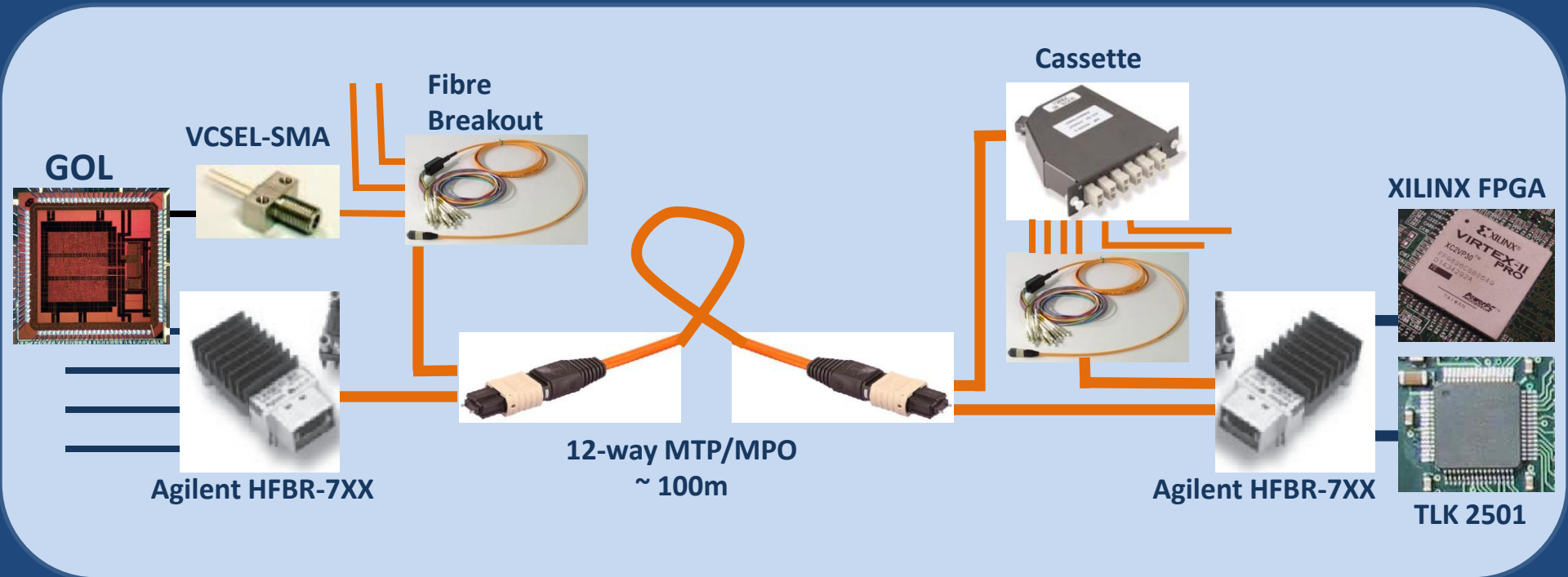


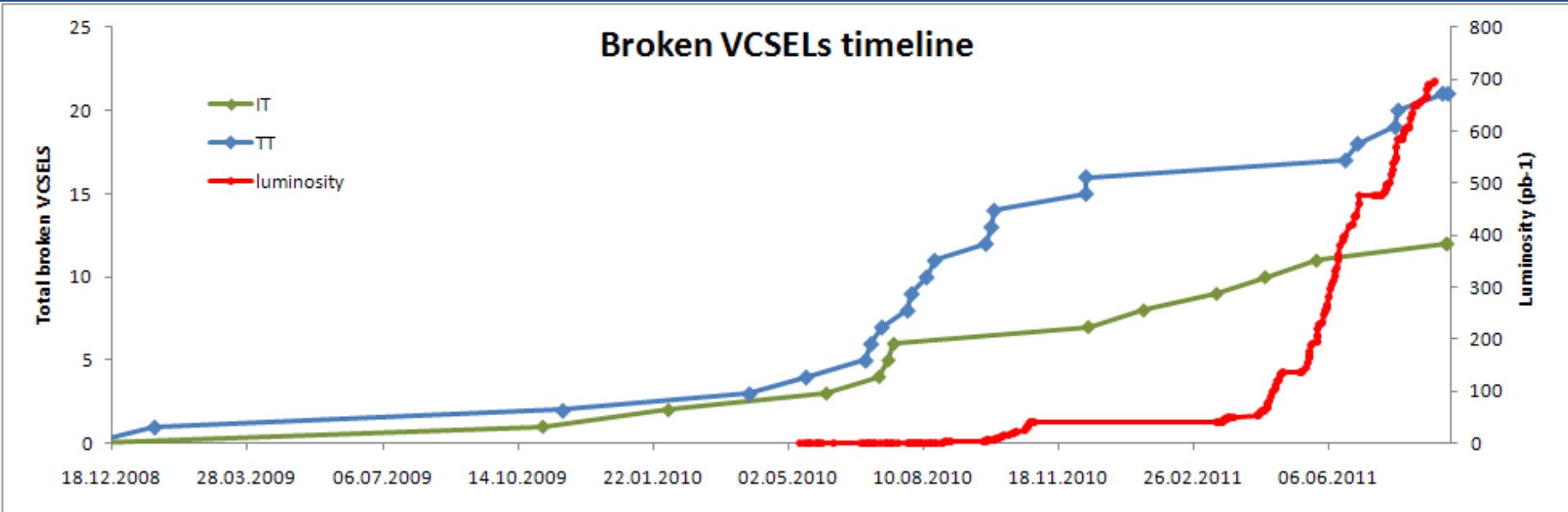
Optical Data Transmission in LHCb

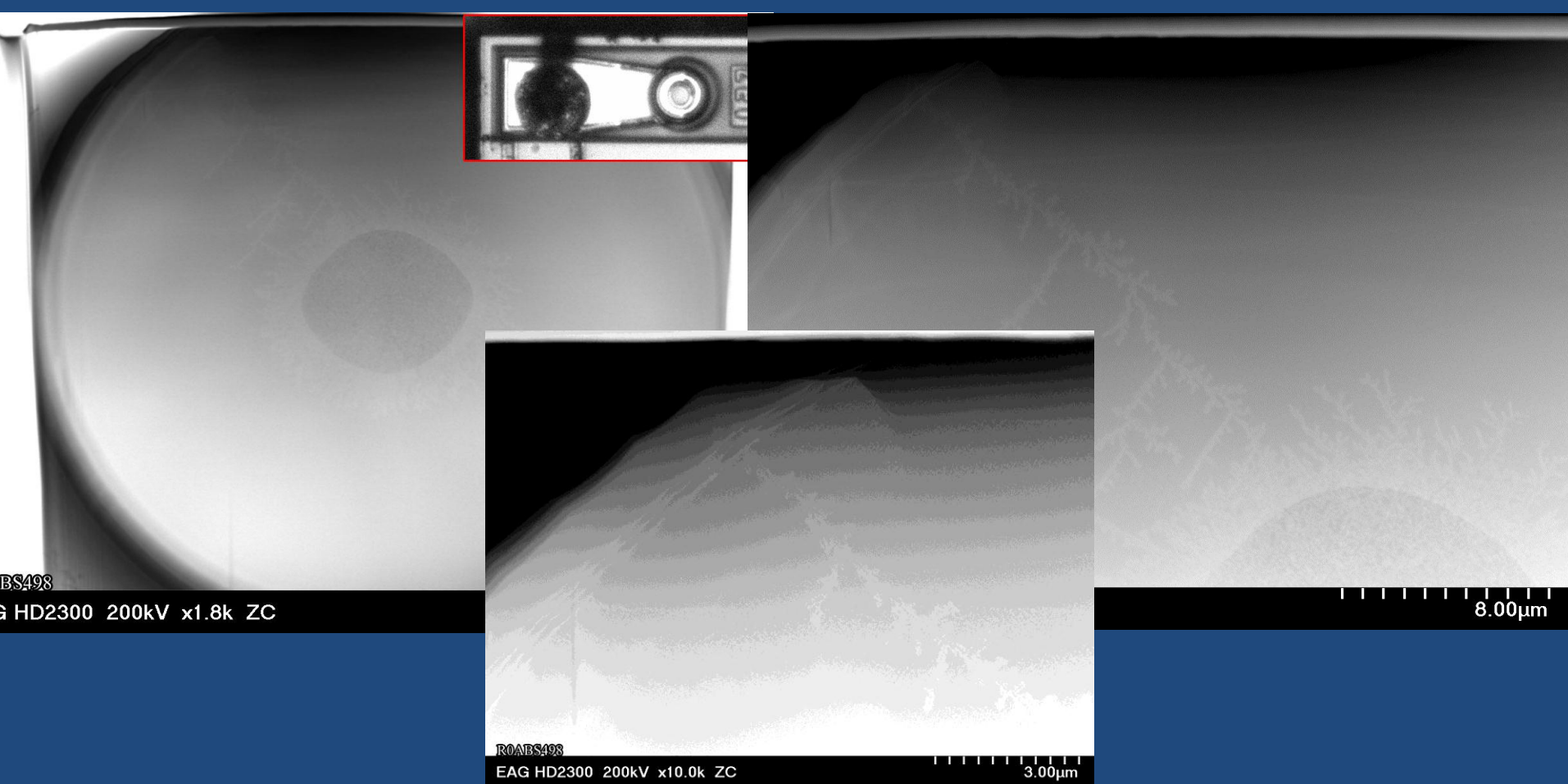


System summary	Radiation environment (10 years)		
1.6 Gbit/s serial data, 8b/10b			
3084 single-channel VCSELs	24krad	$3.4 \times 10^{12} n_{eq}$	3.1×10^{11} hadrons >20MeV
234 12-channel TXs	2.2krad	$3.4 \times 10^{11} n_{eq}$	1.9×10^{10} hadrons >20MeV
850nm, multi-mode 50/125			

Problem: VCSEL deaths (see Opto WG March 2011)

As of Sept 2011, 1.8% of VCSELs died (and replaced)
 Silicon Tracker (IT+TT) most affected (2000 VCSELs)
 1 – 2 deaths per month





Decision: Death rate is 'acceptable'

