MEG II drift chamber characterisation with the silicon based cosmic ray tracker at INFN Pisa

The cosmic ray telescope

- BaBar layer 4 and 5 spare module assembly
- new FPGA-based read-out
- high precision track reference for a prototype under test
- hit detection efficiency >90% for each module
Detector under test

- 7mm squared cells
- anode wire 20 µm (Au)W wire
- 85-15% He-isobutane gas
- low ionisation density: 13 cluster/cm
- operated at ~1600 V, 5x10^5 gain
- read with waveform digitiser, 2GSPS, 300 MHz BW
Alignment
- wire imaging for the horizontal plane
- wire projection for tracks with opposite slant angles for the height

T-XY tables
Extracted from data. Compatible with Garfield++ predictions.
Results and perspectives

- Resolution of the order of 110 µm in the whole cell by using only the first ionisation cluster information
- Expected deviations from gaussian distribution in particular for events close to the wire; right exponential tail starting from distance δ from the mean µ
- visible thanks to the external track reference
- due to the low ionisation density
- algorithm to solve this issue by using the other ionisation clusters under study, presented by Signorelli in a poster at the conference

Integrated on all impact parameters

\[ \chi^2 / \text{ndf} = 127.7 / 31 \]

\[ A = 1099 \pm 12.7 \]

\[ \mu = -0.01546 \pm 0.00157 \]

\[ \sigma = 0.1062 \pm 0.0016 \]

\[ \delta = 0.07781 \pm 0.00310 \]