

Minutes of WP-meeting 228

Attendance:

DESY: Ties Behnke, Ralf Diener, Ulrich Einhaus, Oleksiy Fedorchuk, Leif Jönsson, Claus Kleinwort, Paul Malek, Felix Müller, Volker Prahl, Oliver Schäfer, Dimitra Tsionou

Fuzebox: Deb Sankar Bhattacharya, Madhu Dixit, Takahiro Fusayasu, Jochen Kaminski, Peter Kluit, Michael Lupberger, Nayana Majumber, Supratik Mukhopadhyay, Amir Shirazi, Ron Settles, Jan Timmermans

General News:

Ties asked, if anyone wants to give a TPC talk during the ILD meeting during the LCWS 2015 in Whistler.

News from the groups:

Michael gave a summary of a preliminary analysis from the InGrid test beam in March/April. He started with giving some impressions of the design and construction of the 3 modules with 160 InGrids. He then showed several tracks as observed with the online event display during the test beam. He then presented the different steps of the analysis: It first begins with the cleaning of the data from noise. The cleaning is based on the occupancy plots and physically impossible counter values. The cleaned time spectrum shows the expected features of beam position, cathode position and off-trigger particles with DESY II repetition frequency. From this spectrum the drift velocity was calculated with two different methods: The beam position during a z-scan gives results closed to the values given by Magboltz, while the drift velocity derived from the cathode cutoff give values about 1.2 % lower. The reason for this has not been understood yet. Michael gave then a short overview on the reconstruction of tracks and the current alignment procedure. It was shown, that the current alignment is not enough and a better algorithm based on individual chips is necessary. Then the stringent cuts for good tracks was presented. The energy loss for these tracks was calculated and is in agreement with literature values. The dE/dx values were given and extrapolations for various scenarios of a full ILD TPC were calculated from an ideal case (3.84 %) to an extrapolation of the test beam setup (5.71%). Next the spatial resolutions were presented both for the transverse and the longitudinal direction. While the transverse resolution is close to the diffusion limit, there are significant degradations for the longitudinal case. However, in both cases the track distortions because of field inhomogeneities preclude better results. Nevertheless, it could be demonstrated that the transverse spatial resolution does not degrade with the track inclination. If the track's momenta are calculated the maximum value of the distribution should correspond to the value selected for the beam. This is however only the case for low momenta, but for higher momenta (e.g. 5 GeV) the reconstructed value is significantly lower. This is potentially also because of misaligned chip positions. The final topic the stability of the system. Michael described the different modes of failure or limited operation and gave the numbers before (9) and after the test beam (21). This high rate of failure is still under study, but there are first indications, that most of the failing chips are of the same wafer, while other wafers had much lower rates of failure.

Deb Sankar reported on his simulation of field distortions with the MM modules. He made a simplified model of three MM modules with rectangular shape and smaller area ($3.4 \times 3.4 \text{ cm}^2$ and $3.4 \times 4.0 \text{ cm}^2$). The other parameters were as close to the modules as possible. The meshing was done with neBEM and took about 2 days. Deb Sankar used then Garfield++ to simulate the drift paths of electrons of about 100 tracks. 300 electrons were placed equidistantly on the track. The drift paths in typical

electrical fields and a magnetic field of $B = 1$ T showed the expected $E \times B$ effects at the module border. Also, gaps of similar size as seen in data are given by the simulation. Because of the necessary simplifications some features observed in data are not visible in the simulation results. In the next step Deb Sankar wants to test the effect of misalignment of the modules on the reconstructed distortions. It was also suggested, that he should try to implement the keystone shape of module., because this and the varying distance between the modules could also contribute to the shape of the observed mean deviations of the residuals.

AOB:

The next workpackage meeting will take place on October 8th.