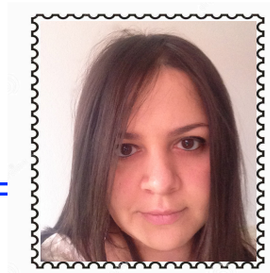
OPTICAL LINK FOR THE ATLAS PIXEL DETECTOR



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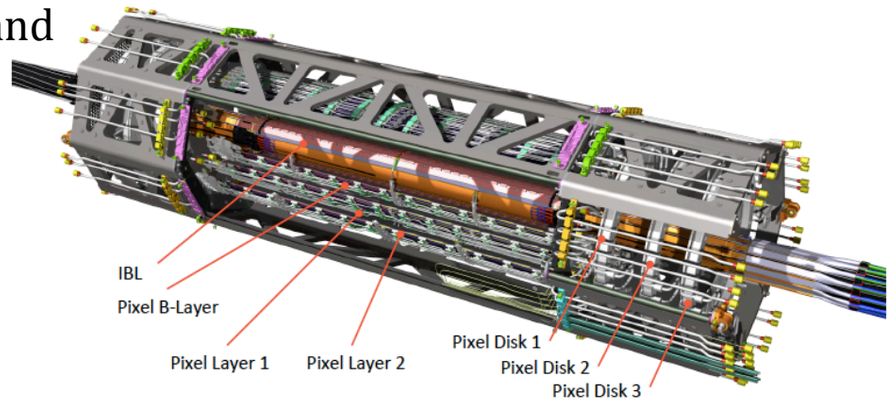
- Layer1 and Layer2 began to suffer from high occupancy at the end of Run 1
- Read-out has to be upgraded in order to survive at higher rates for Run 2
- Bandwidth needs to be increased from 40Mb/s to 80Mb/s for Layer2 and from 80 Mb/s to 2x80Mb/s for Layer1

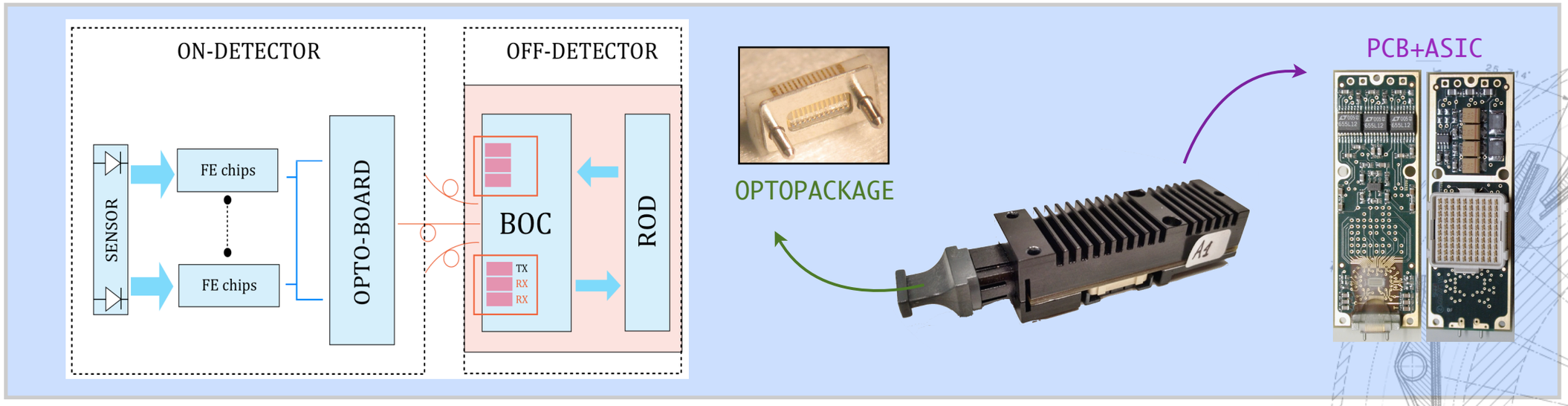
	μ	B-Layer	Layer 1	Layer 2	Disks
50ns 8 TeV	37	51%	45%	69%	40%
25ns 13 TeV	25	47%	42%	65%	37%
	51	71%	67%	88%	52%
	76	95%	97%	148%	75%



