

A Large TPC Prototype for an ILC Detector

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A Time Projection Chamber is foreseen as main tracker for the International Large Detector (ILD) which is proposed for the International Linear Collider. The ILD concept requires an unprecedented performance of the tracking system, in particular a momentum resolution of $\Delta(1/p_t) \sim 5 \cdot 10^{-5} / \text{GeV}/c$. To achieve this goal, the Linear Collider TPC (LCTPC) groups aim to optimize the TPC readout technology. New readout systems under study use Micro Pattern Gas Detectors, namely GEMs and Micromegas detectors. Moreover, a CMOS pixel readout chip (TimePix) with one of these amplification systems, was proposed. To study these technologies on sizable readout surfaces, a large TPC prototype (LP) was built. The LP has an inner diameter of 720 mm, a length of 610 mm and allows to measure up to 125 space points per track. It became available in November 2008 and is now operated in a 1.25 Tesla magnet at the 6-GeV DESY electron test beam. Data runs started in 2009 with prototype GEM and Micromegas readout modules and first results look very promising. Also, an 8-chip TimePix module was tested. Recently the setup was completed with silicon tracking detectors outside the TPC. These provide reference points of test beam electrons to complement the resolutions studies. Besides being a test infrastructure, the LP was a test case for the construction of a larger, lightweight TPC. In this presentation, we report on the setup, the production of the LP and results of the test beam runs.

Summary (Additional text describing your work. Can be pasted here or give an URL to a PDF document):

<http://www.desy.de/~pschade/LPsummary.pdf>

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