

Abstract

To suppress the substantial hadronic background, the first level trigger of HERA-B experiment selects events with di-lepton pairs of the J/Ψ -decay. The Inner Tracker (ITR) supplies track information to the hardware logic of the first level trigger. During my thesis the performance of the ITR trigger was tested and optimized.

The ITR consists of 184 microstrip gas chambers (MSGCs) with an internal pre-amplification (GEM foil) in the gas volume. The chambers of the ITR form 10 stations along the beam pipe with altogether about 120,000 readout channels.

The trigger signals of the ITR are derived from the HELIX front-end amplifier. Comparator circuits are integrated in the HELIX chips which generate digital information derived from four ORed readout channels and transmit it to the trigger outputs of the chip. The trigger data are multiplexed and transferred by 1 GHz optical links to the first level trigger.

During the first operation tests of the ITR trigger oscillations of the chips occurred, which limited the comparator efficiency to 45 %. Based on extensive measurements at the test beam of the Paul Scherrer institute, in the laboratory and at HERA-B, the oscillations could be completely suppressed due to modifications of the grounding and of the chips. The comparator efficiency of single chambers could be increased to more than 95 %.

In the course of the year 2001 the ITR will be equipped with optimized trigger electronics. The ITR trigger will increase the trigger efficiency of the experiment by about 60 %.