

15th RD50 Workshop

Report of Contributions

Contribution ID: 1

Type: **not specified**

Charge collection annealing study of p-in-n silicon microstrip detectors

Tuesday 17 November 2009 14:40 (20 minutes)

The annealing of the charge collection as a function of the RT equivalent time (CCET) is now well established with n-side readout sensors. It is though less known with p-in-n sensors. Results of CCET measurements with this type of detectors irradiated to the dose anticipated for the inner microstrip layer of the present ATLAS SCT are here presented. The results are discussed in view of possible annealing scenarios in the ATLAS experiments. Also, future work for confirming the present studies with sensors of the same type of the ATLAS SCT p-in-n devices is announced.

Author: WIGLESWORTH, Craig (Department of Physics)

Presenter: WIGLESWORTH, Craig (Department of Physics)

Session Classification: Strip Sensors

Contribution ID: 2

Type: **not specified**

Investigation of electric field and charge multiplication in irradiated silicon detectors by Edge-TCT

Tuesday 17 November 2009 11:25 (20 minutes)

A Transient Current Technique (TCT) utilizing IR laser with 100 ps pulse width and beam diameter of FWHM=8 μm was used to evaluate non-irradiated and irradiated p-type silicon micro-strip detectors. The beam was parallel with the surface and perpendicular to the strips (Edge-TCT) so that the electron hole pairs were created at known depth in the detector. The pulse shapes were analysed in a new way, that does not require the knowledge of effective trapping times, to determine: drift velocity, charge collection

and electric field profiles in heavily irradiated silicon detectors.

The profiles were studied at different laser beam positions (depth of carrier generation), voltages and fluences up to 5×10^{15} neutrons $1/\text{cm}^2$. Strong evidences for charge multiplication at high voltages were found for detector irradiated to the highest fluence.

Author: KRAMBERGER, Gregor (Jozef Stefan Institute)

Co-authors: MANDIĆ, Igor (Jozef Stefan Institute); MILOVANOVIĆ, Marko (Jozef Stefan Institute); ZAVRTANIK, Marko (Jozef Stefan Institute); MARKO, Mikuž (Jozef Stefan Institute); CINDRO, Vladimir (Jozef Stefan Institute)

Presenter: KRAMBERGER, Gregor (Jozef Stefan Institute)

Session Classification: Pad Detector Characterization & Studies on Charge Multiplication

Contribution ID: 3

Type: **not specified**

Annealing of Charge Collection Efficiency in highly irradiated MCz-n strip detectors.

Tuesday 17 November 2009 15:00 (20 minutes)

MCz p-readout strip detectors, irradiated to sLHC foreseen fluences, were characterized through Charge Collection Efficiency (CCE) measurements at different isothermal annealing steps. Though n-readout detectors have shown so far remarkable CCE performances, engineering issues (e.g. strip insulation) make them a less reliable alternative to n-readout sensors. The results of this study are compared with existing studies on CCE of different materials already published in literature to evaluate the possibility to consider the MCz p-in-n as a feasible alternative to n-readout detectors for the sLHC tracking system upgrade.

Author: Mr PACIFICO, Nicola (CERN & Università degli Studi di Bari)

Presenter: Mr PACIFICO, Nicola (CERN & Università degli Studi di Bari)

Session Classification: Strip Sensors

Contribution ID: 4

Type: **not specified**

Surface properties of ATLAS n-on-p sensors

Tuesday 17 November 2009 15:20 (20 minutes)

Date on Rint, Cint, Punc-through pre-rad and post rad from the ATLAS07 test sensors (HPK) will be presented

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

Co-authors: LANCASTER, Alex (Uk); UC SANTA CRUZ GANG, Chris et al (SCIPP); TSUKUBA LAB, Kazu et al (Tsukuba Univ.)

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

Session Classification: Strip Sensors

Contribution ID: 5

Type: **not specified**

Measurements of 3D/FBK sensors

Wednesday 18 November 2009 09:55 (20 minutes)

3D-Si sensors fabricated at FBK-first with the Double-side Double Type Column approach and columnar electrodes only partially etched through p-type substrates were tested in laboratory and in a 1.4 Tesla magnetic field with a 180 GeV pion beam at CERN SPS.

