20th RD50 Workshop (Bari)

Report of Contributions

https://indico.cern.ch/e/175330

Contribution ID: **0** Type: **not specified**

Operational conditions for enhancement of collected charge via avalanche multiplication in n-on-p strip detectors

Thursday 31 May 2012 10:00 (20 minutes)

Recent results on the collected charge Qc in heavily irradiated Si detectors developed by RD50 collaboration for SuperLHC revealed a significant Qc enhancement if detectors were operated at the bias voltage beyond 1000 V. Our investigations showed that this enhancement arises from a fundamental effect of carrier avalanche multiplication in high electric field of n+-p junction. This study extends the PTI model and gives the results on the detector bias voltage and the other operational conditions as well as detector geometry which lead to Qc enhancement. Simulations predict that the maximum Qc in irradiated detectors may be larger than in a non-irradiated detector that agrees with the experimental data.

Author: Dr VERBITSKAYA, Elena (Ioffe Physical-Technical Institute RAS)

Co-authors: Prof. ZABRODSKII, Andrei (Ioffe Physical-Technical Institute RAS); Dr EREMIN, Vladimir (Ioffe Physical-Technical Institute RAS)

Presenter: Dr VERBITSKAYA, Elena (Ioffe Physical-Technical Institute RAS)

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: **1** Type: **not specified**

Temperature dependence of reverse current of irradiated Si detectors

Wednesday 30 May 2012 10:25 (20 minutes)

Temperature dependences of reverse current, I(T), of irradiated Si detectors are simulated and analyzed in the scope of carrier generation rate based on Shockley-Read-Hall statistics. Two models of bulk generation current have been developed for simulation of I(T) dependences: carrier generation via a single effective level in the bandgap, and carrier generation via midgap levels of radiation induced defects considered in PTI model of irradiated Si detectors –deep donors Ev + 0.48 eV and deep acceptors Ec –0.53 eV. The results have shown that: a) both models give good fits of the experimental data; b) the activation energy Ea of the I(T) dependence for detectors irradiated by 23 GeV protons and 1 MeV neutrons is the same and equals 0.65 eV.

Author: Dr VERBITSKAYA, Elena (Ioffe Physical-Technical Institute RAS)

Co-authors: Mr ILYASHENKO, Igor (Ioffe Physical-Technical Institute RAS); Dr HÄRKÖNEN, Jaakko (Helsinki Institute of Physics, CERN/PH); Dr LUUKKA, Panja (Helsinki Institute of Physics, CERN/PH); Dr EREMIN, Vladimir (Ioffe Physical-Technical Institute RAS); Dr LI, Zheng (Brookhaven National Laboratory)

Presenter: Dr VERBITSKAYA, Elena (Ioffe Physical-Technical Institute RAS)

Session Classification: Material and Defect Characterization

Track Classification: Detector Characterization

Contribution ID: **2** Type: **not specified**

Analysis of Edge and Surface TCTs for Irradiated 3D Silicon Strip Detectors

Thursday 31 May 2012 10:50 (20 minutes)

We performed edge and surface TCT measurements of a double sided 3D silicon strip detector at the Jozef Stefan Institute. Double sided 3D devices are a useful counterpart to traditional planar devices for use in the very highest radiation environments. The TCT techniques allow the electric fields in 3D devices to be probed in a way not possible before.
Short 3D strip detectors, produced at CNM Barcelona, have been used for this study. The strip detectors had a substrate thickness of 280 micrometers and a strip pitch of 80 micrometers. The columns, that formed the electrodes, had a diameter of 10 micrometers, and were 250 micrometers deep. The junction electrodes were connected together to form the strips with 20 micrometer wide Aluminium metallisation. The Ohmic electrodes were all connected together on the backside of the device with a uniform contact. This is a similar technology as to that used for the ATLAS IBL 3D pixel sensor candidates. The detectors were tested both prior to irradiation and after irradiating to 5 x 10ˆ15 N/cmˆ2. Studies were performed into the effect of varying bias voltage and also the effect of annealing on the irradiated sample. An IR laser (1064 nm) was used to scan the devices with a FWHM of 7 micrometers. Scans with a step of 2.5 micrometers were performed over the surface of the device in both x and y directions, illuminating either the front surface or the cut edge. The irradiation and edge polishing were completed at the Jozef Stefan Institute in Ljubljana. The TCT experiment was undertaken in an atmosphere of dry air, with the irradiated samples held at a temperature of -20℃. Annealing was achieved insitue by warming to 60℃ for intervals of 20, 40, 100, 300 and 600 minutes corresponding to room temperature annealing times of between 8 days and 200 days. 300 minutes is equivalent to the amount of annealing expected for 7 years of operation in an LHC experiment.
The current waveforms, as a function of illumination position and applied bias, were obtained for both pre and post irradiated devices and after annealing. This gives information on the origin of the induced signal, that is the portion from electron or hole motion. From the rise times of the signals, the velocity profile of the carriers in the devices and therefore electric fields can be determined. The collected charge was calculated from the integral of the waveforms. The results are compared to previous simulations.
The current waveforms are analysed to give results such as the collected charge as a function of illumination position for the front surface, the cut edge and the velocity profile.
There is a clear non-uniformity of the sensors prior to irradiation. While the lateral depletion between the columns is low, at approximately 4V, a uniform carrier velocity between the columns is not achieved until 5 times this value at 20V. Before irradiation, both the drift of electrons and holes provide equal contributions to the measured signals. After irradiation there is clear charge multiplication enhancement along the line between columns with a very non-uniform velocity profile in the unit cell of the device. The annealing of the detector further enhances this non-uniformity and charge multiplication effects.

Author: STEWART, Graeme Douglas (University of Glasgow)

Co-authors: Dr FLETA CORRAL, Celeste (Universidad de Valencia (ES)); PELLEGRINI, Giulio

(Universidad de Valencia (ES)); KRAMBERGER, Gregor (Jozef Stefan Institute (SI)); LOZANO FANTOBA, Manuel (Universidad de Valencia (ES)); MILOVANOVIC, Marko (Jozef Stefan Institute, Ljubljana); BATES, Richard (University of Glasgow (GB))

Presenter: STEWART, Graeme Douglas (University of Glasgow)

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: **3** Type: **not specified**

Update on thin vs thick microstrip detector studies

Thursday 31 May 2012 16:10 (20 minutes)

Measurements with 50, 100, 140 and 300μm thick detectors after irradiation.

Author: CASSE, Gianluigi (University of Liverpool (GB))

Presenter: CASSE, Gianluigi (University of Liverpool (GB))

Session Classification: Full Detector Systems

Track Classification: Full Detector Systems

Contribution ID: **4** Type: **not specified**

Laser tests of irradiated detectors at low temperatures.

