

Design of trigger electronics for the measurement of CP-violation in B-decays at HERA-B

Abstract

The HERA-B - experiment at the german electron synchrotron DESY in Hamburg is primary built to investigate the CP -violation in the decay of B^0 -mesons. The investigated decay channel is here covered by an about 10^{11} times larger background, so that an effective, multi-level trigger system is necessary for the selection of the relevant events. Among others the Inner Tracker subdetector makes a contribution to the first of these trigger levels. Here the components which implement the data communication of this Inner-Tracker system to the First-Level-Trigger are described.

Due to numerous, incompatible requests to the data transmission facilities a two-stage system was developed. The first level is located directly at the detector and is characterised by its radiation hardness and small space requirement. The second level performs the more complex data formatting and finally transmits the output data using 1 GHz optical data lines.

Controlling and monitoring of the electronics is done by a conventional personnel computer, which runs under control of the Linux operating system. A data protocol based on the JTAG standard facilitates complex configuration and read-out functions.

Finally the contribution of the Inner-Tracker system to the First-Level-Trigger as well as the influence of different detector configurations on the trigger efficiency are examined by monte carlo simulations.