We'll present leakage current and noise measurements, results of functional tests with gamma-ray sources, charge collection tests with beta-source, an overview of preliminary result from the CERN beam test and of present irradiation at CERN PS.

Author: LA ROSA, Alessandro (CERN)

Presenter: LA ROSA, Alessandro (CERN)

Session Classification: New structures, Pixel and 3D detectors & Lorentz Angle Measurements

Contribution ID: 6

Type: **not specified**

Status of the Freiburg ALIBAVA systems on the laser and beta setups

Tuesday 17 November 2009 17:50 (20 minutes)

There are two setups in Freiburg with the new ALIBAVA system as a replacement for the binary ATLAS SCT DAQ for testing silicon strip detectors (planar and 3D detectors). The first setup is a beta setup with a radioactive source (Sr90) for charge collection efficiency measurements and the second one is a laser setup with an infrared pulsed PicoQuant laser to investigate the space-resolved electric field and the charge collection efficiency. Some laser scans were performed on various parts of a planar reference detector with ALIBAVA. In the future we want to learn more about the electric field distribution and space-resolved charge collection efficiency of the detectors with this measurement.

Measuring highly irradiated detectors requires an efficient cooling system to reduce leakage current and prevent thermal runaway. Standard cooling systems as used (e.g. on ATLAS module tests) circulating a cooled liquid are not sufficient. Therefore in the near future a new cooling system based on liquid nitrogen will be installed in Freiburg to cool down to deep temperatures.

Author: BREINDL, Michael (Freiburg University)

Presenter: BREINDL, Michael (Freiburg University)

Session Classification: ALIBAVA - First experiences within RD50

Contribution ID: 7

Type: **not specified**

Mixed irradiation studies with magnetic czochralski diodes

Tuesday 17 November 2009 09:15 (20 minutes)

TCT measurements with magnetic czochralski diodes (n-in-p and p-in-n) after a mixed irradiation with protons und neutrons at five different fluences above $3 \cdot 10^{14}/\text{cm}^2$ were performed. Annealing studies are ongoing. Trapping times for the lower irradiated diodes could be extracted. The electric field inside the diode at different voltages was simulated and reconstructed from the TCT-Signal.

Author: EBER, Robert (IEKP, KIT)

Co-authors: DIERLAMM, Alexander (IEKP, KIT); FREY, Martin (IEKP, KIT); STECK, Pia (IEKP, KIT); MÜLLER, Thomas (IEKP, KIT); DE BOER, Wim (IEKP, KIT)

Presenter: EBER, Robert (IEKP, KIT)

Session Classification: Pad Detector Characterization & Studies on Charge Multiplication

Contribution ID: 8

Type: **not specified**

New Detectors with Novel Electrode Configurations for Applications in sLHC and Photon Sciences

Wednesday 18 November 2009 09:35 (20 minutes)

Concept, simulations, and design of the US patent-pending new detectors with novel electrode configurations will be presented. These detectors can be ultra-radiation hard for applications in extremely high radiation environment such as sLHC, and for applications in photon sciences.

Author: LI, Zheng (BNL)**Presenter:** LI, Zheng (BNL)**Session Classification:** New structures, Pixel and 3D detectors & Lorentz Angle Measurements

Contribution ID: 9

Type: **not specified**

Simulations of guard ring designs for n-on-p sensors and of 3D detectors

Wednesday 18 November 2009 11:05 (20 minutes)

Electrical simulations have been performed with the Synopsys Sentaurus TCAD to develop a guard ring structure that minimizes the electric field throughout the periphery of an n-on-p silicon particle detector. The behavior of the breakdown voltage has been studied as the function of the radiation fluence, the field plate length, and the oxide thickness.

Preliminary results of the performance of 3D detectors after irradiation will also be presented.

