SCT DCS Update

SCT Weekly
ID Week
29 Oct. 2013

The SCT DCS is currently undergoing a major upgrade

- New computers
- New operation system (Windows → SLC6)
- New PVSS / WinCC OA (3.11)
- New OPC Server (UA)
- Systec box to replace kvaser cards
- These updates are designed to improve the stability and reliability of the DCS and to stay up to date with central DCS systems

We will make sure everything works before making changes to the production system

- Use SR1 test setup!
- We are currently in the process of updating both the ENV and PS DCS in SR1
- This setup has the computers in the rack area, separated from the barrel and endcap test modules, which are located in the clean room

  --> previously the ENV DCS machines were located in the clean room

We are using the test setup in SR1 to evaluate and document the migration procedure that will be used in the pit

- First, we have to revive the old setup

  -->test setup had not been used once the existing production system was stable and well understood
- ENV setup was rearranged (disassembled) while other SR1 clean room systems (e.g. cooling) were moved and updated
- Need to make sure this system still works so that if/when anything goes wrong, we can be certain it is due to the new changes

The environmental DCS is working again in SR1

- Two setbacks (now solved)

  ->problem with CAN cable between clean room and rack area

  ->nonsensical temperature readings
- Communication is now working on both the Windows and the Linux machines
- Linux machine is up to date with the latest DCS packages
- Temperature measurements make sense again!

We still need to get the power supply DCS working in SR1

- First-- revive it on Windows
- Second-- get it working on the new Linux machine

  ->project already installed
- Third-- thorough tests to ensure it works properly

The migration procedure for the ENV/PS DCS systems are being documented so they can be reproduced in the pit:

https://twiki.cern.ch/twiki/bin/view/Main/AndreeRobichaudVeronneau#Migration_of_production_DCS_proj

We have a plan in place for updating the production machines

- The plan takes into account space limitations in the USA15 / US15 computer racks
- Strategy --> install and test new machines before removing the old setup

  --> this requires us to proceed in stages
- For USA15:

  ->Stage 1: Install ENV+SCS machine + 1 Systec box

  ->Stage 2: Remove old ENV + SCS machines

  ->Stage 3: Install 4 PS machines + 2 Systec boxes

  ->Stage 4: Remove old PS machines
- Similar for US15

A working DCS test setup enables us to do further studies --> endcap temperature measurements

- Problem: temperature difference between hybrid and sensor poses a problem for leakage current calculations
  - Temperature dependence of bulk leakage current [1]

$$I_{0°C} = I_{data}\left(\frac{T_0}{T_{sensor}}\right)^2 \exp\left(\frac{1.21\,[\mathrm{eV}]}{2k_B}\left(\frac{1}{T_{sensor}} - \frac{1}{T_0}\right)\right) \quad , \quad T_0 = 273.15\,\mathrm{K}$$

  - Sensor temperature T_{sensor} is obtained using T_{hybrid}

$$T_{sensor} = T_{hybrid} - \begin{pmatrix} 3.7 \\ 15.5 \\ 13.1 \end{pmatrix} \text{ for } \begin{pmatrix} \text{barrel} \\ \text{outer, middle} \\ \text{inner} \end{pmatrix}$$

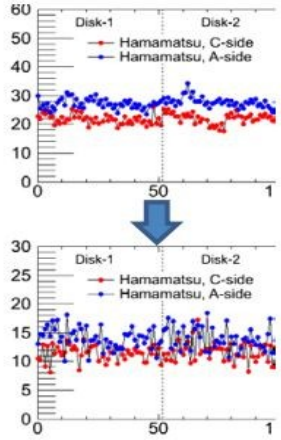
These values are from FEM simulations. End-cap values are big and thus highly subject to module-by-module fluctuations.

[1] S. Sze, Physics of semiconductor devices, 1981.

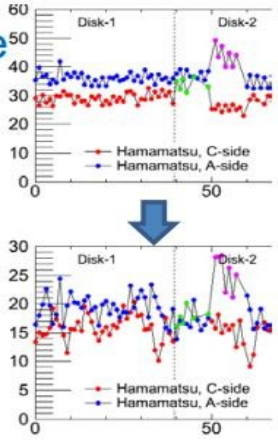
* from Taka Kondo

The large fluctuations in EC are due to Temperature corrections !