Thursday 31 May 2012 15:30 (20 minutes)

Progress of charge collection measurement of irradiated strip detectors with a laser in low temperatures will be presented. The tests use four custom made preamplifiers connected to group of strips and an automatic data acquisition. The laser generator of infrared light (wavelength 1066 nm) is connected to a box with electronics and detector via an optical fiber and defocusser to generate large laser spot covering many strips. Hence, light intensity on each strip is similar to each other. Data acquisition was performed with a digitizer DRS4 V2 triggered by a pulse generator. Whole box is situated in a freezer where the temperature is about -30 degrees of Celsius. The temperature is monitored by a thermometer probe placed close to the detector. Data are recorded using DRS digitizer software at frequency 200 - 300 Hz.

The tested sensors are ATLAS07 minis (10x10mm) of different designs, irradiated to different doses. In this presentation we will show results of charge collection measurement as a function of bias voltage. Bias current and response of one strip or average from all 4 measured strips was recorded. As a reference unirradiated detector W12-Z6-P22 was measured at several temperatures (room temperature, -22 C and -31 C). Sensors W13-BZ4A-P04, W13-BZ4D and W13-BZ4B were irradiated by dose 2x10ˆ15 cm-2, sensor W12-BZ4D-P22 by 4x10ˆ14 cm-2 and sensor W13-BZ5-P11 by 1x10ˆ16 cm-2. For unirradiated sensors, as well as for sensors irradiated to 1.3x10ˆ14 and 4x10ˆ14 n/cm2 the bias dependence of the collected charge reached plateau corresponding to the full depletion voltage as found from the CV scan.

Author: Dr KODYS, Peter (Charles University)

Presenter: Dr KODYS, Peter (Charles University)

Session Classification: Full Detector Systems

Track Classification: Full Detector Systems

Contribution ID: **5** Type: **not specified**

TCT measurements with strip detectors

Thursday 31 May 2012 17:20 (20 minutes)

First results of TCT measurements with focused IR laser pulses on heavily irradiated strip detectors will be presented. Laser light was directed on the surface of the detector on the area not covered with metal. TCT signals were measured at different distance from the strip.

Author: MANDIC, Igor (Jozef Stefan Institute (SI))

Presenter: MANDIC, Igor (Jozef Stefan Institute (SI))

Session Classification: Full Detector Systems

Track Classification: Full Detector Systems

Contribution ID: **6** Type: **not specified**

Investigation of Charge Multiplication in Silicon Strip Detectors

Thursday 31 May 2012 17:00 (20 minutes)

Samples of n-in-p sensors provided by the RD50 collaboration have been irradiated with protons to fluences of 1e15, 5e15 and 1e16 neq/cm². An overview of the sensor properties before and after irradiation will be presented. After irradiation an annealing study of signal, signal to noise and leakage current has been performed with the ALiBaVa setup at different annealing steps up to 500 days at room temperature.

Author: ALTAN, Lokman (KIT - Karlsruhe Institute of Technology (DE))

Co-authors: DIERLAMM, Alexander (KIT - Karlsruhe Institute of Technology (DE)); MUELLER, Thomas (Institut fuer Experimentelle Kernphysik); DE BOER, Wim (KIT - Karlsruhe Institute of Technology (DE))

Presenter: ALTAN, Lokman (KIT - Karlsruhe Institute of Technology (DE))

Session Classification: Full Detector Systems

Track Classification: Full Detector Systems

Contribution ID: **7** Type: **not specified**

Thin Irradiated Strip and Pixel Detectors

Thursday 31 May 2012 11:50 (20 minutes)

Employing the MPP/HLL thinning procedure n-in-p sensors with an active thickness of 75µm and 150µm were produced. Presented will be edgeTCT measurements on strip sensors irradiated with neutrons to a fluence of 5e15 and 1e16 neq/cm², as well as laboratory and beam test measurements for pixel sensors inter-connected to ATLAS read-out chips. These pixel detectors were irradiated with neutrons and protons up to fluences of 5e15neq.

Author: WEIGELL, Philipp (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D)

Presenter: WEIGELL, Philipp (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D)

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: **8** Type: **not specified**

Comparison of the performance of irradiated n-in-p planar pixel sensors of different active thickness

Thursday 31 May 2012 15:50 (20 minutes)

We present the results of the post-irradiation characterization of n-in-p pixels produced at CiS and at the Semiconductor Laboratory of Max-Planck-Institut. N-in-p pixels represent a cost-effective alternative to the n-in-n technology to instrument the outer layers of the new pixel systems at HL-LHC. The performance of this kind of detectors will be shown up to fluence of 1e16 neq/cm**2, in terms of charge collection efficiency (CCE), noise occupancy and tracking efficiency obtained in beam tests. A comparison of the CCE for n-in-p pixels of active thickness between 75 um and 300 um will be shown.
A proposal for a new production at CiS of n-in-p pixels and diodes, as a common RD50 project will be also presented.

Author: MACCHIOLO, Anna (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D)

Presenter: MACCHIOLO, Anna (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D)

Session Classification: Full Detector Systems

Track Classification: Full Detector Systems

Contribution ID: **9** Type: **not specified**

A Silicon Strip Tracker for ATLAS after the HL-LHC Upgrade

While the Large Hadron Collider (LHC) at CERN continues to deliver increasing amounts of luminosity to the experiments, a phased upgrade of the LHC is planned, ultimately aimed at a luminosity of ten times the LHC design luminosity (HL-LHC). To cope with the expected harsh operating conditions in terms of particle rates and radiation dose, the ATLAS collaboration is developing a new tracker. In our presentation, we give an overview of the ATLAS tracker upgrade project, focusing on the silicon strip layers. We discuss technology choices for the sensors and present mechanical and electronic aspects of proposed module designs.

Summary

While the Large Hadron Collider (LHC) at CERN is continuing to deliver an ever-increasing luminosity to the experiments, a phased upgrade of the LHC is planned, ultimately aimed at increasing the integrated luminosity to about ten times the original LHC design luminosity (HL-LHC). To cope with the harsh conditions in terms of particle rates and radiation dose expected during HL-LHC operation, the ATLAS collaboration is developing technologies for a complete tracker replacement. This new detector will need to provide extreme radiation hardness and a high granularity, within the tight constraints imposed by the existing detectors and their services. An "all silicon"high granularity tracking detector is proposed.

Silicon sensors with sufficient radiation hardness are the subject of an international R&D programme, working on pixel and strip sensors. The efforts presented here concentrate on the strip layers. We have had fabricated a number of large area prototype planar detectors produced on p-type wafers to designs suitable for use at HL-LHC. These prototype detectors and miniature test detectors have been irradiated to a set of fluences matched to HL-LHC expectations. The irradiated sensors, along with several prototype modules using prototype HL-LHC readout electronics, have been studied in order to determine performance after doses of up to a few 1015 1-MeV neutron-equivalent per cm2.

