

EIC Simulation Updates

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Parameters

- ▶ Single π^- going through all Si detector
- ▶ 100,000 events for each p_{truth} value: $p = 5, 10, 20$ GeV
- ▶ $-5.0 < \eta < 5.0$, full ϕ coverage

$\sigma\left(\frac{dp}{p}\right)$ vs η

- ▶ Double Gaussian fit for each bin

$$f(x) = \frac{p_0}{\sqrt{2\pi p_2^2}} \exp\left(-\frac{1}{2}\left(\frac{x-p_1}{p_2}\right)^2\right) + \frac{p_3}{\sqrt{2\pi p_4^2}} \exp\left(-\frac{1}{2}\left(\frac{x-p_1}{p_4}\right)^2\right)$$

- ▶ Parameter restrictions

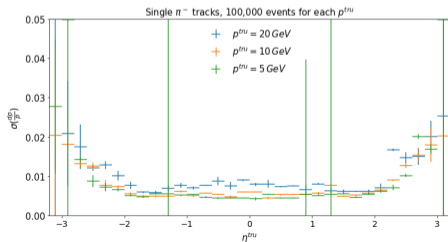
For $|\eta| < 1.4$, $\max(|p_2|) = \max(|p_4|) = 0.03$

For $|\eta| > 1.4$, $\max(|p_2|) = \max(|p_4|) = 0.05$

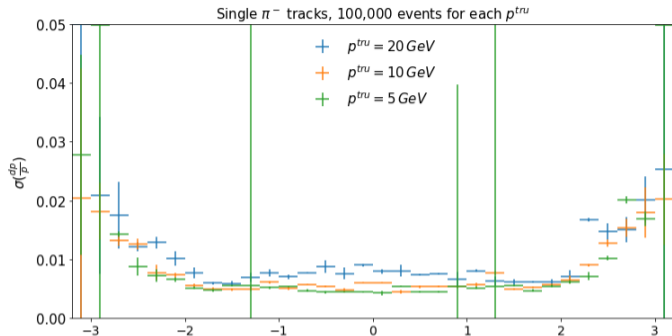
- ▶ Plot the standard deviation of the Gaussian that has the larger normalization factor

If $|p_0| > |p_3|$, $\sigma(dp/p) = |p_2|$

If $|p_0| < |p_3|$, $\sigma(dp/p) = |p_4|$



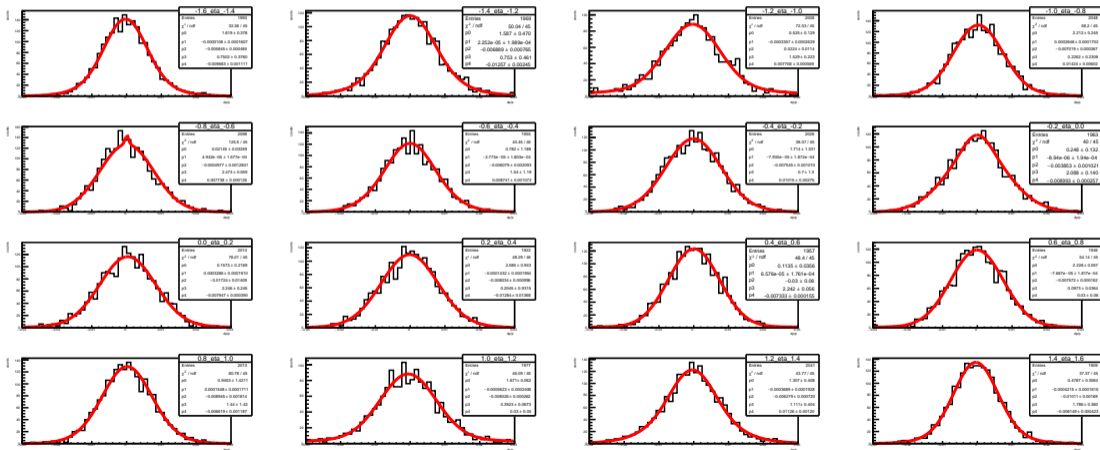
$\sigma\left(\frac{dp}{p}\right)$ vs η



- ▶ Problematic bins: Printout from terminal says fit doesn't converge.
 - 20 GeV (2.2, 2.4)
 - 10 GeV (-2.2, -2.0)
 - 5 GeV (-2.4, -2.2) (-1.4, -1.2) (0.8, 1.0) (1.2, 1.4) (2.6, 2.8) (3.0, 3.2)
- ▶ Small peaks not at the center might cause the fitting to fail, because we force the Gaussians to have the same mean.
- ▶ To do: extend fit range for high $|\eta|$ bins, and see if we are able to make the some of the fits converge