Author: BORTOLETTO, Daniela (Purdue University)

Co-author: KOYBASI, Ozhan (Purdue University)

Presenter: BORTOLETTO, Daniela (Purdue University)

Session Classification: New structures, Pixel and 3D detectors & Lorentz Angle Measurements

Contribution ID: 10

Type: **not specified**

Effects of annealing on charge collection in heavily irradiated silicon micro-strip detectors

Tuesday 17 November 2009 11:45 (15 minutes)

Electric field and charge collection properties of a n+-p strip detector irradiated to $5 \times 10^{15} \text{ cm}^{-2}$ were investigated by Edge-TCT (E-TCT) during long term annealing.

It was found that charge collection improves with time, due to larger avalanche multiplication. On the other hand, when operated under forward bias, charge collection properties of the detector were not affected by the annealing process.

Author: MILOVANOVIĆ, Marko (Jozef Stefan Institute, Ljubljana)

Co-authors: KRAMBERGER, Gregor (Jozef Stefan Institute, Ljubljana); MANDIĆ, Igor (Jozef Stefan Institute, Ljubljana); MIKUŽ, Marko (Jozef Stefan Institute, Ljubljana); ZAVRTANIK, Marko (Jozef Stefan Institute, Ljubljana); CINDRO, Vladimir (Jozef Stefan Institute, Ljubljana)

Presenter: MILOVANOVIĆ, Marko (Jozef Stefan Institute, Ljubljana)

Session Classification: Pad Detector Characterization & Studies on Charge Multiplication

Contribution ID: 11

Type: **not specified**

INTERSTITIAL DEFECT REACTIONS IN P-TYPE SILICON IRRADIATED AT DIFFERENT TEMPERATURES

Monday 16 November 2009 15:05 (20 minutes)

In this work we present some new findings on the formation and annealing behavior of radiation-induced defects of interstitial type in p-silicon irradiated with 6 MeV electrons and alpha-particles of Pu-239 at temperatures of 78 K (LNT) and 273-295 K (RT). The samples studied were n+-p structures with a hole concentration in the base region from about $3 \times 10^{12} \text{ cm}^{-3}$ to $6 \times 10^{14} \text{ cm}^{-3}$. The low hole concentration allowed to minimize the injection annealing of primary defects upon electron irradiation by using the beam of low intensity.

The defect transformation kinetics have been studied using DLTS measurements. To monitor the mobile interstitial Si atoms we use a DLTS peak related to interstitial carbon Ci ($E_a = 0.29 \text{ eV}$).

We have found that after electron irradiation at LNT this peak begins to appear only after thermal annealing at temperatures higher than 300 K. The irradiation with alpha-particles at RT also keeps self-interstitials immobile. However direct current injection resulted in complete transformation of self-interstitials to Ci already at 78 K. These facts indicate that silicon self-interstitials have very low mobility even at room temperature in p-Si, but become extremely mobile under electron injection.

It is shown that upon annealing of interstitial carbon in p-Si a metastable state for interstitial carbon-interstitial oxygen complex is formed. This state has an energy level of about $E_v + 0.36 \text{ eV}$. The formation of the stable and metastable states takes place concurrently. The observed features of the carbon-related complexes formation are likely related to the existence of different crystallographic orientation of the equiprobable pathways through which the interstitial carbon and oxygen atoms can approach each other.

Author: Dr MAKARENKO, Leonid (Belarusian State University)

Co-authors: Dr MURIN, Leonid (Scientific-Practical Materials Research Centre of NAS of Belarus); Dr MOLL, Michael (CERN); Dr LASTOVSKII, Stanislav (Scientific-Practical Materials Research Centre of NAS of Belarus)

Presenter: Dr MAKARENKO, Leonid (Belarusian State University)

Session Classification: Defect Characterization

Contribution ID: 12

Type: **not specified**

Detailed investigation of charge multiplication properties in highly irradiated thin epitaxial silicon diodes

Tuesday 17 November 2009 11:05 (20 minutes)

Recently, charge multiplication has been observed in charge collection measurements of highly irradiated (i.e. several 10^{15} to 10^{16} n/cm²) 75, 100 and 150 μ m thin epitaxial silicon diodes. CCE results for different sources (670, 830, 1060 nm laser light and 5.8 MeV alpha particles with different absorber layers between source and diode) will be presented and compared to theoretical considerations. The pulse height and charge spectra for single TCT pulses were investigated and compared for different charge multiplication levels. Moreover, the spatial homogeneity and long-term stability of collected charge in the multiplication regime were studied.