In addition to producing full-scale (5120 channel in 40 ASICs per 9.75cm×9.75cm sensor) modules for the irradiation programme, several tens of prototype modules have been produced for multi-module assemblies. These have been designed to demonstrate the proposed next level of electrical and mechanical integration in the anticipated tracker structures, and have allowed testing of many critical aspects, including different powering options (serial power and DC-DC conversion).

In our presentation, we give an overview of the ATLAS tracker upgrade project, in particular focusing on the silicon strip layers. We discuss the challenging mechanical and electronic aspects of the proposed detector, which requires lightweight yet mechanically very rigid detector modules with a high level of service integration, producing high bandwidth data and with stringent cooling requirements. We present both mechanical and electronic test results relevant to the final anticipated performance in the upgraded detector.

Author: VOSSEBELD, Joost (University of Liverpool (GB))

Presenter: VOSSEBELD, Joost (University of Liverpool (GB))

Track Classification: Radiation Damage in LHC detectors

Contribution ID: **10** Type: **not specified**

Measurements of the effective depletion voltage in the ATLAS Pixel Detector

Wednesday 30 May 2012 14:10 (20 minutes)

With the rapidly increasing LHC luminosity, radiation damage effects in the ATLAS Pixel Detector will become critical to the detector operation and performance. Thus, it is necessary to monitor the impact of the irradiation on a regular basis. One crucial observable is the voltage that is needed to fully deplete the pixel sensor. Before type-inversion this is monitored in the Pixel Detector during routine maintenance stops of the LHC by a scan that exploits the cross-talk between neighbouring pixels. A high-ohmic short between pixels exists as long as the sensor is not fully depleted. If the sensor is fully depleted, then the pixels are isolated from each other. The cross-talk scan reads-out a pixel while charge is injected into two adjacent pixels. The change in cross-talk is measured while increasing the bias voltage. Radiation damage effects cause a decrease of the n-type doping concentration in the sensor bulk. Thus, the effective depletion voltage reduces with time, while annealing effects can induce a rise of the effective depletion voltage. The evolution of the effective depletion voltage during the last year is reported in this talk.

Author: SCHORLEMMER, Andre Lukas (CERN / Georg-August-Universitaet Goettingen (DE))

Presenter: SCHORLEMMER, Andre Lukas (CERN / Georg-August-Universitaet Goettingen (DE))

Session Classification: Radiation Damage in LHC Detectors

Track Classification: Radiation Damage in LHC detectors

Contribution ID: **11** Type: **not specified**

Simulation of the Double Peak Effect in irradiated Sensors

Thursday 31 May 2012 14:20 (20 minutes)

Following the RD50 Simulation Group proposal, simulations of the Double Peak Effect in irradiated sensors have been performed using the Synopsys TCAD Sentaurus software.
Implementation of traps and modeling of leakage current will be explained in detail. The resulting electric field distribution and TCT signals at different voltages, fluences and temperatures are presented.

Author: EBER, Robert (KIT - Karlsruhe Institute of Technology (DE))

Co-authors: DIERLAMM, Alexander (KIT - Karlsruhe Institute of Technology (DE)); MUELLER, Thomas (Institut fuer Experimentelle Kernphysik); DE BOER, Wim (KIT - Karlsruhe Institute of Technology (DE))

Presenter: EBER, Robert (KIT - Karlsruhe Institute of Technology (DE))

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: **12** Type: **not specified**

Effective depletion voltage and 2nd metal layer charge loss in LHCb VELO

Wednesday 30 May 2012 16:15 (20 minutes)

The VErtex LOcator (VELO) is a silicon strip detector designed to reconstruct particle tracks and vertices produced by proton-proton interactions near to the LHCb interaction point. The excellent track resolution and decay vertex separation provided by the VELO are essential to all LHCb analyses. For the integrated luminosity delivered by the LHC up to the end of 2011 the VELO is exposed to higher particle fluences than any other silicon detector of the four major LHC experiments. The results from radiation damage studies, based on effective depletion voltage monitoring, carried out during the first two years of data taking at the LHC are presented. A radiation induced second metal layer charge loss effect is also discussed in detail.

Author: Dr MORAN, Dermot (University of Manchester)

Presenter: Dr MORAN, Dermot (University of Manchester)

Session Classification: Radiation Damage in LHC Detectors

Track Classification: Radiation Damage in LHC detectors

Contribution ID: **13** Type: **not specified**

The ATLAS Pixel Detector radiation damage monitoring with the High Voltage delivery system

Wednesday 30 May 2012 13:50 (20 minutes)

The ATLAS Pixel Detector radiation damage monitoring system uses leakage currents in pixel modules measured with ATLAS Pixel High Voltage delivery system. We present leakage currents measured in 2011 and 2012 and their dependence
on the ATLAS integrated luminosity (> 6 fbˆ{-1}). We compare them with the theoretical model prediction. The status of the system is presented as well as the prospects for the further studies.

Authors: Dr GORELOV, Igor (University of New Mexico (US)); TOMS, Konstantin (University of New Mexico (US)); HOEFERKAMP, Martin (Department of Physics and Astronomy); WANG, Rui (University of New Mexico (US)); Prof. SEIDEL, Sally (University of New Mexico / ATLAS)

Presenter: TOMS, Konstantin (University of New Mexico (US))

Session Classification: Radiation Damage in LHC Detectors

Track Classification: Radiation Damage in LHC detectors

Contribution ID: **14** Type: **not specified**

First results on cryogenic semiconductor detectors for advancing the LHC beam loss monitor

Friday 1 June 2012 09:00 (20 minutes)

One of the goals of LHC upgrade is the increase of the particle maximal energy. For that, the magnet coils of the collider should operate at higher current that requires advancing system for monitoring of the radiation environment in the vicinity of the coils. To fulfill the new requirements, the novel version of Beam Loss Monitor (BLMs) which should be radiation hard at cryogenic temperature and operate in the LHe bath at 1.7 K is under development at CERN in cooperation with Ioffe Physical-Technical Institute (St. Petersburg). We present recent results on test beam of silicon and diamond detectors at cryogenic temperature and expectations following from this test.

Author: Dr EREMIN, Vladimir (Ioffe Physical-Technical Institute of Russian Academy of Sciences)

Co-authors: Dr DEHNING, Bernd (CERN); KURFUERST, Christoph (Technical University of Vienna); Dr VERBITSKAYA, Elena (Ioffe Physical-Technical Institute of Russian Academy of Sciences); EREMIN, Igor (Ioffe Physical-Technical Institute of Russian Academy of Sciences); Dr HÄRKÖNEN, Jaakko (Helsinki Institute of Physics/CERN); Dr SAPINSKI, Mariusz (CERN); EGOROV, Nicolai (Research Institute of Material Science and Technology); Dr TUBOLTSEV, Yuri (Ioffe Physical-Technical Institute of Russian Academy of Sciences)

Presenter: Dr EREMIN, Vladimir (Ioffe Physical-Technical Institute of Russian Academy of Sciences)

Session Classification: New Structures

Track Classification: New structures and 3D sensors

Contribution ID: **15** Type: **not specified**

Charge collection studies on heavily irradiated diodes from the RD50 multiplication run

Thursday 31 May 2012 11:30 (20 minutes)

Special diodes were designed on RD50 multiplication mask which combine the ease of use of a pad-detector with electric field of a strip detector. A series of charge collection measurements was performed with diodes of different implant properties and thicknesses. The diodes were irradiated in steps with neutrons to the total accumulated fluence of 1e16 cm-2. Charge collection efficiency for 90Sr was measured at each fluence step and the values were compared between the wafers with different properties.

