



Summary of SLHC Opto-Link Working Group Activity

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Goal



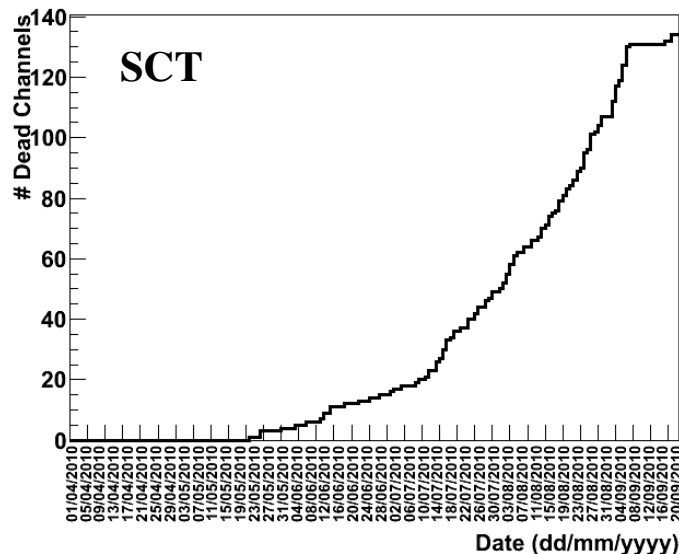
- formed ~2005
 - ◆ improve cooperation and exchange of ideas and results of SLHC opto-links R&D
 - ◆ meet bi-annually:
 - short meeting at TWEPP
 - extended meeting in spring at CERN for detailed discussion
 - ◆ produced a document summarizing the cost and lessons learned:
<https://edms.cern.ch/document/882775/3.8>
 - slow progress in updating to include latest experience



VCSEL Problems

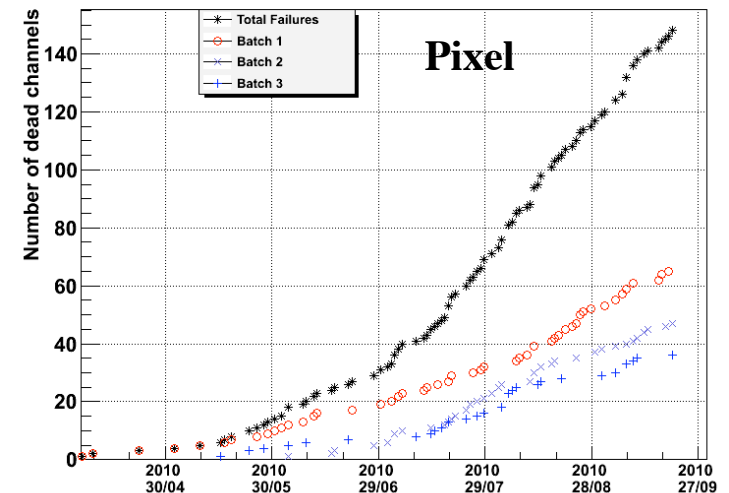
- VCSELs of some subsystems have high fatality rate:
 - ◆ 1% in LHCb
 - ◆ 3% in ATLAS LAr calorimeter
 - ◆ 4% in ATLAS L1 muon barrel RPC
 - ◆ 0.5%/week in ATLAS Silicon Center Tracker (SCT)
 - ◆ 1%/week in ATLAS Pixel detector
 - Pixel/SCT problem under investigation

Number of SCT Tx Deaths since 01/04/2010



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Death Timeline





R&D Activity



- Versatile Links (5 Gb/s):
 - ◆ develop single-channel opto-links with adaptation of commercial packaging
 - ◆ CERN/Oxford/SMU/Fermilab
- Array-based on-detector links (5 Gb/s):
 - ◆ Ohio State/Siegen/Wuppertal/NIKHEF
- 10 Gb/s serializer using silicon-on-sapphire CMOS technology
 - ◆ SMU



Irradiation



- VCSEL/PIN:
 - ◆ Ohio State University
 - arrays, protons/pions
 - ◆ CERN:
 - single channel, neutrons/protons/pions
 - ◆ should know by next TWEPP the damage factor of various particle species (NIEL scaling)
 - fibers:
 - ◆ Oxford/SMU
 - connectors/couplers:
 - ◆ Oxford
 - chips:
 - ◆ designers of various chips
- ⇒ Good coverage with minimum duplication of efforts



Summary



- SLHC Opto-Link Working Group is functioning well with good cooperation and exchange of R&D information
 - ◆ current VCSEL problem is being followed closely for possible implication for the SLHC upgrade
 - ✗ no long-term reliability study of off-detector VCSEL for ATLAS silicon detectors