Electronics/Optoelectronics Radiation effects at the LHC experiments and impact on operation and performance

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Scope

- Ionizing and non-ionizing radiation effects on tracking detector electronics.
- Low and high dose-effects.
- Measurements and operational experience with Single Event Upsets (SEU).
- Contributions of Single Event Transients (SET, “glitches”) to observed SEU rates
- Calibration drift and electronics tuning.
- Outlook toward the readout in 2018 and Run 3.

Conditions

- Concentrate on the effects observed during irradiation at LHC in real working condition
- Low dose irradiation rate as a function of R-z
- Irradiation composition: charged particles vs neutron/gamma cloud
- Influence of temperature, humidity, real annealing profile
- Comparison with simulation
- Comparison with irradiation facilities results

Mitigation

- Strategies for mitigating radiation-induced effects
- Refreshing memories
- Lowering thresholds
- Re-calibrating.
- Power-cycling.
- Choice of the operating voltage
- Choice of the cooling temperature

Agenda

- Introduction
- TID effects at 130nm pixel electronics at low dose in ATLAS - Malte Backhaus (ETH Zurich)
- SEU effects in the ATLAS pixel electronics -Pierfrancesco Butti (CERN)
- Irradiation effects in the ATLAS optoelectronics -Anthony Weidberg (University of Oxford)
- SEU in the ATLAS strip detector (SCT) - Dave Robinson (University of Cambridge)
- Irradiation aging of the electronics of the ATLAS Transition Radiation Tracker (TRT) - Bijan Haney (University of Pennsylvania)
- Strip electronics and optoelectronics irradiation effects at CMS - Jan Troska (CERN)
- SEU in CMS pixels - Wolfram Erdmann (Paul Scherrer Institut)
- Irradiation effects in ALICE electronics – Hartmut Hillemanns (CERN)
- Discussion session