Contribution ID: **131** Type: **Oral**

Design, production and first operation of the ALICE Silicon Pixel Detector system

Wednesday 17 September 2008 12:15 (25 minutes)

The ALICE Silicon Pixel Detector (SPD) constitutes the two innermost barrel layers of the ALICE experiment. The SPD is the detector closest to the interaction point, mounted around the beam pipe at r=3.9 cm and 7.6 cm, respectively. In order to reduce multiple scattering the material budget per layer in the active region has been limited to ≈1% X0. It consists of 120 hybrid silicon pixel detectors modules with a total of ˜10ˆ7 cells. The on-detector read-out is based on a multi-chip-module containing 4 ASICs and an optical transceiver module. The control room located read-out electronics is housed in 20 VME boards and builds the interface to the ALICE trigger, data acquisition and control system. In this contribution the detector components design and production are reviewed. The detector commissioning and experience during first operation are presented.

Summary

The ALICE Silicon Pixel Detector (SPD) constitutes the two innermost barrel layers of the ALICE experiment. The SPD is mounted close to the interaction point (r=3.9 cm and 7.6 cm, respectively). It consists of 120 hybrid silicon pixel detectors modules (half-stave) with a total of ˜10ˆ7 cells. The active elements of the half-stave are two silicon sensors (70.7 x 16.8 mm2) glued to a multi-layer Al flexible flat cable carrying power and signal lines. Each half-stave consists of 10 pixel chips bump bonded to the two silicon pixel sensors and is read out by a multi-chip module. Each pixel chip contains a matrix of 8192 cells. Out of the SPD acceptance area copper flat cables are used for power supply connections.

The off-detector electronics in the control room consists of 20 VME boards (router). Each router holds three plug-in daughter cards (link receiver), which are connected to two detector modules each. The off-detector electronics forms the interface to the ALICE trigger, data acquisition and detector control system. A complex optical fiber distribution network with a high number of intermediate patch panels connects the detector modules to the electronics in the control room.

The SPD cooling is based on a C4F10 evaporative system with 40 um thin cooling pipes directly integrated into the carbon fiber support structure, on which the half-staves are glued. PLC based interlock processors monitor constantly the temperature of the half-staves and act directly on the power supplies.

The constraints in terms of compactness and material budget of the SPD required the development, prototyping and qualification of many different components The SPD has been installed in summer 2007. Commissioning runs and dedicated cosmic ray sessions have been undertaken. A review of the design, production and installation process is reported in this contribution, as well as the system commissioning and the experience during first operation.

Primary author: Dr KLUGE, Alex (CERN)

Presenter: Dr KLUGE, Alex (CERN)

Session Classification: Parallel Session A3 - Installation & Commissioning