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|=3.5m and R≈1.5m

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
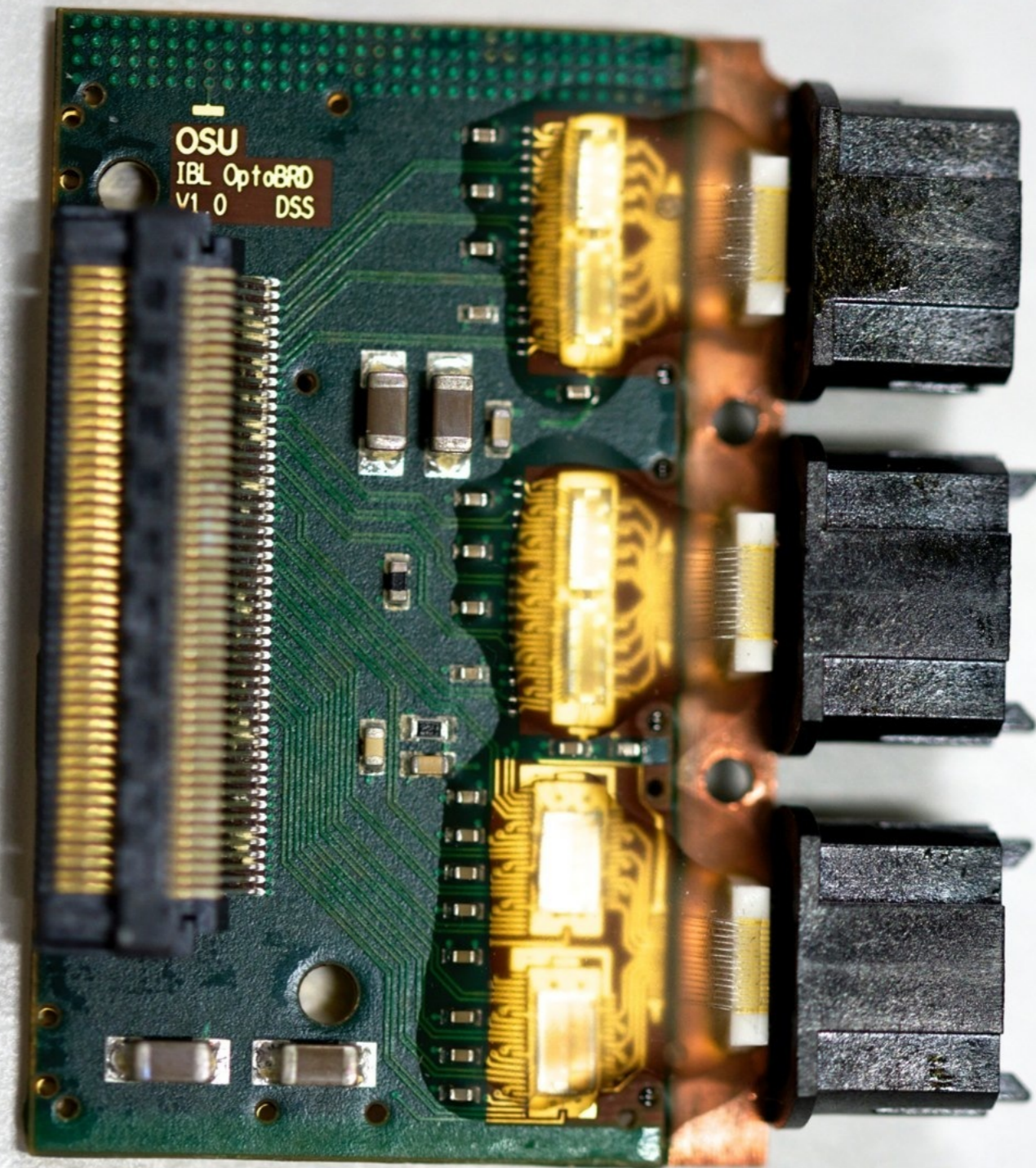
Off-Detector Components

- 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 re-configuration, 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