



# Summary of SLHC Opto-Link Working Group Activity

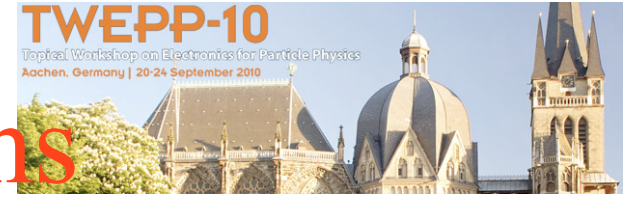
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The Ohio State University  
September 23, 2010



# Goal

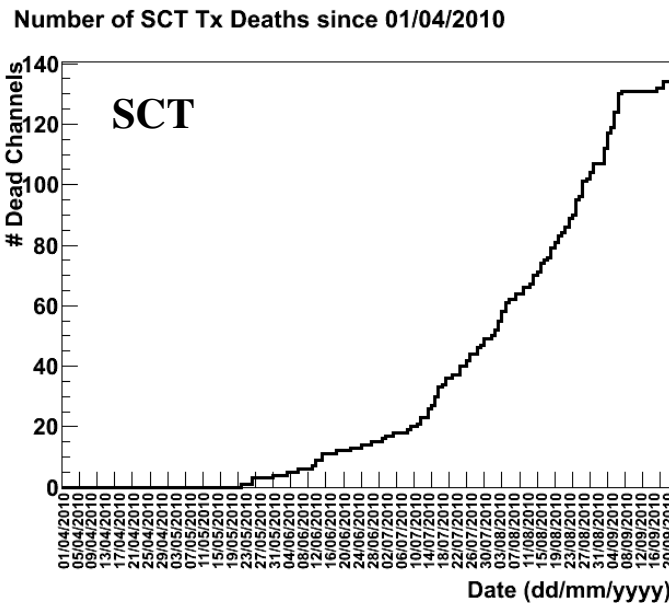


- formed ~2005
- ◆ improve cooperation and exchange of ideas and results of SLHC opto-links R&D
- ◆ meet bi-annually:
  - short meeting at TWEPP
  - extended meeting in spring at CERN for detailed discussion
- ◆ produced a document summarizing the cost and lessons learned:  
<https://edms.cern.ch/document/882775/3.8>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

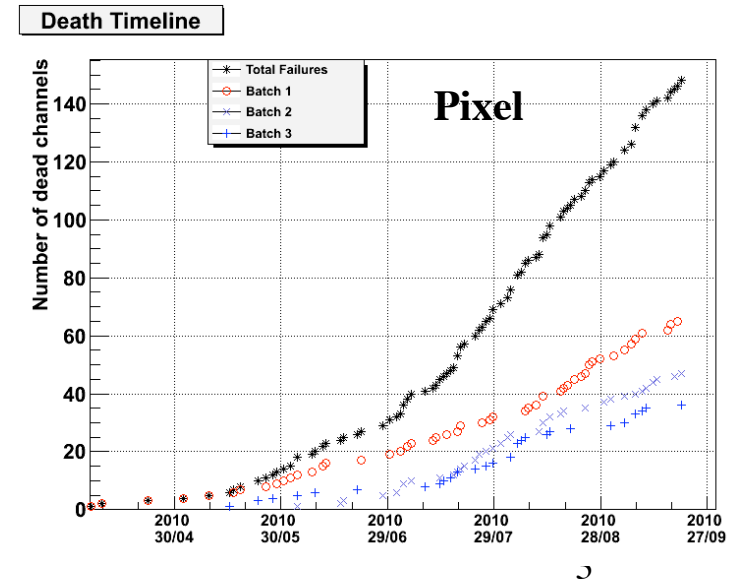


# VCSEL Problems

- 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



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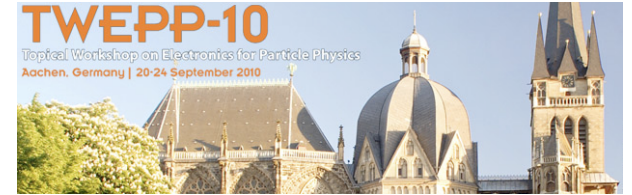
# R&D Activity



- 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