Author: KRAMBERGER, Gregor (Jozef Stefan Institute (SI))

Co-authors: MANDIC, Igor (Jozef Stefan Institute (SI)); MIKUZ, Marko (Jozef Stefan Institute (SI)); CINDRO, Vladimir (Jozef Stefan Institute (SI))

Presenter: KRAMBERGER, Gregor (Jozef Stefan Institute (SI))

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: **16** Type: **not specified**

Impact of proton irradiations with different particle-energies on the electrical properties of Si-diodes

Thursday 31 May 2012 09:40 (20 minutes)

Silicon n-type test-diodes made of FZ and MCz material were manufactured for the CMS HPK campaign and irradiated with 23 MeV protons. At a fluence of 3e14/cm2 neq the MCz n-type diodes demonstrated a clear type inversion directly after irradiation without exhibiting a strong double junction effect. This is unexpected compared to results measured on MCz diodes from RD50 and irradiated with 23 GeV protons. Because of previous results on this batch of sensors revealing process induced bulk defects, it was investigated whether this type inversion is a result of the material defects or an effect of the lower proton energy of 23 MeV, compared to the RD50 irradiations at 23 GeV.

An additional set of these sensors was irradiated by 23 GeV protons and has been characterized electrically by means of capacitance-voltage (C-V) and current-voltage (I-V) measurements. Transient current technique pulses (TCT) and charge collection efficiency (CCE) measurements have proven a dependence of the bulk damage on the proton energy. Moreover RD50 diodes were irradiated with 23 MeV protons, electrically characterised and compared to results obtained after 23 GeV irradiations. Our previous observation on the energy dependence of the radiation damage can be confirmed. Microscopic measurements will be performed in order to get a deeper understanding for the difference of the induced defects from the two different proton energies.

Author: NEUBUSER, Coralie (Hamburg University (DE))

Co-authors: JUNKES, Alexandra (Brown University); ECKSTEIN, Doris (DESY); FRETWURST, Eckhart (II. Institut fuer Experimentalphysik); GARUTTI, Erika (DESY); Dr STEINBRUECK, Georg (Hamburg University (DE)); ERFLE, Joachim (Hamburg University (DE)); POEHLSEN, Thomas (University of Hamburg)

Presenter: NEUBUSER, Coralie (Hamburg University (DE))

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: **17** Type: **not specified**

Progress on Scribe-Cleave-Passivate (SCP) Slim Edge Technology

Thursday 31 May 2012 17:40 (20 minutes)

Within the framework of RD50 collaboration, we are pursuing scribe-cleave-passivate (SCP) technology of making "slim edge"sensors. Such sensors have only a minimal amount of inactive peripheral region, which benefits construction of large-area tracker and imaging systems. Key application steps of this method are surface scribing, cleaving, and passivation of the resulting sidewall. We are working on developing both the technology and physical understanding of the processed devices performance. Our recent advances include: a) further investigation of scribing technologies, b) new methods of sidewall passivation, c) investigation automated processing machines for scribing and cleaving, d) investigation of the charge collection near the edge, e) radiation hardness of the processed devices. We will also report on the status of devices processed at the request of the RD50 collaborators.

Authors: Dr PHLIPS, Bernard (NRL); Mr PARKER, Colin (UCSC); SADROZINSKI, Hartmut (SCIPP, UC santa Cruz); Dr CHRISTOPHERSEN, Marc (NRL); Mr ELY, Scott (UCSC); FADEYEV, Vitaliy (University of California,Santa Cruz (US))

Presenter: FADEYEV, Vitaliy (University of California,Santa Cruz (US))

Session Classification: Full Detector Systems

Track Classification: New structures and 3D sensors

Contribution ID: **18** Type: **not specified**

Exploring charge multiplication for fast timing with silicon sensors

Friday 1 June 2012 10:00 (20 minutes)

Charge multiplication in silicon sensors (discovered by RD50 institutions) might have applications beyond off-setting charge lost due to trapping during the drift of electrons or holes.
Charge multiplication makes silicon sensors more like drift chambers or micro-channel plates, where a modest number of created charges are amplified (by factors of 10,000 or so) and can be used for fast timing.
We will consider the use of silicon detectors for precision position and fast timing measurements.
A possible research program is outlined, and the needed pieces are identified.

Author: SADROZINSKI, Hartmut (SCIPP, UC santa Cruz)

Co-authors: SEIDEN, Abraham (University of California,Santa Cruz (US)); CARTIGLIA, Nicolo (INFN Torino)

Presenter: SADROZINSKI, Hartmut (SCIPP, UC santa Cruz)

Session Classification: New Structures

Track Classification: New structures and 3D sensors

Contribution ID: **19** Type: **not specified**

FORMATION AND ANNEALING OF INTERSTITIAL DEFECTS IN P-TYPE SILICON AND SILICON-GERMANIUM ALLOYS UNDER ELECTRON AND ALPHA-IRRADIATION

Thursday 31 May 2012 09:00 (20 minutes)

We have found that the single silicon self-interstitial atoms can be kept essentially immobile in p-type materials upon irradiation with alpha-particles at room temperature or low intensity electron irradiation at liquid nitrogen temperature. The conclusion is based on observations of the formation of interstitial carbon related defects due to an interaction of self-interstitial (I) with substitutional carbon (Cs) (Watkins replacement mechanism) in the course of isochronal annealing of irradiated samples. We also have found that the relative probabilities of Sii reaction with carbon and boron are controlled with electronic excitation.
Activation energies of interstitial atom migration (both I and Ci) do not depend essentially on germanium content in SixGe1-x alloys (x<2 %).
To explain the observed experimental evidences a model of self-interstitial reactions in p-type silicon is suggested. This model predicts the dependence of the rate for I annealing on Fermi level position. The prediction is confirmed experimentally.

Author: Dr MAKARENKO, Leonid (Belarusian state University)

Co-authors: MOLL, Michael (CERN); Dr ABROSIMOV, Nikolay (Leibniz Institute for Crystal Growth, Berlin, Germany); Dr LASTOVSKII, Stanislav (Scientific-Practical Materials Research Centre of NAS of Belarus, Minsk, Belarus)

Presenter: Dr MAKARENKO, Leonid (Belarusian state University)

Session Classification: Detector Characterization and Simulations

Track Classification: Defect and Material Characterization

Contribution ID: **20** Type: **not specified**

Life time determination of free charge carriers in irradiated silicon sensors

Wednesday 30 May 2012 09:35 (20 minutes)

The transient current technique (TCT) is a well-known technique to analyse the electric field and the trapping behaviour of free charge carriers in silicon devices.

