

## Minutes of WP-meeting 166

### Attendance:

DESY: Paul Colas, Ralf Diener, Isa Heinze, Leif Jönsson, Felix Müller, Astrid Münnich, Volker Prah  
Webex: Alain Bellerive, Andrii Chaus, Madhu Dixit, Philippe Gros, Jochen Kaminski, Dan Peterson, Saiqa Shahid, Ron Settles, Akira Sugiyam, Jan Timmermans, Wenxin Wang

### General News:

Jochen reported, that he was contacted by Yannis Karyotakis with the question if LCTPC wanted to be reviewed by the ECFA Detector R&D panel in April. After some discussion the regional coordinators thought a review would be a good idea, but that it would be better to delay the review to the fall of 2013. Then the test beam campaigns of early 2013 will be largely analyzed and there will be enough time to prepare the report.

Jochen also suggested to make a collaboration meeting, which would also be a good opportunity to start preparing the review report. As a possible date and place he suggested to make it at DESY either before or after the ECFA Linear Collider Workshop (27.-31.5.2013). This was greeted.

Jochen also announced, that the contract of the GDE with Webex-company expires on 26th of January and will not be extended because the prize was raised too much. The successor system is called Fuzebox and will be tested during the next workpackage meeting.

### PCMAG/LP setup, test beam:

Ralf: PCMAG/test beam area:

- The cool-down of PCMAG has started today and will last until the 20th. In the time between the 20th and the start of Paul's test beam campaign, the Belle group will measure the magnetic field in the test beam area (outside of PCMAG), because they need a 3D field map to know, where they can place their equipment. Oliver Schäfer has fixed one of the Hall probes inside PCMAG, so the  $\Delta B$  can be measured, when the magnet is moved closer to the wall or further away.

LP:

- Because of the numerous test beam campaign at the beginning of this year, there will be no further HV-tests not to endanger the stability of the setup. The tests have been postponed after the last test beam measurements this year.

Test beam schedule:

- There is a link on the agenda to the test beam websides where also the schedules is posted. The schedule is not official yet, but it is already very crowded and only a few weeks are left. So everyone who wants to do a test beam campaign should contact the test beam coordinators immediately. (Ingrid is currently gone, but Marcel Stanitzki, who will take over from her soon, should be at DESY).

### News from the groups:

Jochen had asked everyone to prepare a short overview over all projects in the groups despite the status and to discuss the plans for the near future.

Paul gave a short summary on the evolution of the Micromegas with resistive anode-modules and showed some results of the latest test beam from last July. There are some distortions at the border of

the modules, which partially arise from the  $E \times B$ -effects because of field inhomogeneities. The discussion is still going on if there are more effects necessary to explain the observed behavior of the residuals. Additionally, Saclay is involved in designing the successor chip of SALTRO, the GdSP chip, in analyzing the data of the last Octopuce test beam campaign and in preparing a new Octopuce. A test bench has also been set up to test the LP-modules with an  $^{55}\text{Fe}$  source. Further plans for the close future include a test beam campaign with a 7 module setup in February, adapt 2PCO2 cooling, and test several modifications of the modules, like smaller pads, piggy-back setup etc. Also power pulsing and the creation of an ion sheet by UV-light are planned.

Ralf reported on the projects of DESY. DESY is taking care and upgrading the test beam area T24/1. Some of the ongoing and planned improvements are the construction of a mounting tool for the LP modules, tests concerning and improving the HV-stability of the LP and simplifying the use of the movable stage. Bigger projects are to build a new field cage and cathode endplate. Also a silicon tracker as track reference is under consideration. Besides, DESY is preparing a new test beam campaign with 3 triple GEM modules in February and March. To understand the ion backflow, Klaus Zenker has started detailed simulations with a Garfield++ and CST to understand the signal formation in a GEM and to reduce the ion backflow in the simulation. A test setup for reference measurements has been completed and measurements will start soon. DESY has also contributed to the improvements of the MarlinTPC software, implemented the new track finding tools Pathfinder and on based on a General Broken Line method. Also a fast analysis package designed for test beam campaigns has been written and made available. DESY also takes care of central infrastructure like data repository, conditions database, etc.