Author: LANGE, Jörn (University of Hamburg)

Co-authors: FRETWURST, Eckhart (University of Hamburg); LINDSTRÖM, Gunnar (University of Hamburg); BECKER, Julian (University of Hamburg); KLANNER, Robert (University of Hamburg)

Presenter: LANGE, Jörn (University of Hamburg)

Session Classification: Pad Detector Characterization & Studies on Charge Multiplication

Contribution ID: 13

Type: **not specified**

Results of Beam Test Measurements with 3D-DDTC Silicon Strip Detectors

Wednesday 18 November 2009 10:15 (20 minutes)

Detectors in the 3D-DDTC (double-sided double type column) layout combine the intrinsically radiation hard design of 3D detectors with a simplified processing technology. This talk presents results of 3D-DDTC detectors obtained in beam test measurements with high-energy particles at the CERN SPS. The Silicon Beam Telescope (SiBT), provided by the University of Helsinki, was utilised to measure the reference tracks. Special emphasis of the analysis is placed on space-resolved evaluation of charge collection and efficiency. Results of detectors produced by CNM-IMB (Barcelona) and FBK-IRST (Trento) are presented.

Author: KOEHLER, Michael (Freiburg University)

Presenter: KOEHLER, Michael (Freiburg University)

Session Classification: New structures, Pixel and 3D detectors & Lorentz Angle Measurements

Contribution ID: 14

Type: **not specified**

Welcome to the 15th RD50 Workshop

Monday 16 November 2009 13:30 (15 minutes)

Presenter: MOLL, Michael (CERN)

Session Classification: Welcome

Contribution ID: 15

Type: **not specified**

The ATLAS Insertable B-Layer (IBL)

Monday 16 November 2009 13:45 (30 minutes)

Author: PERNEGGER, Heinz (CERN)

Presenter: PERNEGGER, Heinz (CERN)

Session Classification: ATLAS and CMS - Phase I upgrades

Contribution ID: **16**

Type: **not specified**

A low mass 4 layer pixel system for CMS

Monday 16 November 2009 14:15 (30 minutes)

Author: Dr KAESTLI, Hans-Christian (PSI)

Presenter: Dr KAESTLI, Hans-Christian (PSI)

Session Classification: ATLAS and CMS - Phase I upgrades

Contribution ID: 17

Type: **not specified**

Results on diodes

Tuesday 17 November 2009 09:35 (20 minutes)

Results on diodes

Author: KASKA, Katharina (Technische Universitaet Wien)

Presenter: KASKA, Katharina (Technische Universitaet Wien)

Session Classification: Pad Detector Characterization & Studies on Charge Multiplication

Contribution ID: **18**

Type: **not specified**

Status of the CERN ALIBAVA system

Tuesday 17 November 2009 17:30 (20 minutes)

First experiences with the hard and software will be presented.

Authors: DEL CASTILLO SANCHEZ, Eduardo (CERN); MOLL, Michael (CERN)

Presenter: DEL CASTILLO SANCHEZ, Eduardo (CERN)

Session Classification: ALIBAVA - First experiences within RD50

Contribution ID: **19**

Type: **not specified**

Alibava System Hardware

Tuesday 17 November 2009 16:50 (20 minutes)

A short description of all the Alibava system hardware including both the MB and the DB.