It turns out that neither the electric field nor the trapping can be predicted for irradiated diodes. Different assumptions on the drift of free charge carriers or on the trapping behaviour may be made in order to analyse TCT current signals. Different methods for the extraction of the free charge carrier life times are discussed in this talk.

A study is presented based on TCT measurements and on simulated TCT signals. Fluences between 1e14 and 4e15 neq / cm² were used. Results will be presented and discussed.

Author: POEHLSEN, Thomas (Hamburg University)

Co-authors: NEUBUSER, Coralie (Hamburg University (DE)); ECKSTEIN, Doris (DESY); GARUTTI, Erika (Hamburg University (DE)); NAGEL, Evangelos (Hamburg University (DE)); Dr STEINBRUECK, Georg (Hamburg University (DE)); ERFLE, Joachim (Hamburg University (DE)); LANGE, Joern (Hamburg University)

Presenter: POEHLSEN, Thomas (Hamburg University)

Session Classification: Material and Defect Characterization

Track Classification: Defect and Material Characterization

Contribution ID: **21** Type: **not specified**

Electric Field Modeling by simulations with ISE-TCAD

Thursday 31 May 2012 14:00 (20 minutes)

Simulations of a pad silicon sensor (100 x 300 μm) have been carried out in order to model the electric field distribution under irradiation as proposed by V.Eremin. The electric field distribution has been compared at different bias voltages and for several irradiation doses with the two midgap level model.
The software package used has been ISE-TCAD which allows to simulate the electrical parameters of the device.

Author: MINANO MOYA, Mercedes (Universidad de Valencia (ES))

Presenter: MINANO MOYA, Mercedes (Universidad de Valencia (ES))

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: **22** Type: **not specified**

Recent results on radiation damage in the LHCb silicon tracking system

Wednesday 30 May 2012 15:55 (20 minutes)

The LHCb experiment is dedicated to searching for New Physics effects in the heavy flavour sector, precise measurements of CP violation and rare heavy meson decays. Precise tracking and vertexing around the interaction point is crucial in achieving these physics goals.
The LHCb VELO (VErtex LOcator) silicon micro-strip detector is the highest precision vertex detector at the LHC and is located at only 8 mm from the proton beams. Consequently the sensors receive a large and non uniform radiation dose.
The high spatial resolution (up to 4 microns single hit precision) is crucial for precise reconstruction of the primary and secondary vertices and in turn for achieving high quality measurements of the impact parameter and life time of beauty and charm mesons. The High Level Trigger relies heavily on these quantities.
The VELO comprises of 86 planar sensors fabricated from oxygenated n-on-n silicon (with one module made from p-on-n silicon) that operate in extremely harsh radiation environment (a dose of 0.5 x 1014 1MeV neutron equivalents /cm2 per fb-1 of data is predicted at the tip of the sensors).
The radiation damage is monitored by three studies:
1) the currents drawn as a function of temperature and voltage,
2) studying the noise versus voltage behaviour,
3) charge collection efficiency, studied with tracks from proton-proton collisions, as a function of voltage.
Here we report the results from the first two studies, where signs of radiation damage being observed. Clear differences in behaviour, as expected, are observed between n-on-n and n-on-p sensors. Type inversion is observed in the tips of the n-on-n sensors.
The detector so far shows no significant performance degradation, however many interesting effects have been observed in the sensors.
The LHCb Silicon Tracker is constructed from silicon micro-strip detectors with long readout strips. It consists of one four-layer tracking station upstream of the LHCb spectrometer magnet and three stations downstream of the magnet. In this presentation, an overview of the first measurements of the observed radiation damage will also be shown.

Authors: OBLAKOWSKA-MUCHA, Agnieszka (AGH University of Science and Technology (PL)); SZUMLAK, Tomasz (AGH University of Science and Technology (PL))

Co-authors: PARKES, Chris (University of Manchester (GB)); TOBIN, Mark (Physik-Institut-Universitaet Zuerich); COLLINS, Paula (CERN)

Presenter: OBLAKOWSKA-MUCHA, Agnieszka (AGH University of Science and Technology (PL))

Session Classification: Radiation Damage in LHC Detectors

Track Classification: Radiation Damage in LHC detectors

Contribution ID: **23** Type: **not specified**

Isolation Characteristics of Silicon Sensors Using Simulation Approach

Thursday 31 May 2012 14:40 (20 minutes)

Si sensors will be used in the extremely harsh radiation environment in the present and future generation nuclear and high energy physics experiments. In addition, the double sided silicon sensors and single sided sensors in n+-p- configurations will face an additional problem of shorting of n+ strips. There are several techniques, like p-spray and p-stop, which provide inter-strip isolation, but, they have an additional impact on other electrical characteristics like inter-strip capacitance and breakdown voltage. The shortcoming of p-spray and p-stop isolation techniques can be reduced by using the combination of these two techniques along with multiple p-stops and metal overhang over p-stops. A comprehensive 2-D device simulation approach (using Silvaco TCAD tools) is used to find an optimized configuration. Simulations are performed on a n-type substrate with uniform doping concentration of 7x1011 cm-3 and thickness 300μm. The n+ strips of width 18μm with pitch equal to 80μm are used. The electron concentration, potential and electric field distributions are used to investigating device characteristics and optimizing design parameters.

Author: Dr RANJAN, Kirti (Delhi University)

Co-authors: Dr BHARDWAJ, Ashutosh (Delhi University); Prof. SHIVPURI, Ram (Delhi University); Mr SINGH, Ranjeet (Delhi University)

Presenter: Dr RANJAN, Kirti (Delhi University)

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: **24** Type: **not specified**

Deep levels roles in non-equilibrium conductivity in irradiated Si.

Wednesday 30 May 2012 09:15 (20 minutes)

Two light beams excitation technique was used for investigation the recombination process in the by neutron irradiated Si (WODEAN samples, bar type). By application of additional illumination in the extrisic excitation region the photoconductivity spectrum and time dependent conductivity measurement reveals the levels that participate in the photoconductivity, but, if the sample is excited, their excitation quenched the photoresponse. These results allow to analyze the properties of micro-inhomogeneities identified by Hall effects, thermally stimulated and persistent current measurements.

