ATLAS IBL Optolink
Status and Plans

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IBL outline

- IBL is a new Layer of the ATLAS Pixel detector, inserted into the current detector as a 7m long assembly with a new beam-pipe - mean radius of 33mm
- Based on a new FE-chip, FE-I4, it delivers:
  - Higher resolution in z
  - Lower impact of high occupancy (linearised behaviour)
  - Higher readout bandwidth and balanced encoding on the return lines
  - Local power converters
- Higher bandwidth needs a new readout system
- Spacial restrictions and lower radiation impact led to placement of the electro-optical converters outside the detector at $|z|=3.5\text{m}$ and $R\approx1.5\text{m}$
On Detector Component

Hybrid component incorporating:

- 8 receivers in 2 chips (DORIC)
  - Decoding a manchester Code into Clock and Data
  - Output clock is in phase with data
- 16 transmitters in 4 chips (VDC)
  - LVDS input
  - Forward current through VCSEL adjustable
  - Bias current 1mA
- Pins and VCSELs mounted to BeO substrate at OSU
Off-Detector Components

- Commercial optical subassemblies
- SNAP 12 Transmitters
  - 12 channels, 8 are used
  - Power might eventually be worrisome
- FPGA based encoding and phase adjustment
  - Successfully employed partial reconfiguration, using FPGA output delays with 75ps stepping
- SNAP 12 Receivers
  - AC coupled, hence only suited for balanced codes
  - Maximum input level could actually cause trouble, but has not been a concern so far
- FPGA based decoding and automated phase adjustment
- IBL off-detector electronics are planned to be used for the Pixel readout upgrade, RX-plugin to support NRZ readout is being looked into
Status

• Fibre Installation and testing is done
• Optoboard production done
• Commercial transmitters and receivers available
• Back-of-Crate Card production for IBL almost done (should arrive at CERN in April)
• Open Items:
  • Optobox - the housing for the Optoboards (imperative to arrive soon)
  • DAQ Software…
  • Pixel RX plugin to support speed upgrade of Layer-2/-1