Author: MARCO HERNANDEZ, Ricardo (Instituto de Fisica Corpuscular (IFIC)-Universitat de Valencia-U)

Presenter: MARCO HERNANDEZ, Ricardo (Instituto de Fisica Corpuscular (IFIC)-Universitat de Valencia-U)

Session Classification: ALIBAVA - First experiences within RD50

Contribution ID: 20

Type: **not specified**

Alibava - a discussion on Software and FAQ

Tuesday 17 November 2009 17:10 (20 minutes)

A brief discussion on known issues with the Alibava system, the most commonly asked questions/complaints about the system, and the macros developed in Liverpool out of our own requirements that are available on the internet.

Author: BROWN, Henry (University of Liverpool)

Presenter: BROWN, Henry (University of Liverpool)

Session Classification: ALIBAVA - First experiences within RD50

Contribution ID: 21

Type: **not specified**

Microscopic Study of Proton Irradiated Epitaxial Detectors

Monday 16 November 2009 16:15 (20 minutes)

Thick epitaxial material (e.g. 150 μm) may be an option for application in S-LHC, therefore we are interested in the microscopic defect generation and the macroscopic parameters of this material. DLTS and TSC study of n-type pad diodes with thicknesses up to 150 μm have been performed after irradiation with 23 GeV protons and following isochronal annealing. A correlation between macroscopic electrical parameters and concentrations of corresponding defects has been observed.

Author: KHOMENKOV, Volodymyr (Hamburg University)

Co-authors: JUNKES, Alexandra (Hamburg University); PIRVUTOIU, Cristina (Hamburg University); FRETWURST, Eckhart (Hamburg University); PINTILIE, Ioana (NIMP Bucharest)

Presenter: KHOMENKOV, Volodymyr (Hamburg University)

Session Classification: Defect Characterization

Contribution ID: 22

Type: **not specified**

Charge Collection and Trapping in Epitaxial Silicon Detectors after Neutron Irradiation

Tuesday 17 November 2009 09:55 (20 minutes)

The charge collection and the trapping behaviour of 150 μm n-type epitaxial silicon detectors irradiated with neutron fluences between $1\text{E}15$ and $4\text{E}15\text{ cm}^{-2}$ were investigated. Observed double peaks in the TCT signal could be simulated assuming parabolic electric fields. Contrary to previous assumptions of field independent trapping time constants the field dependence was studied. The experimental results and simulations will be presented and discussed

Author: Mr POEHLSEN, Thomas (University of Hamburg)

Co-authors: Dr FRETWURST, Eckhart (University of Hamburg); LANGE, Joern (University of Hamburg); Mr BECKER, Julian (University of Hamburg); Prof. KLANNER, Robert (University of Hamburg)

Presenter: Mr POEHLSEN, Thomas (University of Hamburg)

Session Classification: Pad Detector Characterization & Studies on Charge Multiplication

Contribution ID: 23

Type: **not specified**

First Results of SiBT test beam 2009

Tuesday 17 November 2009 14:00 (20 minutes)

This talk gives preliminary results obtained from test beam experiment performed in 29. June-12.July 2009 at CERN H2 area with Silicon Beam Telescope (SiBT). The SiBT is based on CMS Tracker readout electronics and data acquisition system, and the telescope consists of up to eight reference silicon microstrip modules and slots for two test modules.

The sensors used in this study have been processed at Micro and nanoelectronics center of Helsinki University of Technology. The size of detectors is 4cm x 4cm and they have 768 strips with 50um pitch. The detectors under investigation have been irradiated at University of Karlsruhe by 26 MeV protons. This presentation focuses on two modules. First, p-type MCz-Si detector irradiated to 2×10^{15} neq/cm² and second, n-type Fz-Si detector irradiated to 1×10^{14} neq/cm².

Author: HAERKOENEN, Jaakko (Helsinki Institute of Physics HIP)

Co-author: SIBT, Collaboration (<http://www.hip.fi/research/cms/tracker/SiBT/php/members.php>)

Presenter: HAERKOENEN, Jaakko (Helsinki Institute of Physics HIP)

Session Classification: Strip Sensors

Contribution ID: 24

Type: **not specified**

Interstrip resistance in silicon position-sensitive detectors

Tuesday 17 November 2009 14:20 (20 minutes)

Results on interstrip isolation resistance in Si position-sensitive detectors are presented. It is demonstrated that experimental I-V characteristics of the interstrip gap show a step in the current. This feature is caused by the current redistribution between neighboring strips and its influence on the interstrip resistance is more pronounced than ohmic conductance between the strips.

