

Minutes of WP-meeting 329

Attendance:

Vidyo: Paul Colas, Ralf Diener, Ulrich Einhaus, Leif Jönsson, Shivam Joshi, Jochen Kaminski, Peter Kluit, Uwe Krämer, Kees Ligtenberg, Jurina Nakajima, Shinya Narita, Tomohisa Ogawa, Huirong Qi, Oliver Schäfer, Ron Settles, Jan Timmermans, Maxim Titov, Keita Yumino

General News:

Jochen reminded that there are several video meetings coming up soon: The announcement of the European Strategy on the 19th of June, on the same day the first meeting of the Snowmass process regarding instrumentation and the RD51 collaboration meeting from 22-26th of June.

Maxim announced that on the 5th of June the National Diet of Japan has passed a series of new laws extending the recovery plan for the Tohoku area from 2021 to 2031. Along with these laws a number of resolutions were passed, in which for the first time the ILC was stated as being part of the recovery plan. It was mentioned in 2 resolutions: here are unofficial translations given in the ILD meeting: Supplementary Resolution #5: In cases where international research and development projects, such as the International Linear Collider which will contribute to the creation of a “New Tohoku”, are to be implemented in Japan, coordination and cooperation should be done with relevant organizations so that the projects can be hosted in the disaster-stricken areas.

Supplementary Resolution #26: Since the Tohoku area is the world’s candidate site for the International Linear Collider project, its implementation will contribute, alongside the Fukushima Innovation Coast Framework, to the creation of a “New Tohoku” by becoming a breeding ground for scientific innovation; considerations towards hosting in Japan should proceed together with the relevant organizations.

This is for the first time that the House of Councilors (Upper House) and House of Representatives (Lower House) have officially acknowledged Tohoku area as the candidate site for the future global ILC laboratory in Japan.

PCMAG/LP setup, test beam:

Ralf: So far the machines are running and several local groups have successfully performed a test beam campaign. This week, the first external group (ALICE) is on-site and the feasibility of the new rules is tested under more realistic conditions. In the summer shutdown, which starts at the beginning of July, the coordinators will organize the schedule for the second half of the year. This will include contact to all groups having requested beam time to check their status and wishes. A few groups have already withdrawn their request and some have asked to be delayed until the end of the year (September/October/November). Paul added that Saclay is on track for its T2K test beam in September/October. Nikhef is still reconsidering its application for a pixel test beam.

News from the groups:

Huirong reported that there is again a lockdown at Beijing because of a new breakout of the Corona pandemic with more than one hundred new cases in one of the seafood markets from last Friday. All schools and also the institute of Huirong are closed again.

He then showed more details on the setup of the TPC at IHEP. Concerning the fibers needing more bending room along drift length and more splitting points, the laser is coupled directly via mirrors into the setup and not via a fiber. To keep the laser tracks stable, the setup has to be stabilized against vibrations. Therefore, it is placed on an anti-vibration pneumatic optical platform, where a central

spring, a pendulum bar and an auto inflation system damp any vibration down to amplitudes of less than 1 μm . Huirong then showed the event display of the DAQ with the noise performance and one laser track. He explained and showed the hits. From the hits the clusters are formed with a center of gravity algorithm. The variation of the cluster position around the laser track is spread with a width of 66.64 μm . For this a gas amplification of ~ 4000 and a drift distance of 3.3 cm was chosen. At the moment he is studying the pad response function to include it in the analysis.

Huirong also explained that during the last HV-tests sparks were observed and only 4000 V could be applied to the field cage. After studying the problem it was found that the return ground was broken at one point. After repairing the connection the HV could be ramped up to 19500 V again.

Leif showed some pictures with an updated on the SALTRO readout. The components were mounted on the first 2 MCM boards at DESY. The boards are now at Lund and will be tested soon. He also showed a first 3D picture of the LV-board design. A box is needed to hold the LC boards and to guide the short flex cables to the MCM boards. Lund hope to get assistance from DESY to design and produce such a box.

Kees reported on measurements with an negative ion TPC. The Nikhef group has added CS_2 to argon based mixtures and has used a UV laser to generate signals. CS_2 is an electronegative gas as the electrons are captured close to the point of ionization. Because the diffusion is much reduced compared to the drift of electrons, this concept promises a better transverse and longitudinal spatial resolution. To have a well known minority carrier, the group has added also 0.1 % of O_2 , which also gives a second signal arriving slightly before the main signal. The time difference between the two signals allows to reconstruct the position of the ionization without a trigger signal. Kees showed the signals from different drift distances and gave the fit function to the time spectrum. Both the majority and the minority signals give a constant drift velocity and the majority carrier have a constant mobility of 1.391 $\text{cm}^2/\text{V}\cdot\text{s}$. Kees demonstrated that the transverse diffusion is given by the thermal limit corresponding to the room temperature. The longitudinal diffusion gives a higher temperature of 383 K which is possibly due to some unrecognized minority carriers with a different mobility.

The concept of a negative ion TPC is probably not suitable for the ILC because the too large transverse diffusion coefficient and the long drift times of the order of 0.5 s. But it is intensely studied by the dark matter community. The Nikhef group is preparing a paper to publish the measurements with the GridPix.

Shivam gave a report on the results of his Master thesis. He studied two aspects of the Micromegas data. First he simulated the charge spreading on the resistive foil for both the T2K and the ILC setup. Because of the lower resistivity and the larger pads the signals look quite similar. Shivam studied the impact of the parameters such as resistivity, different capacitive coupling (stronger/weaker coupling of resistive layer to pads) and the size of the amplification gap. All these parameters behave as expected. He also studied the effect of grounded edges on the signal, where he could show that at first there is no effect, but after 100ns the signal becomes skewed.

In the second study he investigated ghost tracks, which were observed in the Micromegas before. He could identify several characteristics of these tracks, which help to filter out the events. The charge of the tracks is significantly reduced, as the central pad is missing and only the induced charge (< 60 ADC counts) on the side pads is recorded. The ghost tracks are always recorded in the first 21 time slices of an event, where no real track can be, as the trigger time is at the 21st time slice. If these requirements are met for at least 40 pads, then the event is likely to contain a ghost track. About 0.4-0.6% of all events have a ghost track. The origin is not clear yet, but it is probably due to the trigger inefficiency. The charge of untriggered events is added up in the SCA and not cleared before reading out the next triggered event.

AOB:

The next workpackage meeting will take place on July 2nd.