Author: Prof. VAITKUS, Juozas (Vilnius University)

Co-authors: Dr MEKYS, Algirdas (Vilnius university); Mr MOCKEVICIUS, Giedrius (Vilnius University); Dr STORASTA, Jurgis (Vilnius University); Mr VAINORIUS, Neimantas (Vilnius Universitetas); Mr MALINOVSKIS, Paulius (Vilnius University); Mr DUMBAUSKAS, Vytautas (Vilnius University)

Presenter: Prof. VAITKUS, Juozas (Vilnius University)

Session Classification: Material and Defect Characterization

Track Classification: Defect and Material Characterization

Contribution ID: **25** Type: **not specified**

Design and fabrication of Endcap prototype sensors (petalet) for the ATLAS Upgrade

Wednesday 30 May 2012 11:40 (20 minutes)

A prototype for the Endcap part in the ATLAS Upgrade has been designed and fabricated at CNM-Barcelona. The petalet, prototype for the full petal, includes microstrips with built-in stereo angle. Because of their particular geometry, a Python script was developed to design the sensors and propose solutions for different issues such as, orphan strips, no-standard bias rails and also to add some features like embedded pitch adaptors.
The sensors are being fabricated and some initial results on the sensor performance will be presented.

Summary

The design and construction of a petal stave, which will be used for the Endcap in the ATLAS Tracker Upgrade, is a difficult task due to many different shapes and objects resulting from the built-in stereo angle in each sensor and the petal shape. Strips on each sensor are laid-out with 20 mrad stereo angle so that front and back sensors produce 40 mrad, this is done in order not to rotate sensors on both sides.
The petalet prototype is composed by 3 trapezium-shaped sensors, each sensor contains 2 strip rows. Four inches silicon wafers were used for fabrication which was performed in the clean room facilities at CNM-Barcelona. The assembly of the sensors into the petalet modules will be done by other institutes of the ATLAS collaboration (Valencia, DESY, Freiburg).

Authors: LACASTA LLACER, Carlos (IFIC-Valencia); Prof. GARCIA, Carmen (Universidad de Valencia (ES)); Dr FLETA CORRAL, Celeste (Universidad de Valencia (ES)); PELLEGRINI, Giulio (Universidad de Valencia (ES)); LOZANO FANTOBA, Manuel (Universidad de Valencia (ES)); Dr ULLAN COMES, Miguel (Universidad de Valencia (ES)); BENITEZ CASMA, Victor Hugo (Universidad de Valencia (ES))

Presenter: BENITEZ CASMA, Victor Hugo (Universidad de Valencia (ES))

Session Classification: Detectors for the LHC upgrade

Track Classification: Full Detector Systems

Contribution ID: **26** Type: **not specified**

Low Resistance Strip Sensors and Slim Edges Combined RD50 Experiment

Friday 1 June 2012 10:50 (20 minutes)

An update will be presented on the Common RD50 Project "Low Resistance Strip Sensors". Three RD50 institutes are collaborating in this project (CNM-Barcelona, IFIC-Valencia, and SCIPP-Santa Cruz), in which a new method to enhance the sensor hardness to beam-loss damage is studied. The fabrication has been combined with new experiments related with another RD50 Common Project involving Slim Edges. Additional wafers will be fabricated to try several experiments using deep reactive ion etching (DRIE) to cut the wafer closer to the sensor edge. A new mask has been designed for the definition of the trenches that will help the cleaving of the sensors for the cut.

Summary

In case of beam loss in large colliders, large amount of charge can be generated instantaneously in the sensors bulk which cannot be evacuated fast enough. In this scenario, the sensors can get damaged by the development of very large voltages across the coupling capacitor with the result of permanent damage in the strip. Usually, punch-through protection (PTP) structures are used to prevent this damage by activating a low resistive path for the large charge to be evacuated. Nevertheless, it has been shown that the strip resistance can inhibit the charge evacuation in the cases when the charge is generated far away from the PTP structure. In this project we try to reduce the strip resistance in order to make the PTP structures effective in all the cases.

We have designed, using our automatic layout generation tool, a set of 64-strips, ATLAS-barrel-like sensors with different PTP geometries and with a metal layer contacting all along the strip implant in order to reduce the strip resistance. Also, several test structures with DC pads along the strips have been designed which will allow a more precise measurement of the potential gradient in the strip in case of large charge generation. Some technological experiments have been also carried out in order to optimize the coupling capacitor fabrication, which will have to be made with Metal-Insulator-Metal (MIM) structures.

An additional mask has been designed to define trenches for Deep Reactive Ion Etching (DRIE) of some wafers. Three additional wafers will be fabricated in order to try different DRIE methods to form the trenches. The design has included trenches at different distances from the sensor edge, and several trench designs, in order to include a variety of experiment of the DRIE cutting and slim edges.

Authors: Dr GRILLO, Alex (University of California,Santa Cruz (US)); LACASTA LLACER, Carlos (IFIC-Valencia); PELLEGRINI, Giulio (Universidad de Valencia (ES)); SADROZINSKI, Hartmut (SCIPP, UC santa Cruz); LOZANO FANTOBA, Manuel (Universidad de Valencia (ES)); Dr ULLAN COMES, Miguel (Universidad de Valencia (ES)); BENITEZ CASMA, Victor Hugo (Universidad de Valencia (ES)); FADEYEV, Vitaliy (University of California,Santa Cruz (US))

Presenter: Dr ULLAN COMES, Miguel (Universidad de Valencia (ES))

Session Classification: New Structures

Track Classification: New structures and 3D sensors

Contribution ID: **27** Type: **not specified**

Irradiation study on diodes of different silicon materials for the CMS tracker upgrade

Thursday 31 May 2012 09:20 (20 minutes)

The aim of the CMS tracker upgrade campaign is to find a new radiation hard sensor material for the HL-LHC upgrade of the CMS tracker. Different test structures and sensors were implemented on a variety of silicon materials with different thicknesses by Hamatsu Photonics, Japan. Samples have been irradiated to fluences up to 1E15 with protons at Karlsruhe and the CERN PS and with reactor neutrons at Ljubljana.

To find a radiation hard sensor material we investigated current characteristics (I-V), capacitance characteristics (C-V) and characteristics of charge collection (TCT).

This talk will present the results concerning dark current, effective doping concentration and charge collection efficiency and their annealing, key parameters in defining a material well suited for the upgrade of the CMS tracker.

Author: ERFLE, Joachim (Hamburg University (DE))

Presenter: ERFLE, Joachim (Hamburg University (DE))

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: **28** Type: **not specified**

Status of radiation damage of the ATLAS SCT detector

Wednesday 30 May 2012 15:00 (25 minutes)

ATLAS barrel SCT sensors have received so far about 0.5 to 1 e12 1MeV-neutron-equivalent fluence per cm**2 from 7-TeV pp collisions at LHC. The HV currents reached up to several micro-Amps/cm**3 at 0 C, assuming they are all due to bulk generation current. Their time dependences are compared with predictions by two leakage current models with self-annealing effects. The prediction takes into account of time-profile of the sensor temperature as well as the fluence estimate based on the FLUKA simulation. Fairly good agreements are obtained between data and predictions. In addition, we report the time profiles of the equivalent-noise-charges ENC measured in calibration runs.

