versus deltai yptar versus yptari 0.04 0.02 160 400 0.03 0.015 140 350 0.02 0.0 120 300 0.005 0.0 100 250 yptar-ypta 큠 0 80 200 -0.0-0.005150 60 -0.02-0.01 100 40 -0.03 -0.015 20 -0.04 -0.04 -0.02-0.03-0.02-0.010 0.01 0.02 0.03 0.04 -1020 yptari deltai Fitted value of par[2]=Sigma Fitted value of par[1]=Mean  $\times 10^{-5}$ 0.001 0. 0.001 0.08 0.001 0.06 0.0012 0.04 0.00 0.0008 0.02 0.0006 n 0.0004 -0.02 0.0002 0<u>−</u>20 -20-100 10 20 30 -100 10 20 30

#### Reconstruction Resolution – 2b

pointtarg\_20deg\_6gev\_wc\_msct\_vac\_sieve



#### Focal Plane Patterns

pointtarg\_20deg\_6gev\_wc\_msct\_vac\_sieve

- Study of the patterns in focal plane variables
- What can we expect?
- Can we use them for calibration?

#### Overview



#### Sieve Holes – xsieve

- Select sieve columns with cuts on hsxpfp-hsxfp
- Optional cut on delta

hsxfp vs hsxpfp cut on xsieve

• Not much difference if Cerenkov or vacuum



ysieve vs xsieve cut on xsieve

xsieve

8

鑁

10

15

### Sieve Holes – ysieve

- Select sieve rows with cuts on hsypfp-hsyfp
- Optional cut on delta
- Not much difference if Cerenkov or vacuum



ysieve vs xsieve cut on ysieve



### Quad Strength and Focal Plane Patterns

• Can we use focal plane patterns to calibrate strengths of quadrupole magnets?

- Calculated new transport matrices with COSY for different strengths of quads
- Ran mc\_shmh\_single with new matrices

### Q1 Strength Variation – 1

- Q2, Q3 on nominal strength
- Q1 [\*0.95, \*1.00, \*1.05] nominal strength



### Q1 Strength Variation – 2

- Q2, Q3 on nominal strength
- Q1 [\*0.95, \*1.00, \*1.05] nominal strength



### Q2 Strength Variation – 1

- Q1, Q3 on nominal strength
- Q2 [\*0.95, \*1.00, \*1.05] nominal strength



### Q2 Strength Variation – 2

- Q1, Q3 on nominal strength
- Q2 [\*0.95, \*1.00, \*1.05] nominal strength



### Q3 Strength Variation – 1

- Q1, Q2 on nominal strength
- Q3 [\*0.95, \*1.00, \*1.05] nominal strength



### Q3 Strength Variation – 2

- Q1, Q2 on nominal strength
- Q3 [\*0.95, \*1.00, \*1.05] nominal strength



#### Overview

- Patterns not very sensitive to Q1 and Q3
- High sensitivity to Q2
- Hard to disentangle effect of single quad from others
  - All have similar effects on the patterns
  - In first order increasing strength of Q2 is the same as lowering strength of Q1 and Q3
  - Focus in one defocus in other direction
- Try patterns with only single quad powered

# Q1 Single Strength Variation – 1

- Q2, Q3 turned off
- Q1 [\*0.95, \*1.00, \*1.05] nominal strength



# Q1 Single Strength Variation – 2

- Q2, Q3 turned off
- Q1 [\*0.95, \*1.00, \*1.05] nominal strength



# Q2 Single Strength Variation – 1

- Q1, Q3 turned off
- Q2 [\*0.95, \*1.00, \*1.05] nominal strength



# Q2 Single Strength Variation – 2

- Q1, Q3 turned off
- Q2 [\*0.95, \*1.00, \*1.05] nominal strength



# Q3 Single Strength Variation

- Q1, Q2 turned off
- Q3 [\*0.95, \*1.00, \*1.05] nominal strength
- 0 < delta < 15

