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Welcome to the LHCb Upgrade Silicon Tracker page

This twiki collects information about the LHCb upgrade silicon TT and upgrade silicon IT

**UT (TT Upgrade)**

*The information in this section has been moved/reorganized below*

**TDR**

**SVN repository**

- Web access to SVN repository
- Instructions for working with the LHCbDocs SVN

**Outline and editors** (last update 2014.01.07)

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**Documents for framework TDR**

For reference and "inspiration":

- VELO TDR
- PID (RICH, Calorimeter, Muon) TDR

R&D towards TDR

- Design concept and goals presented by M. Artuso Presentation at the LHCb Upgrade Tracking Workshop
- Study of ghost reduction optimization of TT Tracker by J. Wang study of ghost suppression with the TT
- Instructions on how to run with modified magnetic field and no RICH1 here
- Beam pipe interface design studies and tests: talk1 (Kaan Vatansever, LHCb Upgrade Silicon Tracker meeting, 5-dec-2012), EDMS report
- Mechanical requirements document for UT here (R. Mountain, et al., v2, rev.5/6/2013), updated here (v3, 10/7/2013).
- Numerology of UT detector (by J.C. Wang, et al.): ASICS, readout eLinks, power lines, etc. v5, 04/04/2014, v6, 01/12/2015.

Welcome to the LHCb Upgrade Silicon Tracker page
Project management, cost and technical issues

- Front End ASIC specifications: New version of the TT electronics specifications, requirement on on-chip regulator added
- Excel sheet documenting cost estimate. Rev1
- Excel sheet documenting cost estimate
- Draft of TT design evolution note
- R&D towards low mass LHCb Upgrade Silicon Inner tracker modules (IT)

Project Organization

- UT private area

Software for TT Upgrade

- This is a repository of useful information for code development to optimize the UT detector use in the tracking software.
- script_performanceStudy.tar.gz: Set of scripts for performance studies, and optimization studies

Requirements

- Numerology of UT detector (by J.C. Wang, et al.): ASICS, readout eLinks, power lines, etc. v5, 04/04/2014, v6, 01/12/2015,

Geometry

Sensor

SALT ASIC

- SALT twiki; contacts: Marek Idzik, Tomasz Szumlak
- Front-end ASIC specifications: new version of the TT electronics specifications, requirement on on-chip regulator added

Electronics

- Technical Note on Electronics Architecture of the LHCb Upgrade
- Latest numerology version
- Number of GBTx, VTTx, VTRx for the UT (February 2014)

Useful documentation

- GBT-SCA specifications (December 2011)
- GBTx latest update (October 2013)

Power Supply

- Cost estimate

A set of useful document is linked here, Daniel's thesis is essentially a very useful manual to the HV and LV of the TT

- Olaf's presentation on HV and LV supplies
TFC and ECS

- System-level Specifications of the Timing and Fast Control system for the LHCb Upgrade
- Readout Control Specifications for the Front-End and Back-End of the LHCb Upgrade

TFC commands

Our SOL40 boards will transmit 8 TFC information bits repeated 8 or 10 times in each SOL40 GBT frame:

- FE reset
- BXID reset
- BX Veto OR Header Only: Single signal as the ASIC needs to perform the same way for both.
- NZS
- Calibration
- Synch
- Snapshot
- Extra bit: We can have a second calibration bit, or the LSB of the BXID

For each GBT master 8 or 10 eLinks at 320Mbps will send the data to the FE. Each eLink contains all the necessary TFC information.

ECS

Most of the detector monitoring and configuration will be done using the SOL40 boards with GBT-SCA chips. The exceptions are:

- HV PS: OPC server
- LV PS: OPC server
- Cooling: TBD
- TELL40: CCPC server

The main SCA interfaces are:

- SALT I2C
- Data GBTx I2C
- Temperature and humidity sensors ADC
- LV regulators ADC
- GPIO for LV regulators inhibit
- JTAG for FPGA (if present)

Monitoring

- SALT: Status registers (LDO, DLL, PLL, ADC, DSP, Buffer, SEU, etc.), TFC counters
- data GBTs status
- Hybrid temperature sensors
- Box humidity sensors
- Balcony electronics temperature
- Master GBTx status
- LV regulators output voltage
- HV PS current and voltage
- LV PS current and voltage
• Cooling temperature
• TELL40 status

Detector Safety System

PLC sensors will have to be deployed around the detector:

• Box temperature and humidity
• Balcony electronics temperature
• Cooling
• HV interlock
• Smoke detection
• Water leak detection
• Gas flow in the box
• If we plan to cool the Balcony electronics with air, we need to know if the air is flowing or not.

Failure or alarm in those sensors should trigger either an alarm to the expert on call and a power cut when there is immediate danger for the electronics. The smoke detection should also trigger an alarm to the fire brigade.

Mechanics

• Mechanical requirements document for UT here (R. Mountain, et al., v2, rev.5/6/2013), updated here (v3, 10/7/2013).

• Beam pipe interface design studies and tests: talk1 (Kaan Vatansever, LHCb Upgrade Silicon Tracker meeting, 5-dec-2012), EDMS report.

Cooling

gathering the edms documents concerning the cooling plants...

• UT_MECH_REQUIREMENTS_DOCUMENT_v3b.pdf: updated mechanical requirements doc for UT

Irradiation Plans

This section includes talks and material about irradiation plans of SALT, sensors, etc...

• Presentation of the CHARM facility at CERN
• Preliminary plans: 24 Feb 2014
• RP Rules for shipping, etc...

Test Beam

• SiliconStripTrackerTestbeamPage: Main page for all info about Test Beam
• Velo Testbeam Software Twiki

ASIC functionality test, Flex cable test and electronics slice test

• SaltASICTest, electronics slice test, flex cable test
Integration and Testing

- Initial plans
- LHCbUT test results repository

Costs and Schedule

Picture of the current TT

- A visual inspection of the TT

IT Upgrade

General:

- Presentation at LHCb Week Cracow, 10-sep-2013, Hans Dijsktra
- Presentation at LHCb Week CERN, 4-jun-2013, Eric Van Herwijnen
- Presentation at LHCb Week CERN, 25-feb-2013, Hans Dijsktra
- Presentation at LHCb Week CERN, 27-nov-2012, Hans Dijsktra
- Presentation at LHCb Week Davos, 4-sep-2012, Hans Dijsktra
- LBD meeting, 26-jun-2012, Hans Dijkstra
- LHCb Upgrade Mini-Workshop on tracker 16-09-2011, Hans Dijkstra
- Presentation at TB 8-Mar-2012, Hans Dijsktra

Silicon modules R&D:

- Silicon Tracker Upgrade meeting, 8-feb-2013, Sergii Kandybei
- Silicon Tracker Upgrade meeting, 5-dec-2012, Sergii Kandybei

Simulation:

- SiIT simulation twiki page
- Tracking Upgrade meeting, 5-oct-2012, Eric Van Herwijnen