

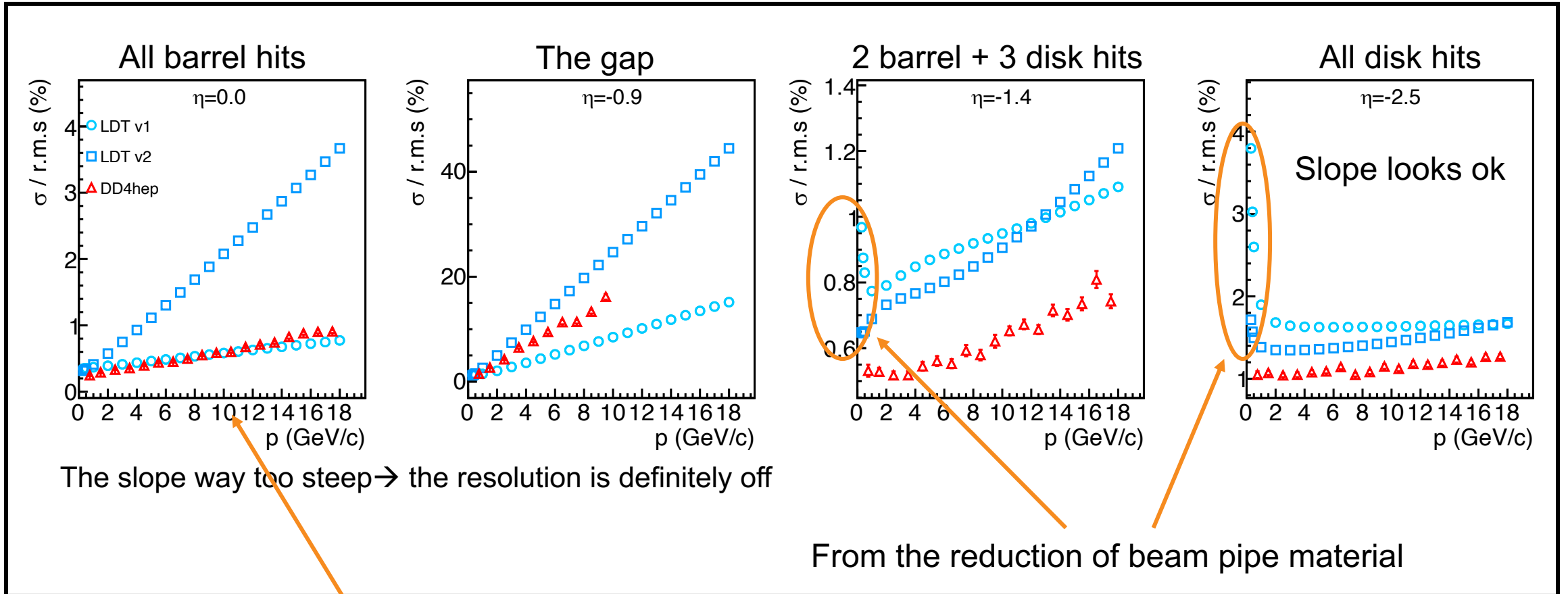
Tracking Simulation for the 2nd Detector -- Using LDT (Fast Sim)

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Last Update

- Pixel resolution is off in both barrel and backward region
- Material budget is off in the backward region



Why the momentum resolution is so high in the barrel region in LDT?

“Decouple” Two Components in Mom. Res.

To make things simpler,

- Reduce the thickness of silicon wafer from 40 μ m to 5 μ m (DD4hep/Eicrecon cannot deal with a thickness < 5 μ m)
 - Remove service/cooling materials: carbon fiber and aluminum
 - Beam pipe material = vacuum
- Minimize the multiple scattering components in the momentum resolutions
- Focus on the pixel size components in the momentum resolutions

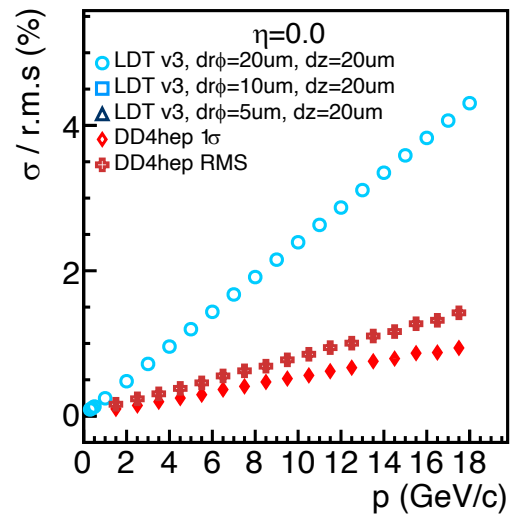
Extraction of Resolutions

- LDT: RMS is used to extract the resolutions
 - RMS highly depends on the dp/p range of interest
- Use RMS to extract the resolutions from DD4hep instead of Gaussian fit
- But the Gaussian fit is used to determine the dp/p range of interest: $\pm 5\sigma$