Ralf summarized the transparencies on the Rostock status on behalf of Oliver. He has serious funding problems, since he has to finance his PhD work by working on an industry project. The situation will not improve in the near future. Nevertheless, he can visit DESY once in a while and work on the extension of DOOCS for HEP experiments. He maintains the slow control system, upgraded the software to readout PCMAG and established HV connector interlocks. Several items to further improve the system are on his list, for example new sensors of the PCMAG have to be implemented in the software and a communication of the DOOCS system with the conditions database for easier storage of the slow control data.

Alain showed results prepared with the newly developed analysis tool in MarlinTPC. The track fit is based on determining the track parameters like inclination. Position and width by fitting the PRF to all pad data at the same time with a likelihood method and not determining the cluster parameters first. A new improvement is the determination of the charge per pad by a reintegration method, summing over the complete signal in time. This leads to a better spatial resolution and a more precise determination of the PRF. But since the PRF changes with the drift distance and track inclination, the PRF has to be measured for a large number of conditions.

Saiqa presented the status of the Siegen activities. The first project is to study the signals of different radiation sources (UV-laser,  $\beta$ -source and cosmic muons) with a triple GEM-stack and Timepix readout. They use a small prototype with a drift length of 40 cm at Siegen. They have also 8 pads of  $10 \times 4 \text{ mm}^2$  each connected to a preamplifier. The second project is a detailed test with carbon coated GEMs, which were developed at Siegen. They stand much higher voltages (650 V) than standard GEMs (430 V) before discharging and also show better long time stability of the gain.

Dan Peterson said he had finished the construction of the second endplate and it will be shipped to DESY soon. There were no more plans to construct new parts, but he will do some more simulation

work and study different endplate models. Possibly he will also do some alignment studies.

Leif reported on the status of the PCB design for the SALTRO chips. The chips will be mounted on separate carrier boards, so that they can be tested individually. These carrier boards were designed slightly larger because the exact size of the chips after dicing were not known. The chips will then be mounted on the MCM, which also features a CPLD and connector for the LC-supply card. The layout of the MCM has been finished and only 2 things remain to be decided: which CPLD and which connector to use. The decision of the CPLD depends on the availability of the preferred version. The negotiations with the production company of the MCM have started. 25 MCM can be placed on one module providing 3200 electronic channels. This requires pad sizes of at least  $1 \times 8.5 \text{mm}^2$  pads. Also the LV-board has been designed, but finalization depends on the decision of the CPLD. He also showed several views of the total setup. The current plan foresees, that the SRU controls the CLPD.

Philippe reported on the first preliminary analysis results of the Japanese test beam in December. He showed The spatial resolution in dependence on the drift distance, which looks as expected. The track curvature, however, also shows a dependence on the drift distance. This is because the form of the distribution of the curvature changes and in particular the tail varies significantly. This will be studied in more detail in the future. The positions of the GEM frames within one modules are clearly visible in the mean position of the residuals. This year the Japanese groups plan to work further on the analysis, finish a test box with a laser system, to study the edge effects between modules, test the wire gate and work on a pad plane for the SALTRO-electronics.

Jan reported that he is the only person involved in LC work at NIKHEF. His plans are to finish a 2nd Octopuce board in collaboration with Saclay and then he plans to do an engineering study for an LP module with optimal geometrical coverage with Timepix chips. The module will be based on either the Relaxed or the Spider readout system and should also take into account the minimization of material and possible future advances like Through Silicon Vias. For the total project he assumes a minimal duration of 2.5 years: A pre-study of full scale cooling would take about half a year, the production of a full module with bare chips would take about one year and the production of the final module with InGrids would take another year.

Jochen reminded everyone of the electrical field calculation and the calculation of field distortions because of ions, which were presented in WPmtg 164 by Thorsten Krautscheid. The simulations of the background have been finished and he has to find out about the mixing before continuing with the field calculations. The second Bonn project is a LP-module with a  $\sim 100$  pixel chips module. For this a new readout system based on the SRS of RD51 has been designed and only a few small bugs have to be eliminated. The first stage of the project is to build a module with a triple GEM stack and 8 TP chips and a module with 8 InGrids. Both modules shall be tested in a test beam campaign from 25th of March to the 7th of April. A cooling system with water and a possible upgrade to 2PCO2 has been foreseen and the modules will be built soon. In a second step the number of Octoboards will be increased so that about 100 chips will be available on a module. The last project is the wafer-based production of InGrids. This has resulted in one good wafer last fall, but a new production batch of 4 wafers has failed because of machine problems. A new production will be launched soon.

#### AOB:

The next workpackage meeting will take place on January 24<sup>th</sup>.