Author: KONDO, Taka (KEK)

Co-author: DERVAN, Paul (University of Liverpool)

Presenter: KONDO, Taka (KEK)

Session Classification: Radiation Damage in LHC Detectors

Track Classification: Radiation Damage in LHC detectors

Contribution ID: **29** Type: **not specified**

Discussion on Material and Defect Characterization

Wednesday 30 May 2012 11:20 (20 minutes)

Presenters: Prof. BRUZZI, Mara (INFN and University of Florence); BRUZZI, Mara (Dipartimento di Fisica)

Session Classification: Material and Defect Characterization

Contribution ID: **30** Type: **not specified**

Welcome to the 20th RD50 Workshop

Wednesday 30 May 2012 09:00 (15 minutes)

Presenters: CREANZA, Donato (Universita e INFN (IT)); CREANZA, Donato (Dipartimento Interateneo di Fisica & INFN - Bari); CASSE, Gianluigi (University of Liverpool (GB)); MOLL, Michael (CERN); GIBSON, Stephen (CERN)

Session Classification: Welcome

Contribution ID: **31** Type: **not specified**

Discussion on New Structures

Friday 1 June 2012 11:40 (30 minutes)

Presenters: PELLEGRINI, Giulio (Universidad de Valencia (ES)); SADROZINSKI, Hartmut (SCIPP, UC santa Cruz)

Session Classification: New Structures

Contribution ID: **32** Type: **not specified**

TCAD Simulation of irradiated Silicon radiation detector using commercial simulation products

Thursday 31 May 2012 12:30 (30 minutes)

Modern Technology-Computer-Assisted Design (TCAD) tools allow for detailed simulation of various physics processes in silicon radiation detector. I present a review of the features of the main available commercial simulation softwares and how they can be used to simulate the main effects of non-ionizing radiation damage in Silicon.

Example of simulation of Space-Charge sign inversion, double electric field peak and charge multiplication will be presented. Strategy to obtain better quantitative results from simulation through a careful calibration of physical parameters will also be discussed.

Author: BENOIT, Mathieu (CERN LCD)

Presenter: BENOIT, Mathieu (CERN LCD)

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: **33** Type: **not specified**

Discussion

Wednesday 30 May 2012 16:55 (30 minutes)

Presenter: GIBSON, Stephen (CERN)

Session Classification: Radiation Damage in LHC Detectors

Contribution ID: **34** Type: **not specified**

The EUDET high resolution pixel beam telescope (status and development plans)

Wednesday 30 May 2012 12:00 (20 minutes)

A high resolution (\sigma ˜2um) beam telescope based on monolithic
active pixel sensors was developed within the EUDET collaboration.
The telescope consists of six monolithic active pixel sensor planes (Mimosa26) with a pixel pitch of 18.4 um and thinned down to 50um.
The EUDET telescope copies with a deadtime free readout based on the PXI
express bus are located at DESY and CERN beam lines. The telescopes
operation status and further development plans within the AIDA project are briefly discussed.

Author: Dr RUBINSKIY, Igor (Deutsches Elektronen-Synchrotron (DE))

Presenter: Dr RUBINSKIY, Igor (Deutsches Elektronen-Synchrotron (DE))

Session Classification: Detectors for the LHC upgrade

Track Classification: New structures and 3D sensors

Contribution ID: **35** Type: **not specified**

Characterization of Micron n-on-p ministrip sensors irradiated with 24 GeV/c protons.

Thursday 31 May 2012 11:10 (20 minutes)

We will present the latest developments of the characterization campaign on 24 GeV/c n-on-p sensors irradiated with 24 GeV/c protons.

Author: PACIFICO, Nicola (Universite Montpellier II (FR))

Co-authors: DOLENC KITTELMANN, Irena (Ohio State University (US)); FERNANDEZ GARCIA, Marcos (Universidad de Cantabria (ES)); GABRYSCH, Markus (CERN); MOLL, Michael (CERN)

Presenter: PACIFICO, Nicola (Universite Montpellier II (FR))

Session Classification: Detector Characterization and Simulations

Track Classification: Detector Characterization

Contribution ID: **36** Type: **not specified**

Discussion on Full Detector Systems

Thursday 31 May 2012 18:00 (30 minutes)

Presenters: CASSE, Gianluigi (University of Liverpool (GB)); KRAMBERGER, Gregor (Jozef Stefan Institute (SI))

Session Classification: Full Detector Systems

Contribution ID: **37** Type: **not specified**

Discussion - Simulation Working Group

Thursday 31 May 2012 15:00 (30 minutes)

Presenters: FRETWURST, Eckhart (II. Institut fuer Experimentalphysik); EREMIN, Vladimir (Ioffe Physical Technical Institute of Russian Academy of Scienc)

Session Classification: Detector Characterization and Simulations

Contribution ID: **39** Type: **not specified**

Evaluation of electron and hole detrapping in irradiated silicon sensors

Wednesday 30 May 2012 10:45 (20 minutes)

Preliminary results on the extraction of detrapping time constants for both electrons and holes obtained from red laser TCT measurements. Based on DLTS scans from 10-50℃ the trapping levels and cross sections were obtained for highly p-irradiated silicon diodes.

Authors: Prof. BRUZZI, Mara (INFN and University of Florence); GABRYSCH, Markus (CERN)

Co-authors: DOLENC KITTELMANN, Irena (Ohio State University (US)); FERNANDEZ GARCIA, Marcos (Universidad de Cantabria (ES)); MOLL, Michael (CERN); PACIFICO, Nicola (Universite Montpellier II (FR))

Presenter: GABRYSCH, Markus (CERN)

Session Classification: Material and Defect Characterization

Track Classification: Defect and Material Characterization

Contribution ID: **40** Type: **not specified**

Leakage current measurements in the ATLAS Pixel Detector

Wednesday 30 May 2012 13:30 (20 minutes)

The talk presents latest results on the leakage current in the ATLAS Pixel Detector. Measurements with low granularity using the high voltage power supplies are shown as well as measurements of the single pixel leakage current, using the so-called monleak measurement of the ATLAS Pixel front-end chip. Where possible the measurements are compared to the predictions.

Author: KEIL, Markus (Georg-August-Universitaet Goettingen (DE))

Presenter: KEIL, Markus (Georg-August-Universitaet Goettingen (DE))

Session Classification: Radiation Damage in LHC Detectors

Track Classification: Radiation Damage in LHC detectors

Contribution ID: **41** Type: **not specified**

Radiation Damage of the CMS Pixel and Strips Tracker (EVO presentation)

Wednesday 30 May 2012 14:30 (30 minutes)

In this talk I give an overview of the efforts to monitor the evolution of the sensor properties for the CMS pixel and strips tracker. This contains measurements of changes seen so far, as well as projections of the expected evolution for the coming years of LHC running.

