FASER is a new experiment at CERN designed to complement the LHC’s ongoing physics programme, extending its discovery potential to light and weakly-interacting particles such as long-lived dark photons ($A'$). These are characterised by a signature with two oppositely-charged tracks or two photons with very high energy ($\sim$TeV) that emanate from a common vertex inside the detector.

The FASER tracker consists of 72 double-sided silicon microstrip modules.

- A 150 GeV muon beam with approx. 3.5M tracks was used to study local alignment in middle layer of 1 station
- Local $x$ and $y$ residuals before (after) alignment shown in red (blue) displaying the results after alignment
- Global alignment results are in progress

The main aims of the 2021 Test Beam are:
- Calibration of calorimeter using electron (5-300 GeV) and muon (150 GeV) beams, scanning through 24 spatial points across 6 modules
- Study uniformity of MIP response and pion scan
- Setup consists primarily of the tracking stations, the preshower and the calorimeter.

A full simulation of the calorimeter system is implemented in FASER’s Calypso framework.

- Specific test beam geometry designed to compare simulation to data
- Crystal ball fitted to distributions to extract $\mu$ and $\sigma$, where $\sigma$ is derived from width of crystal ball, converting to energy resolution ($\sigma/E$) allows for direct comparison (see table)

<table>
<thead>
<tr>
<th></th>
<th>$\mu$</th>
<th>$\sigma$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected data</td>
<td>0.134 ± 0.001</td>
<td>0.0117 ± 0.0002</td>
</tr>
<tr>
<td>Raw Data</td>
<td>0.215 ± 0.001</td>
<td>0.0115 ± 0.0002</td>
</tr>
<tr>
<td>Simulation</td>
<td>0.135 ± 0.001</td>
<td>0.0090 ± 0.0017</td>
</tr>
<tr>
<td>LHCb</td>
<td>0.094 ± 0.004</td>
<td>0.0083 ± 0.0002</td>
</tr>
</tbody>
</table>

Errors on plot are too small to be visible at this scale.

Errors on plot are too small to be visible at this scale.

Next stage: calibrate response of calorimeter in terms of energy.