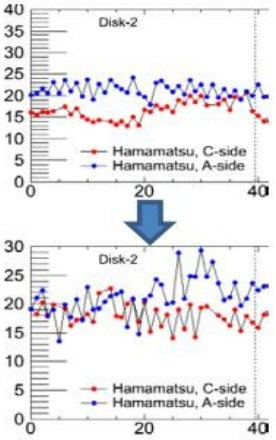
outer



middle



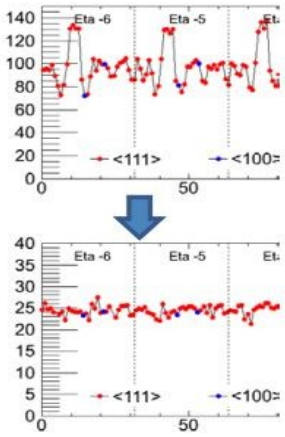
inner



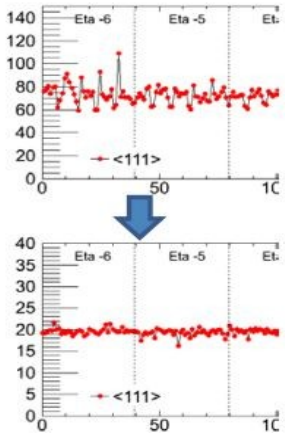
Raw data

T corrected

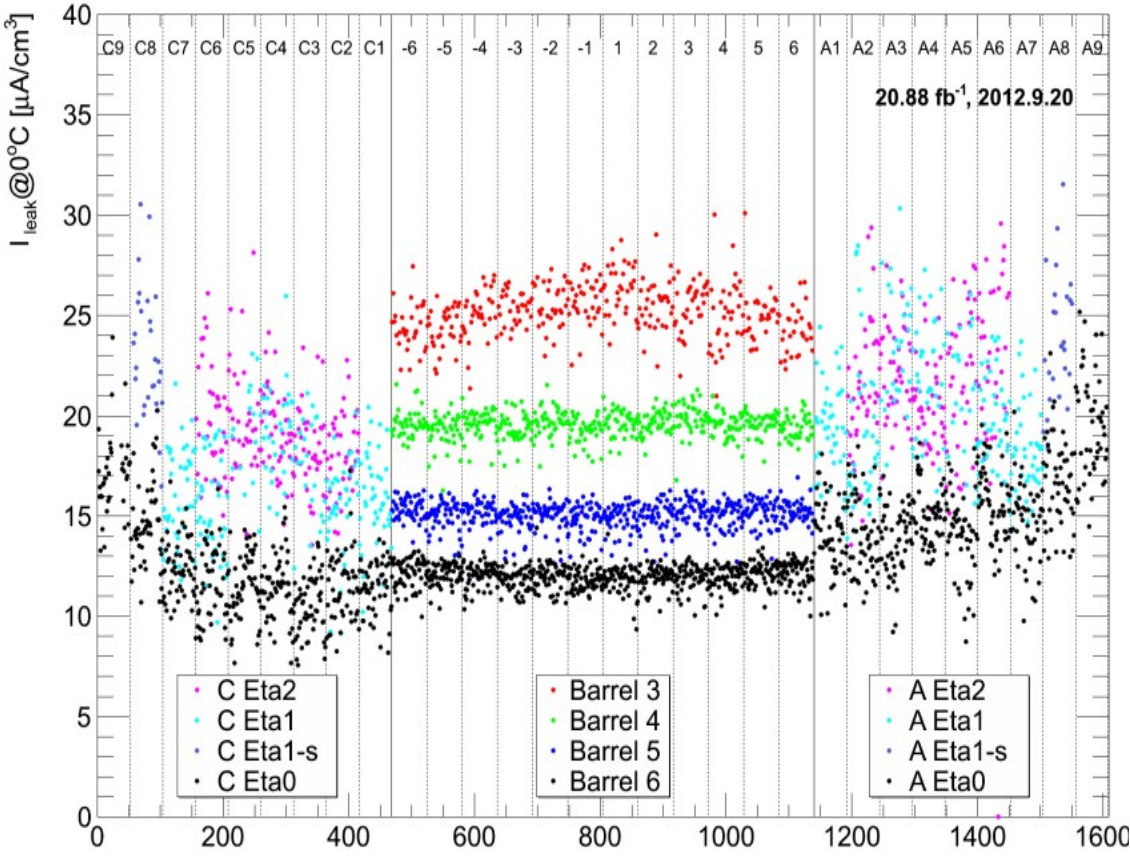
B3



B4



Summary of normalized leak current /cm^3 @ 0^{o}C



* from Taka Kondo

We will investigate these temperature corrections by making a new direct measurement

- 8 thermistors will be glued to the back corner of various sensors in the test setup
- Temperature differences between the hybrid and sensor will be studied in detail
- **Need to decide which modules to test (inner, middle, outer), and find a suitable adhesive**
- → preliminary DSC mapping for new sensors:

  https://twiki.cern.ch/twiki/bin/viewauth/Atlas/SctSR1EndcapDisk