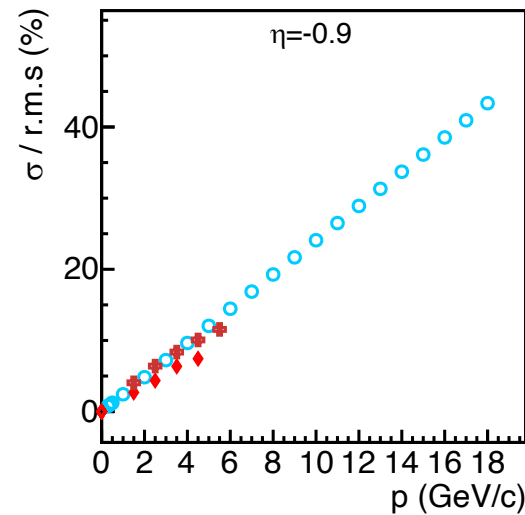
Momentum Resolutions

- Reduce the thickness of silicon wafer from 40um to 5um
- \oplus RMS res $>$ \blacklozenge 1σ res

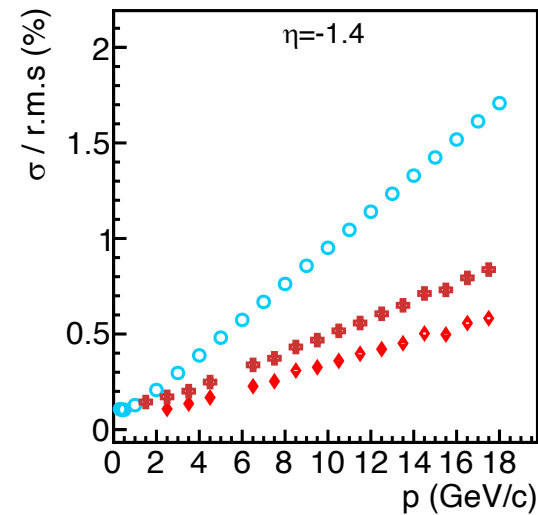
All barrel hits



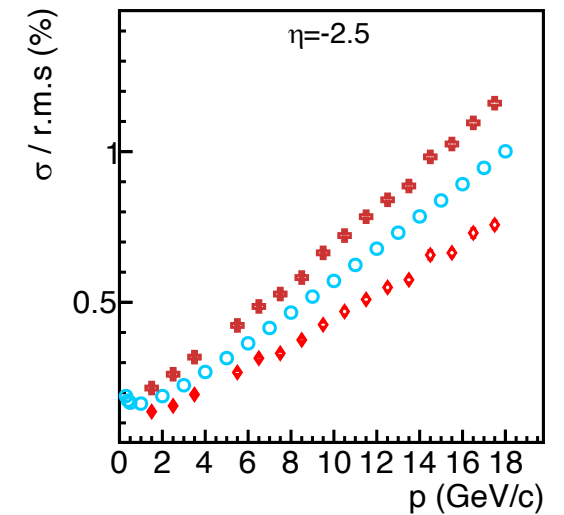
The gap



2 barrel + 3 disk hits



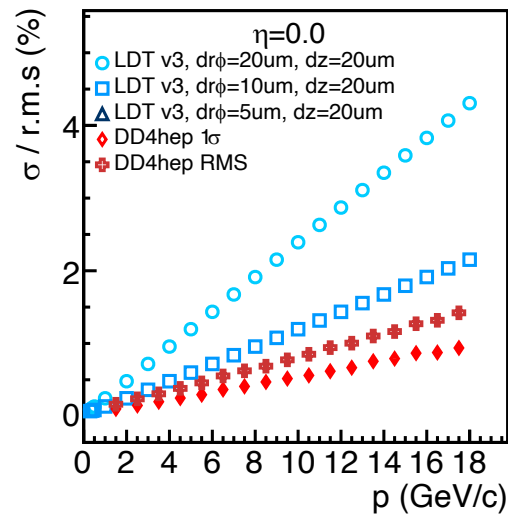
All disk hits



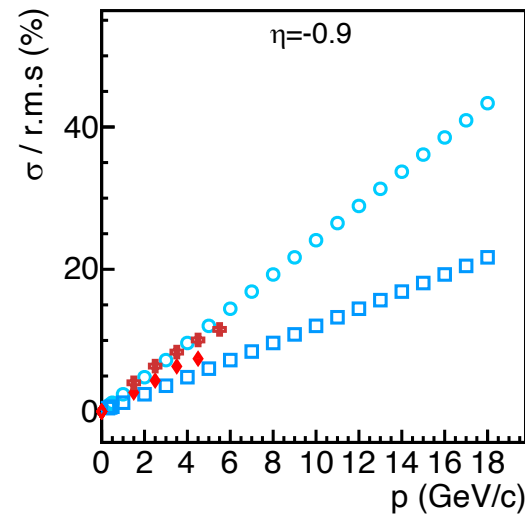
Momentum Resolutions

- Reduce the thickness of silicon wafer from 40 μm to 5 μm
- Now, experiment with the barrel silicon pixel resolutions