Author: BARTH, Christian (KIT - Karlsruhe Institute of Technology (DE))

Co-author: ZENZ, Seth (Princeton University (US))

Presenter: BARTH, Christian (KIT - Karlsruhe Institute of Technology (DE))

Session Classification: Radiation Damage in LHC Detectors

Track Classification: Radiation Damage in LHC detectors

Contribution ID: **42** Type: **not specified**

CMS Preshower silicon detector leakage current measurements and observations (EVO)

Wednesday 30 May 2012 16:35 (20 minutes)

The CMS Preshower detector is made up of two layers of silicon strip sensors located just behind lead absorber planes for electromagnetic shower energy measurement and position determination. The leakage current measurements from these sensors provides a measure of the radiation damage to the bulk as well as a measure of the distribution of NIEL fluence as a function of pseudorapidity. In addition, anomalously high currents were observed at the start of 7 TeV collisions in 2010 which are attributed to radiation induced surface current. These surface currents have evolved in an interesting way but their underlying mechanism is not yet understood.

Summary

A brief description of the detector will be presented. Then the leakage current measurements that can be attributed to the bulk damage will be shown along with predictions from a FLUKA model using the CMS detector simulation. Finally the observations of anomalous high leakage currents are presented along with evidence showing that they are likely to be surface currents induced by radiation. The evolution of these currents since their appearance in mid 2010 are described.

Author: HONMA, Alan (CERN)

Co-authors: ELLIOTT-PEISERT, Anna (CERN); BARNEY, David (CERN)

Presenter: HONMA, Alan (CERN)

Session Classification: Radiation Damage in LHC Detectors

Track Classification: Radiation Damage in LHC detectors

Contribution ID: **43** Type: **not specified**

Low cost commercial scanning TCT setup

Thursday 31 May 2012 12:10 (20 minutes)

Presenter: KRAMBERGER, Gregor (Jozef Stefan Institute (SI))

Session Classification: Detector Characterization and Simulations

Contribution ID: **44** Type: **not specified**

Test beam results with a telescope system based on the Alibava system

Friday 1 June 2012 09:40 (20 minutes)

The Alibava based test beam telescope is a system with four 2D semiconductor detectors which measures track parameters with elevated precision and determines the position of the beam particle interactions with a device under test (DUT). Characteristics of detectors before and after irradiation, as a function of bias voltage or other variables (temperature, influence of magnetic field, etc.) can be studied in real operation conditions. Usually, the set-up of a test beam is laborious and time consuming. Our telescope has been conceived to minimize the set-up time, provide high resolution and high rate tracking with early feedback from analysis of the recorded data. Preliminary results of the telescope operation at the DESY beam-line are presented.

Authors: CASSE, Gianluigi (University of Liverpool (GB)); TSURIN, Ilya (University of Liverpool (GB)); MARTI I GARCIA, Salvador (IFIC-Valencia (UV/EG-CSIC)); BURDIN, Sergey (University of Liverpool (GB))

Presenter: CASSE, Gianluigi (University of Liverpool (GB))

Session Classification: New Structures

Track Classification: New structures and 3D sensors

Contribution ID: **45** Type: **not specified**

Punch through protection and p-stop ion concentration in HPK strip mini-sensors

Friday 1 June 2012 09:20 (20 minutes)

Protection of AC coupling capacitors from beam splashes has been studied on the HPK ATLAS07 mini-sensors with special structures, BZ4A,B,C and D, for p-stop ion concentrations 2e12, 4e12 and 1e13 ion/cmˆ2. Punch through voltage was measured by DC methods on both ends of strips and it was found that voltage dominantly depends on ion concentration for all punch through structures. Minimum PT voltage was found for p-stop concentration 2e12 ion/cmˆ2 and the voltage is growing with concentration. IV characteristics have been measured for whole sample of 74 sensors. All sensors with p-stop isolation were successfully operating up to 1000V and sensors with p-stop plus p-spray 2e12 ion/cmˆ2 -up to 920V only. Full depletion voltage deduced from CV characteristics is in the range 180V –290V. An inter-strip capacitance, Cint, is constant for bias voltages higher than respective full depletion voltages and Cint does not depend on ion concentration within of ±20fE. First sample of 12 sensors has been irradiated in reactor in Rez near Prague to 4e14, 2e15 and 1e16neq/cmˆ2 and sensors will be investigated soon.
Next study concerns a thermal dependence of poly-silicon bias resistors of non-irradiated and irradiated sensors up to 4E14neq/cmˆ2. The respective temperature coefficients are -6.7kΩ/centigrade for non-irradiated sensors and -10.1 kΩ/centigrade for fluency 4e14neq/cmˆ2 .

Author: BOHM, Jan (Academy of Sciences CR)

Presenter: BOHM, Jan (Academy of Sciences CR)

Session Classification: New Structures

Contribution ID: **46** Type: **not specified**

Test beam measurements of CNM 3D pixel detectors

Friday 1 June 2012 11:25 (15 minutes)

I will show the last results on test beam measurements done in collaboration with IFAE on CNM 3D detectors.

Author: PELLEGRINI, Giulio (Universidad de Valencia (ES))

Presenter: PELLEGRINI, Giulio (Universidad de Valencia (ES))

Session Classification: New Structures

Contribution ID: **47** Type: **not specified**

New fabrication run of CMS 3d pixel detectors at CNM.

Friday 1 June 2012 11:10 (15 minutes)

I will show the first results on the manufacturing and electrical characterizations of the 3D CMS pixel sensors fabricated at CNM. This is a common project among IFCA, CNM and PSI.

Author: PELLEGRINI, Giulio (Universidad de Valencia (ES))

Presenter: PELLEGRINI, Giulio (Universidad de Valencia (ES))

Session Classification: New Structures

Contribution ID: **48** Type: **not specified**

Shallow levels analysis in n-type MCZ Si detectors after mixed irradiation

Wednesday 30 May 2012 11:05 (15 minutes)

R. Mori, M. Bruzzi, Z. Li, M. Scaringella INFN and University of Florence, Italy BNL, Upton New York

n-type MCZ Si detectors have been irradiated with different particles and fluences: (a) fast neutron up to 1.5x10ˆ14n/cmˆ2; (b) fast neutrons (1.5x10ˆ14n/cmˆ2) and 60Co gammas (500MRad); (c) fast neutron (3x10ˆ14n/cmˆ2) and 60Co gammas (500MRad), in view to test a possible radiation hardening effect due to gamma irradiation occurring on neutron irradiated detectors.
In this work we examined the possible introduction of shallow donors
in these detectors with the TSC technique performed in the low
temperature range (5-80K). Preliminary results of this experimental study are shown and discussed.

Presenters: Prof. BRUZZI, Mara (Universita e INFN (IT)); BRUZZI, Mara (Dipartimento di Fisica)

Session Classification: Material and Defect Characterization