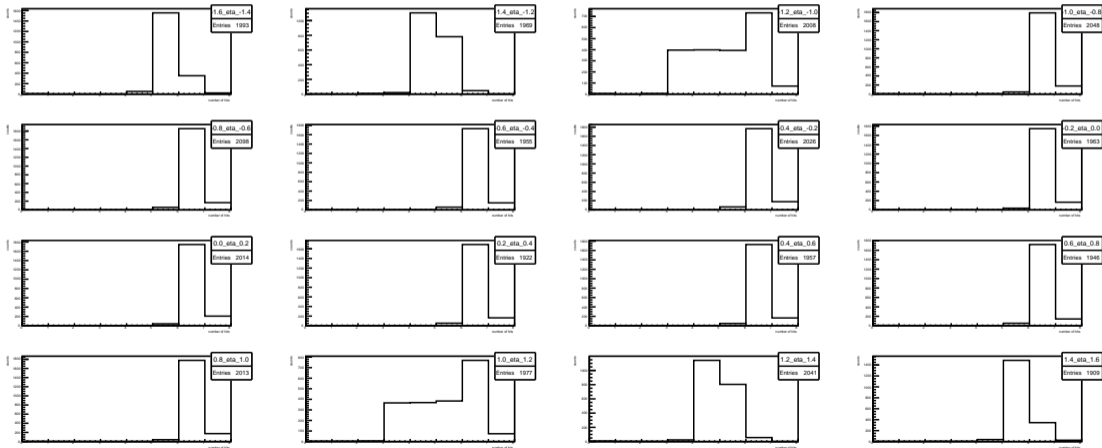
dp/p distributions for 20 GeV at mid η

► x axis (-0.03,0.03): dp/p; y axis: counts



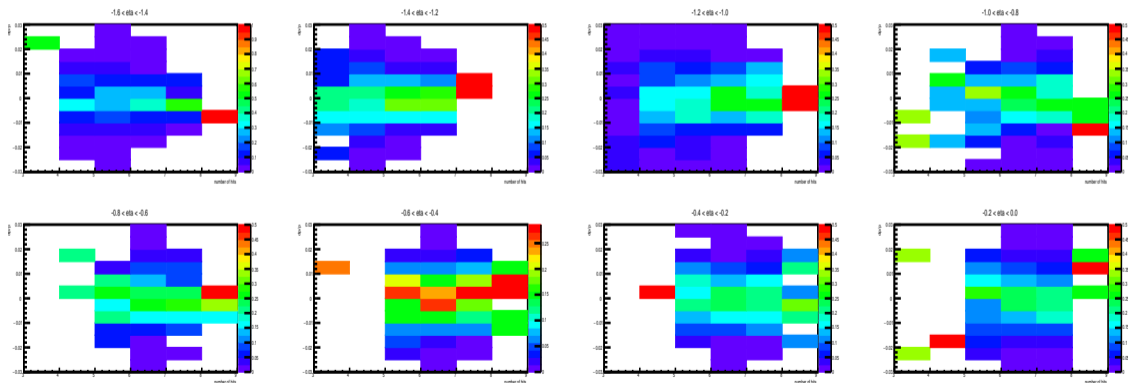
Number of hits distributions for 20 GeV at mid η

► x axis (0,8): number of hits



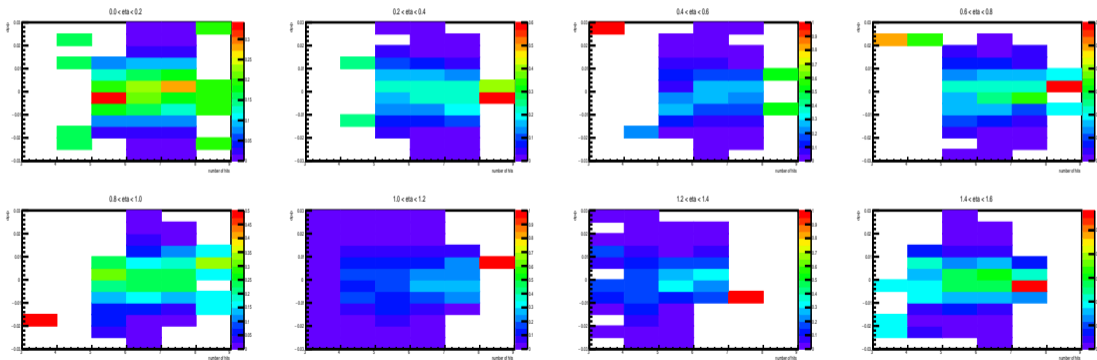
dp/p vs number of hits for 20 GeV at mid η