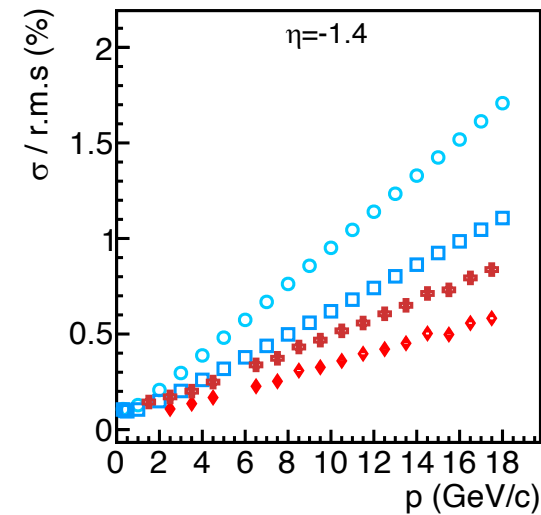
All barrel hits



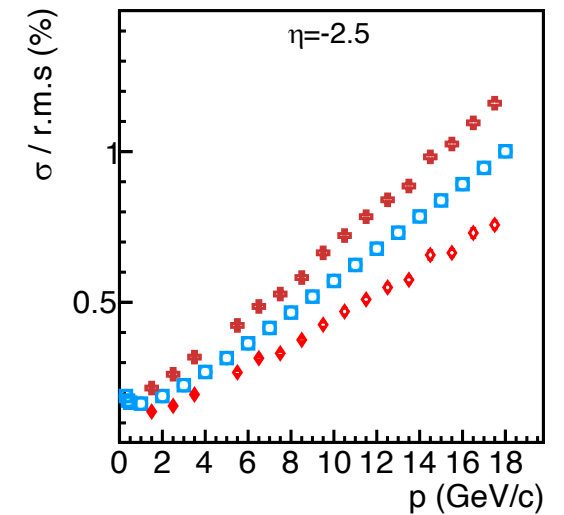
The gap



2 barrel + 3 disk hits

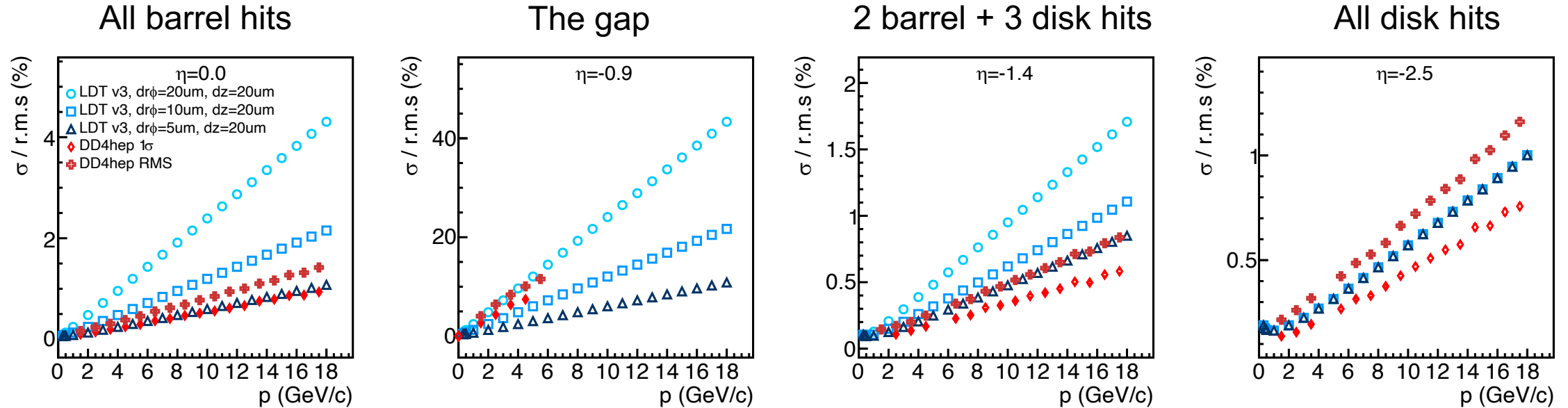


All disk hits



Momentum Resolutions

- Reduce the thickness of silicon wafer from 40 μm to 5 μm



Summary

- Changes in detector setup to decouple multiple scattering and pixel size effects on momentum resolution
- Provide momentum resolution extracted using RMS and Gaussian sigma in DD4hep results
- Testing various pixel resolutions of the barrel silicon layers

Back Up

Momentum Resolutions

- LDT v3, $dr\phi=20\mu\text{m}$, $dz=20\mu\text{m}$
- LDT v3, $dr\phi=10\mu\text{m}$, $dz=20\mu\text{m}$
- ▲ LDT v3, $dr\phi=5\mu\text{m}$, $dz=20\mu\text{m}$
- ◆ DD4hep 1σ
- ◆ DD4hep RMS