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

Co-authors: SAFONOVA, Nadezda (Ioffe Physical-Technical Inst. RAS); Dr EGOROV, Nikolai (Research Institute of Material Science and Technology); GOLUBKOV, Sergey (Research Institute of Material Science and Technology); Dr EREMIN, Vladimir (Ioffe Physical-Technical Inst. RAS)

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

Session Classification: Strip Sensors

Contribution ID: 25

Type: **not specified**

CCE in irradiated silicon detectors with a consideration of avalanche effect

Tuesday 17 November 2009 10:15 (20 minutes)

The results of modeling of CCE vs. fluence and CCE vs. voltage dependences in a wide range of fluences and bias voltage are presented. The shape of the curves is discussed in the frame of PTI model for avalanche multiplication in p-n junctions on deep level rich semiconductors.

Author: Dr EREMIN, Vladimir (Ioffe Physical-Technical Institute RAS)

Co-authors: Prof. ZABRODSKII, Andrei (Ioffe Physical-Technical Institute RAS); Dr VERBITSKAYA, Elena (Ioffe Physical-Technical Institute RAS); Dr HÄRKÖNEN, Jaakko (Helsinki Institute of Physics, CERN/PH); Dr LI, Zheng (Brookhaven National Laboratory)

Presenter: Dr EREMIN, Vladimir (Ioffe Physical-Technical Institute RAS)

Session Classification: Pad Detector Characterization & Studies on Charge Multiplication

Contribution ID: 26

Type: **not specified**

The comparison of the defect generation during the proton irradiation in situ and afterwards in silicon

Monday 16 November 2009 14:45 (20 minutes)

It was performed the measurement of the photoconductivity decay in MCZ silicon during the irradiation by protons in Helsinki Accelerator Laboratory. It was found the difference of defect generation in the “fresh” samples in comparison with the preirradiated samples. The main difference was observed in the low irradiation region and becomes similar at high fluences, except of the cases of the irradiation at low temperature (50 K).

The cluster model was analyzed by the density functional method and the deformation of the bandgap in the environment of the cluster was found.

Summary

It was shown the main defects contributing in the free carrier lifetime are related to the clusters. The trapping effects were observed in the shallow levels.

Author: Prof. VAITKUS, Juozas (Vilnius University)

Co-authors: Mr ULECKAS, Aurimas (Vilnius University); Dr ZASINAS, Ernestas (Vilnius University); Dr GAUBAS, Eugenijus (Vilnius University); Prof. RAISANEN, Jyrki (University of Helsinki)

Presenter: Prof. VAITKUS, Juozas (Vilnius University)

Session Classification: Defect Characterization

Contribution ID: 27

Type: **not specified**

The deep levels in the irradiated Si (WODEAN samples)

Monday 16 November 2009 15:55 (20 minutes)

A few WODEAN series samples were investigated by extrinsic photoconductivity spectrum analyze using the upgraded equipment. More precise data are presented. Measurements were performed at different temperatures.

The slow photoconductivity decay components were measured at different excitation conditions.

Author: Prof. VAITKUS, Juozas (Vilnius University)

Co-authors: Mr VAINORIUS, Neimantas (Vilnius University); Prof. KAZUKAUSKAS, Vaidotas (Vilnius University); Mr KALENDRA, Vidmantas (Vilnius University)

Presenter: Prof. VAITKUS, Juozas (Vilnius University)

Session Classification: Defect Characterization

Contribution ID: 28

Type: **not specified**

Generation of a shallow donor after 6, 15 and 900 MeV electron irradiation

Monday 16 November 2009 16:35 (20 minutes)

This work focuses on the generation of the shallow donor level E30K after 6, 15 and 900 MeV electron irradiation in n-type FZ diodes. The E30K is known to be a cluster related defect which plays a key role in the understanding of non-type inversion of epitaxial diodes after high proton fluences. We found that the generation of E30K is suppressed for increasing electron energies. This suggests a more point like character of the defect.