- ▶ x axis (3,9): number of hits; y axis (-0.03,0.03): dp/p;
z axis: tracks in the bin / tracks in the column



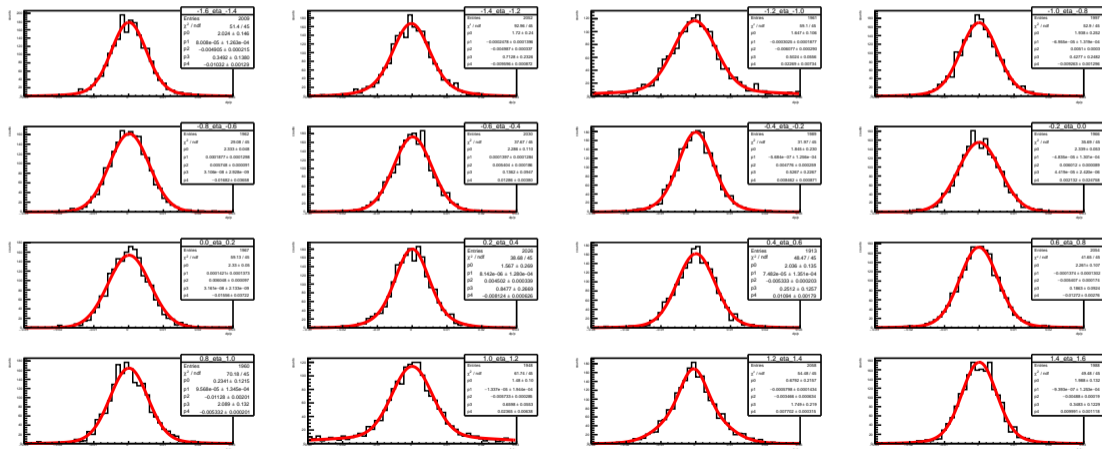
dp/p vs number of hits for 20 GeV at mid η

- ▶ x axis (3,9): number of hits; y axis (-0.03,0.03): dp/p;
z axis: tracks in the bin / tracks in the column



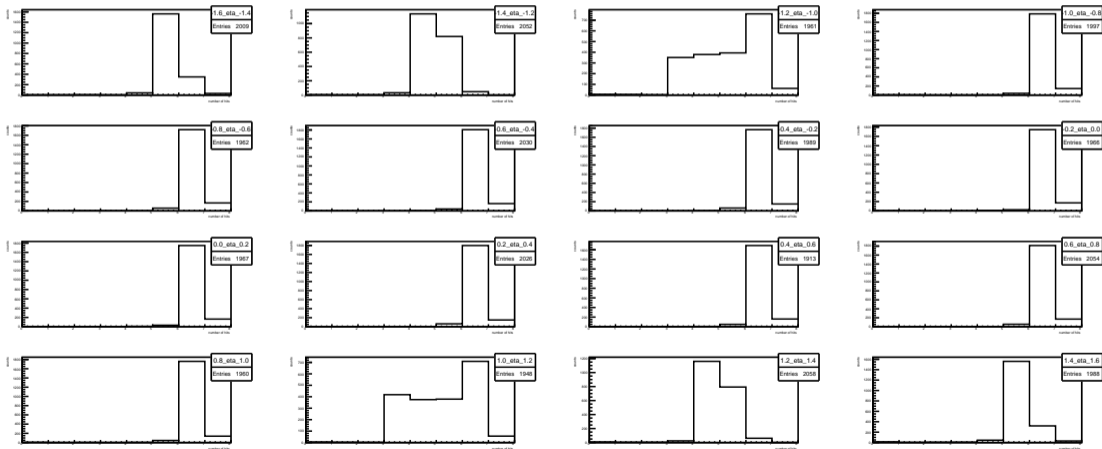
dp/p distributions for 10 GeV at mid η

► x axis (-0.03,0.03): dp/p; y axis: counts



Number of hits distributions for 10 GeV at mid η

- ▶ x axis (0,8): number of hits



dp/p distributions for 5 GeV at mid η

- ▶ x axis (-0.03,0.03): dp/p; y axis: counts
- ▶ bad bins: (-1.4, -1.2) (0.8, 1.0) (1.2, 1.4)