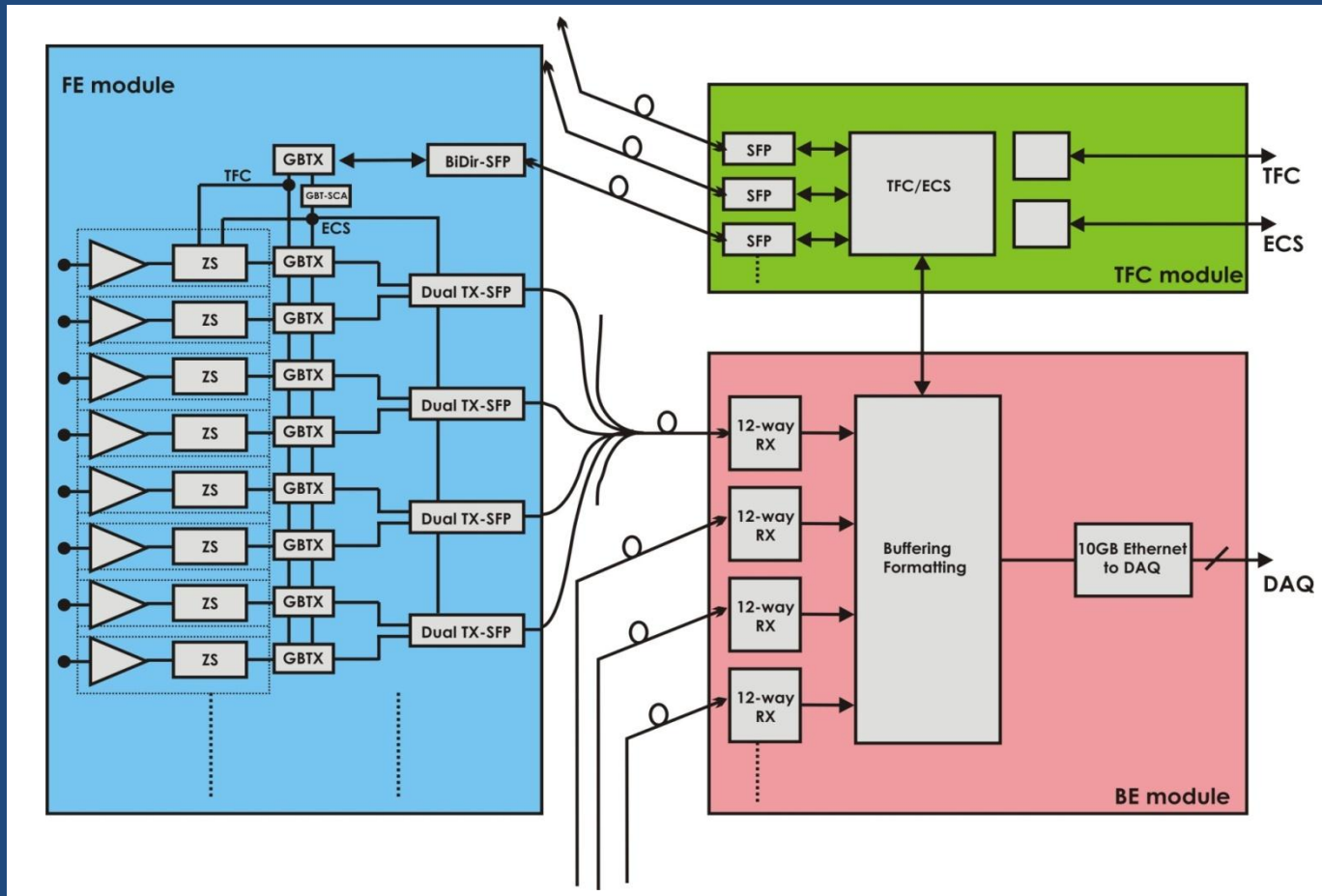
Regular repairs during technical stops – detectors are accessible

New batch of spares purchased from vendor

: no further action planned

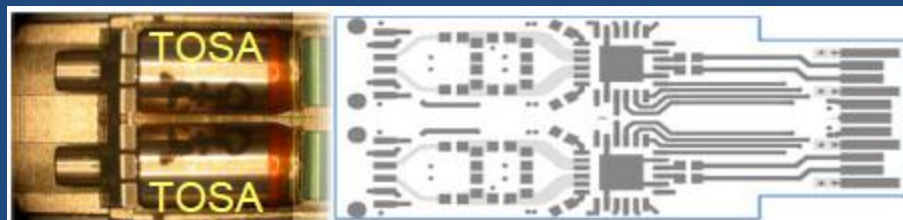
Upgrade plans

Triggerless readout: zero-suppress on front-end
 Use GBT + Versatile Link: ~ 11,000 data links + TTC/Slow-control



Upgrade R&D

Dual transmitter SFP+ is a big advantage



Happy to collaborate with Versatile Link project to advance this

Back-end board (TELL40):
Jean-Pierre Cachemiche et al

Dense connectors on
mezzanine card:

⇒ 24 input data links (4.8 Gbit)
+ 12 x 10GB-ethernet to DAQ

