ATLAS PIXEL DETECTOR AND IBL

The innermost tracking detector of ATLAS is a semiconductor pixel detector made of hybrid silicon modules. It is composed of two parts, the original ATLAS Pixel Detector and an additional innermost layer, the so called Insertable B-Layer (IBL) which will preserve and increase the high tracking and vertexing performance of the ATLAS Pixel Detector during the Run 2.

RUN 2 EXPECTATION

- Layer 1 and Layer 2 began to suffer from high occupancy at the end of Run 1.
- Read-out has to be upgraded in order to survive at higher rates for Run 2.
- Bandwidth needs to be increased from 40 Mb/s to 80 Mb/s for Layer 2 and from 80 Mb/s to 2 × 80 Mb/s for Layer 1.

THE RX IN THE READOUT

The RX should provide communication between the off detector readout and the on detector part, through an optical link.

THE NEW PIXEL RX

The principal components of a RX are:

- The optopackage: same type of Photo-Diodes Array used by the IBL optoboards.
- The PCB where the ASIC is placed. The ASIC is the integrated chip that manages the data acquisition and elaboration.

EXPECTED PERFORMANCE AND TIMELINE

The new RX’s are required to have:

- Stable operation over a wide range of input light power received.
- Independent thresholds for all channels.
- A BER (Bit Error Rate) of less than 10^{-11} at the end of Rx life.

THE INSTALLATION WILL BE COMPLETED BY DEC. 2015

RX PCB TEST PRODUCTION

- Test the correct transmission of signals in the channels.
- Avoid shorts between channels.
- Check the internal signal generated by the PCB DACs.
- Perform test using a custom test board and an Arduino DUE microcontroller.

RX TEST IN REAL CONDITIONS

- Electrical response
- Synchronization check
- Data Integrity check
- Bit Error Rate Test
- Plugin stability
- Ageing test

Ratio between the number of channels successfully receiving a 2000 bytes message in a loopback test run and the total number of channels.