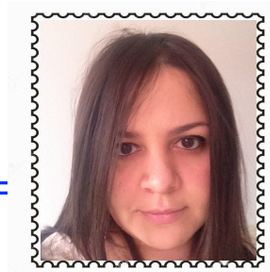
- The IBL cards can handle the higher data rate
- The data stream of the pixel detector is non DC neutral while the IBL one is 8b10b encoded and fully DC neutral
- Commercial plugins don't support non DC neutral signals

A REDESIGNED RX PLUGIN NEEDS TO BE DEVELOPED

- The RX plugin should provide communication between the OFF detector readout and the ON detector part, through an optical link
- The principal components of a RX are: the optopackage and the PCB where the ASIC is placed



OPTICAL LINK FOR THE ATLAS PIXEL DETECTOR



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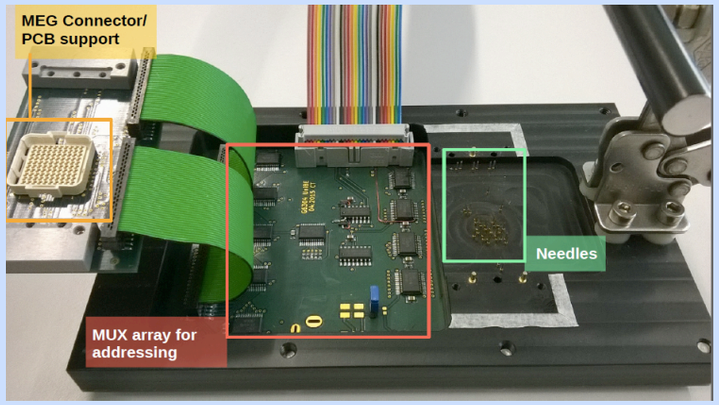
The new RX's are required to have:

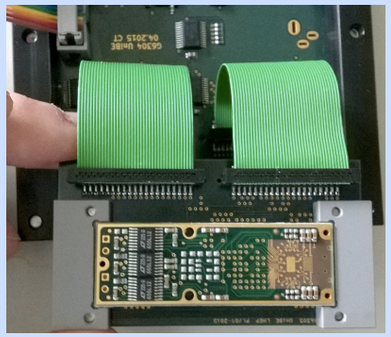
- Stable operation over a wide range of input light power received
- Independent thresholds for all channels
- A BER (Bit Error Rate) of less than 10^{-11} at the end of Rx life

A quality check has been setup at each step of the production. In particular a test of the bare PCB (before bonding/encapsulation) and a test in real conditions with the final RX is foreseen

RX PCB TEST PRODUCTION

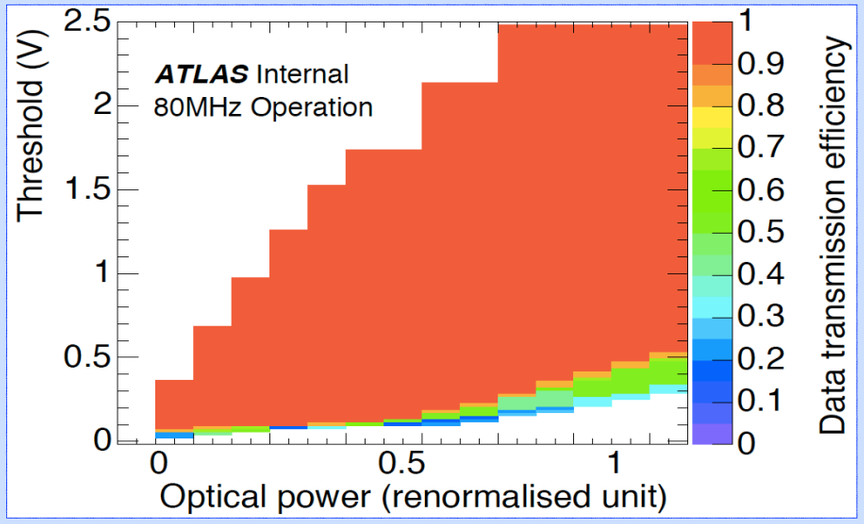
- ☑ Test the correct transmission of signals in the channels
- ☑ Avoid shorts between channels
- ☑ Check the internal signal generated by the PCB DACs
- ☑ Perform test using a custom test board and an Arduino DUE microcontroller





RX TEST IN REAL CONDITIONS

- ☑ Electrical response
- ☑ Syncronisation 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