Defect concentrations were obtained by means of thermally stimulated current technique for several electron fluences.

Author: JUNKES, alexandra (Hamburg University)

Co-authors: Mr FRETWURST, Eckhart (Hamburg University); Mr LINDSTRÖM, Gunnar (Hamburg University); Mrs PINTILIE, Ioana (NIMP, Bucharest-Margurele)

Presenter: JUNKES, alexandra (Hamburg University)

Session Classification: Defect Characterization

Contribution ID: 29

Type: **not specified**

Discussion: Wodean & Defect Characterization

Monday 16 November 2009 17:15 (20 minutes)

Authors: FRETWURST, Eckhart (Hamburg University); BRUZZI, Mara (Dipartimento di Fisica)

Session Classification: Defect Characterization

Contribution ID: 30

Type: **not specified**

Discussion: Pad Detectors and Charge Multiplication

Tuesday 17 November 2009 12:15 (15 minutes)

Session Classification: Pad Detector Characterization & Studies on Charge Multiplication

Contribution ID: **31**

Type: **not specified**

Discussion on Strip Sensors (FDS)

Tuesday 17 November 2009 16:30 (20 minutes)

Author: CASSE, Gianluigi (Department of Physics)

Session Classification: Strip Sensors

Contribution ID: 32

Type: **not specified**

Discussion on Pixel, 3D and new structures

Wednesday 18 November 2009 12:05 (30 minutes)

Session Classification: New structures, Pixel and 3D detectors & Lorentz Angle Measurements

Contribution ID: 33

Type: **not specified**

TSC studies on n- and p-type MCZ Si pad detectors irradiated with neutrons up to 10^{16} n/cm²

Monday 16 November 2009 16:55 (20 minutes)

We report on the investigation of the radiation damage induced by neutron irradiation on both n- and p-type Magnetic Czochralski silicon pad detectors by the Thermally Stimulated Currents technique. Detectors have been irradiated with fast neutrons in the range 10^{14} - 10^{16} n/cm². Temperatures spanned from 10K to 250K to investigate the presence of both shallow and deep traps in the irradiated devices. Priming conditions have been studied in detail in order to investigate the residual electric field due to frozen charged traps after the priming step. Zero bias TSC measurements have also been performed as an additional tool to study the defects distribution and the residual electric field. The electric field distribution inside the sample and its effect on the TSC emission are qualitatively explained by a band diagrams description.

Authors: MENICHELLI, David (University of Florence); BRUZZI, Mara (University of Florence); SCARINGELLA, Monica (University of Florence); MORI, Riccardo (University of Florence)

Presenter: SCARINGELLA, Monica (University of Florence)

Session Classification: Defect Characterization

Contribution ID: 34

Type: **not specified**

New Measurement of Lorentz angles for electrons and holes in silicon detectors

Wednesday 18 November 2009 09:15 (20 minutes)

Silicon sensors are commonly used in particle trackers because of their stability and high spatial resolution in the μm range. Inside a strong magnetic field the ionization is not entering on the electrode hit by the particle, but shifted to neighboring electrodes because of the Lorentz force in crossed E and B fields, which lets the ionization drift under a certain angle. This Lorentz angle is typically a few degrees for holes and a few tens of degrees for electrons in a 4T magnetic field, so it clearly has to be taken into account in typical experiments. The Lorentz angle depends on bias voltage, depletion voltage, temperature, magnetic field and radiation damage.

The Lorentz angle has been measured and parametrized for a large range of voltages (0-1000V), magnetic fields (0-8T), temperatures (126-293K) and fluences ($0-10^{16} \text{ n/cm}^2$). The measurements were performed by inducing ionization with lasers and observing the position of the collected charge as function of the magnetic field. Preliminary data are presented.

