Beam paper update

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Changes made

- **Efficiency correction from source data**
  - All *S4* data now weighted by an additional $1/0.8$
  - Accounts for Efficiency $\neq 1$ even at most efficient part of bar
- **Altered proton time/momentum cut in Data & MC for** *S4*
  - When calculating ratios require minimum proton momentum of 0.15 GeV/c (or time equivalent) in both data and Monte Carlo
- **Smaller time window for bar coincidences**
  - 20 ns $\longrightarrow 18.2$ ns
  - This properly represents the measured end-to-end speed of signals

Resulting ratios

| N. blocks	$S4_{MC}/S3_{MC}$	$S4_{data}/S4_{data}$	Old data ratio
0	0.0491	0.0691 ± 0.0013	0.0549
1	0.1010	0.1221 ± 0.0030	0.0847
2	0.1316	0.1463 ± 0.0023	0.0901
3	0.0943	0.0703 ± 0.0015	0.0325
4	0.0192	0.0770 ± 0.0086	0.0667

- Uncertainties have shrunk due to smaller bar coincidence window (events at bar ends typically have larger weights applied)
- We still see discrepancies
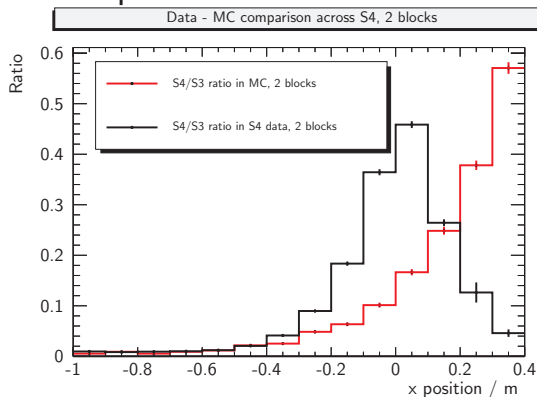
Vertical slice comparison - 0 blocks
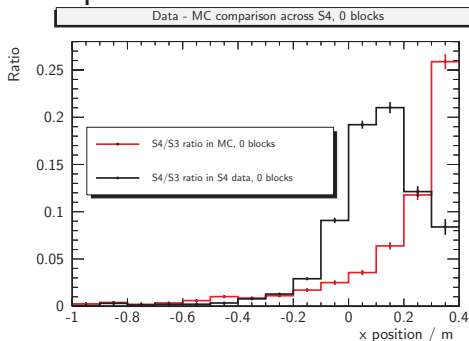
- Continuing discrepancy becomes more obvious when looking at vertical slices
- Comparison of $S4$ data (with efficiency corrections) and MC
- In MC coordinates – $x = 0.4$ is beam side of $S4$

Vertical slice comparison - 1 block
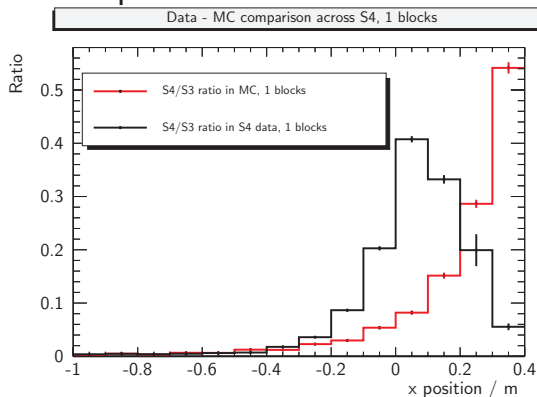
- Comparison of *S4* data (with efficiency corrections) and MC
- In MC coordinates – $x = 0.4$ is beam side of *S4*

Vertical slice comparison - 2 blocks

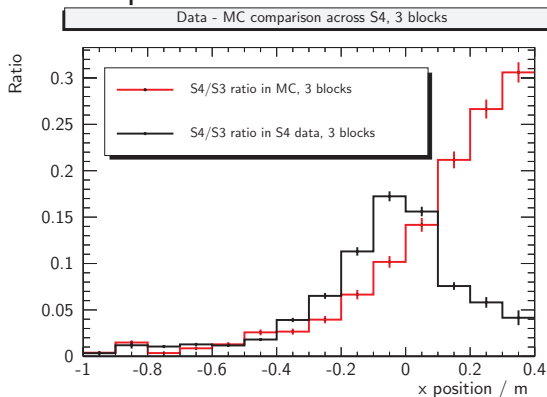Data - MC comparison across S4, 2 blocks

- Comparison of *S4* data (with efficiency corrections) and MC
- In MC coordinates – $x = 0.4$ is beam side of *S4*

Vertical slice comparison - 3 blocks

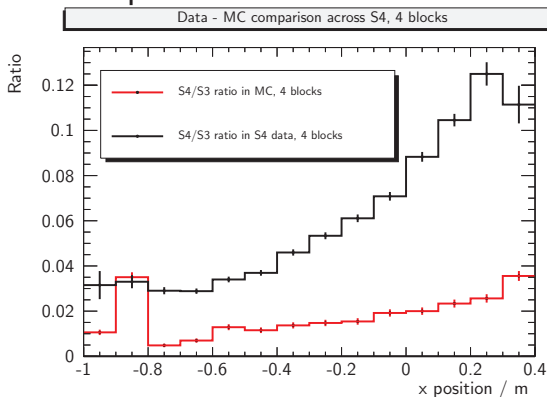Data - MC comparison across S4, 3 blocks

- Comparison of *S4* data (with efficiency corrections) and MC
- In MC coordinates – $x = 0.4$ is beam side of *S4*

Vertical slice comparison - 4 block

Data - MC comparison across S4, 4 blocks

- Comparison of *S4* data (with efficiency corrections) and MC
- In MC coordinates – $x = 0.4$ is beam side of *S4*

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Vertical slice comparison

- It seems as though the corrections are not working correctly at the bar ends
- If we remove the 3 bins closest to the beam-side end from both data and MC, how do our ratios look?

N. blocks	$S4_{MC}/S3_{MC}$	$S4_{data}/S4_{data}$
0	0.0090	0.0308
1	0.0169	0.0697
2	0.0333	0.1078
3	0.0318	0.0548
4	0.0118	0.0458

- Not really any better than previously...