To Office of Experimental Planning and Coordination

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MACHINE TIME EXECUTION

REPORT (2005-4-1 CYCLE)

Experimental Group	T-582	Reporters	Madhu Dixit Ron Settles
Scheduled Period and Shift	Oct. 17 – Oct. 31, 2005 38 shifts	Main, Sub, Para	Pi2

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SUMMARY OF EXECUTION AND RESULTS

The MPGD-TPC for the ILC will have to measure 200 track points with a resolution of 100μm. It will be difficult to achieve the target resolution with the proposed ~2 mm wide pads using conventional methods, and narrower pads might increase the detector cost and complexity. An alternative MPGD readout concept of charge dispersion has been developed recently and has the potential to improve resolution for wide pads. This was demonstrated last year in cosmic ray TPC resolution studies with charge dispersion done without a magnetic field at Carleton University. Since transverse diffusion is reduced in a magnetic field, our Pi2 beam tests in the Jacee magnet were an important step toward demonstrating that the charge dispersion readout has the potential of achieving the ILC-TPC resolution target.
The MPI-TPC had been tested previously in the Pi2 beam with normal MWPC, GEM and Micromegas readout endplates, where the GEM endplate was built by the Saga group and the Micromegas endplate by the Saclay group. The Micromegas and the GEM MPI-TPC endplates were modified for charge dispersion readout and data recorded using 11 MHz digitizing electronics used previously for the Aleph TPC readout. A second TPC built at Carleton University, outfitted with a charge dispersion Micromegas endplate, was also tested and read out with 25 MHz (effective) FADCs to see if a simpler digitizer without a shaper amplifier can be more effective. The two TPCs are about the same size (~25cm diameter and driftlength) and were in the beam at the same time, one in the Jacee magnet & one outside. Data were recorded for several different gas mixtures for pions and electrons. Carleton TPC recorded close to 500,000 events, and the MPI-TPC about 100,00 events. Preliminary results are very encouraging with Carleton TPC achieving a resolution of about 40 microns for short drift distances for 2 mm wide pads. The results for the MPI-TPC with charge dispersion data are also very encouraging, and the final results will soon be ready, after the analyses have been tuned.

EXECUTED MACHINE TIME, BEAM CONDITION, DOWN TIME etc.

We were allocated 38 shifts starting 9 am on 17 October. The Carleton and the MPI TPCs had been set up with cosmic rays and were operational before the beam test started. We moved the setups to the beam area on 17 October. We spent the first day in setting up in the beam area with Carleton TPC in the magnet and the MPI-TPC outside the magnet initially. The trigger was implemented overnight. We got the first beam the next afternoon after the magnet was brought up to 1 T at 5 pm on Tuesday October 18. We had mostly smooth running, including switching the positions of the Carleton and MPI TPCs to outside and inside the magnet respectively on October 21, until the beam went off on Monday morning on 24 October. The data taking, resumed at 5 pm Tuesday on 25 October, was less smooth but successful. The MPI TPC endplate was changed to GEM with resistive foil on October 27 and reinserted in the Jacee magnet. Data-taking continued up until October 31, where we lost about 2 shifts of beam time on the last day of running due to PS machine problems. Nonetheless, we got sufficient data to complete our research goals.

COMMENTS

Overall, the beam test was very successful. We have plenty of high quality data which we look forward to analyzing.