Author: SCHMANAU, Mike (IEKP-KIT-Germany)

Co-authors: DIERLAMM, Alexander (IEKP-KIT-Germany); SABELLEK, Andreas (IEKP-KIT-Germany); SCHNEIDER, Michael (IEKP-KIT-Germany); DE BOER, Wim (IEKP-KIT-Germany)

Presenter: SCHMANAU, Mike (IEKP-KIT-Germany)

Session Classification: New structures, Pixel and 3D detectors & Lorentz Angle Measurements

Contribution ID: 35

Type: **not specified**

Charge collection studies of irradiated 3D detectors (Late submission)

Wednesday 18 November 2009 11:25 (20 minutes)

Short strip CNM double-sided 3D sensors have been fabricated and irradiated in a 26MeV proton beam. The devices have received a fluence up to 2×10^{16} 1 MeV neutron equivalent cm^{-2} . The devices have been tested using the Alibava system with a Sr-90 source. Results of the excellent charge collection of the devices after such high fluences are shown.

Presenter: BATES, Richard (Department of Physics and Astronomy)

Session Classification: New structures, Pixel and 3D detectors & Lorentz Angle Measurements

Contribution ID: 36

Type: **not specified**

Beam tests of Medipix2/Timepix double-sided 3D detectors (Late submission)

Wednesday 18 November 2009 11:45 (20 minutes)

CNM double-sided 3D pixel detectors have been fabricated and assembled to the Medipix2 and Timepix ASICs. Medipix2 assemblies have been tested with a micron-sized beam at the Diamond light source to understand the response of the detector as a function of hit position. The same devices and Timepix assemblies have also been tested in a telescope at a pion beam at the SRS. Complimentary information on the response of the detector as a function of hit position has been obtained and is presented. In addition pulse height spectra is presented from the Timepix assembly.

Presenter: Mr GERSABECK, Marco (University of Glasgow)

Session Classification: New structures, Pixel and 3D detectors & Lorentz Angle Measurements

Contribution ID: 37

Type: **not specified**

Status of the Glasgow Alibava system

Tuesday 17 November 2009 18:10 (20 minutes)

Session Classification: ALIBAVA - First experiences within RD50

Contribution ID: 38

Type: **not specified**

Full-size ATLAS Sensor Testing (Late submission)

Tuesday 17 November 2009 16:10 (20 minutes)

Summary

The ATLAS collaboration R&D group “Development of n-in-p Silicon Sensors for very high radiation environment” has developed single-sided p-type 9.75 cm x 9.75 cm sensors with n-type readout strips having radiation tolerance against the 1015 1-MeV neutron equivalent (neq)/cm² fluence expected in the Super Large Hadron Collider. The compiled results of an evaluation of the bulk and strip parameter characteristics of 19 new sensors manufactured by Hamamatsu Photonics are presented in this paper. It was verified in detail that the sensors comply with the Technical Specifications required before irradiation. The reverse bias voltage dependence of various parameters, frequency dependence of tested capacitances, and strip scans of more than 23000 strips as a test of parameter uniformity and strip quality over the whole sensor area have been carried out at Stony Brook University, Cambridge University, Geneva University, and Academy of Sciences of CR and Charles University in Prague. No openings, shorts, or pinholes were observed on all tested strips, confirming the high quality of sensors made by Hamamatsu Photonics.

Presenter: BOHM, Jan (Institute of Physics)

Session Classification: Strip Sensors

Contribution ID: 39

Type: **not specified**

Recent results of annealing measurements in p-type microstrip detector with SCT128 chip (Late submission)

Tuesday 17 November 2009 12:00 (15 minutes)

Presenter: MANDIC, Igor (University of Ljubljana)

Session Classification: Pad Detector Characterization & Studies on Charge Multiplication

Contribution ID: 40

Type: **not specified**

Production of RD50 sensors at MICRON

Wednesday 18 November 2009 14:30 (30 minutes)

Session Classification: Discussion on future RD50 sensor production runs

Contribution ID: 41

Type: **not specified**

Production of RD50 sensors at VTT

Wednesday 18 November 2009 15:00 (30 minutes)

Session Classification: Discussion on future RD50 sensor production runs