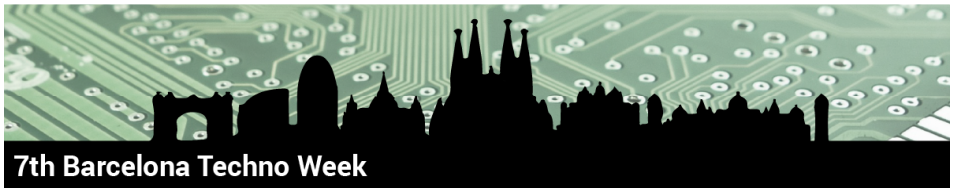
Course on semiconductor radiation detectors



Report of Contributions

https://indico.icc.ub.edu/e/TW2023

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

Tracking and imaging of particles and photons –an introduction

Monday 3 July 2023 09:15 (55 minutes)

Author: CAMPBELL, Michael

Presenter: CAMPBELL, Michael

Session Classification: Welcome and introduction

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

Introduction to Semiconductors detectors

Monday 3 July 2023 10:10 (45 minutes)

Author: HYNDS, Daniel (University of Oxford)

Presenter: HYNDS, Daniel (University of Oxford)

Session Classification: Welcome and introduction

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

Introduction to Semiconductors detectors

Monday 3 July 2023 11:05 (1h 45m)

Author: HYNDS, Daniel (University of Oxford)

Presenters: HYNDS, Daniel (University of Oxford); BALLABRIGA, Rafael (CERN)

Session Classification: Welcome and introduction

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

Introduction to CMOS

Monday 3 July 2023 14:20 (1h 55m)

Author: SERRA-GRAELLS, Francesc (IMB-CNM (CSIC))

Presenter: SERRA-GRAELLS, Francesc (IMB-CNM (CSIC))

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

Hybrid pixels and FE electronics

Tuesday 4 July 2023 09:00 (1h 45m)

Author: BALLABRIGA, Rafael (CERN)

Presenter: BALLABRIGA, Rafael (CERN)

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

Signal conditioning, digitization and Time pick-off

Tuesday 4 July 2023 14:20 (1h 55m)

Author: RIVETTI, Angelo (INFN)

Presenter: RIVETTI, Angelo (INFN)

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

Sensor integration and packaging

Tuesday 4 July 2023 11:05 (1h 45m)

Author: COUDRAIN, Perceval (CEA-Leti)

Presenter: COUDRAIN, Perceval (CEA-Leti)

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

CMOS Image Sensors

Wednesday 5 July 2023 09:00 (1h 45m)

Author: TURCHETTA, Renato (imasenic)

Presenter: TURCHETTA, Renato (imasenic)

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

SPAD + Cryogenic

Wednesday 5 July 2023 11:05 (1h 45m)

Author: CHARBON, Edoardo (École Polytechnique Fédérale de Lausanne)

Presenter: CHARBON, Edoardo (École Polytechnique Fédérale de Lausanne)

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

Embedded in-sensor intelligence for analog-to-information

Thursday 6 July 2023 09:00 (1h 45m)

Author: RODRÍGUEZ-VÁZQUEZ, Ángel (Universidad de Sevilla)

Presenter: RODRÍGUEZ-VÁZQUEZ, Ángel (Universidad de Sevilla)

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

SiPMs

Wednesday 5 July 2023 14:20 (1h 55m)

Author: GOLA, Alberto (Fondazione Bruno Kessler)

Presenter: GOLA, Alberto (Fondazione Bruno Kessler)

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

Electronics for Fast Detectors

Friday 7 July 2023 14:20 (1h 15m)

Author: Dr GASCON FORA, David (ICCUB. Universitat de Barcelona)

Presenter: Dr GASCON FORA, David (ICCUB. Universitat de Barcelona)

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

LGAD detectors: present status and future perspectives

Thursday 6 July 2023 12:00 (25 minutes)

Author: PELLEGRINI, Giulio (CNM-CSIC)

Presenter: PELLEGRINI, Giulio (CNM-CSIC)

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

NUV-MT –A new generation of blue sensitive SiPMs: Performance, Products and Roadmap

Thursday 6 July 2023 14:20 (25 minutes)

The recently released blue sensitive NUV-MT Silicon Photomultiplier (SiPM) range by Broadcom Inc. is setting new standards by combining excellent sensitivity, noise, timing performance and uniformity. In this presentation we will present details of the new NUV-MT technology,

including market leading Photon Detection Efficiency (63% at 420nm), Dark Count Rate (120kcps/mm2), Cross Talk (23%), After Pulsing (1%) and excellent results

of the uniformity of breakdown voltage per design and Coincidence Resolution Timing (CRT) measurements using LYSO scintillators.

Furthermore, all NUV-MT products come in a newly developed, simple, reliable and robust sensor package. We will show data on the optical transmittance down to UV-wavelengths, resulting in a PDE of > 20% at 260nm, relevant for, e.g., timing critical Cherenkov applications. Finally, an overview of the product-portfolio and an outlook of Broadcom's SiPM-roadmap and upcoming product-releases will be shown.

Target applications are: TOF-PET, Cherenkov-PET, radiation spectroscopy, photon-counting X-ray detection, flow cytometry and time-gated fluorescence applications.

Author: MURPHY, John (Broadcom)

Presenter: MURPHY, John (Broadcom)

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

Introduction to fast timing applications in medical physics

Friday 7 July 2023 09:00 (1h 45m)

Author: SCHAART, Dennis R. (TU Delft)

Presenter: SCHAART, Dennis R. (TU Delft)

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

Quantum applications of detectors

Friday 7 July 2023 11:05 (1h 45m)

Author: CACCIA, Massimo (Università dell'Insubria)

Presenter: CACCIA, Massimo (Università dell'Insubria)

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

Graphene

Thursday 6 July 2023 11:05 (55 minutes)

Author: KOPPENS, Frank (ICFO)

Presenter: KOPPENS, Frank (ICFO)

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

Electronics beyond CMOS (such as Carbon Nanotubes)

Author: RUBIO, Antonio (UPC)

Presenter: RUBIO, Antonio (UPC)

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

Best Poster Award & Techno Week Closing

Friday 7 July 2023 15:35 (15 minutes)

Author: GÓMEZ, Sergio (UB)

Presenter: GÓMEZ, Sergio (UB)

Contribution ID: **24** Type: **Contributed e-poster**

Model and analysis of the future ALICE ITS3 wafer-scale on-chip readout architecture

Thursday 6 July 2023 16:35 (1h 25m)

The ALICE collaboration is developing the Inner Tracker System 3 (ITS3), a novel detector that exploits the novel stitching technique to construct cylindrical single-die monolithic pixel sensors of up to 266 mm x 93 mm. ITS3 requires all hits from a particle flux of 4.4 MHz/cm2 to be transmitted on-chip to one of the sensor edges with a readout inefficiency of <0.1 % of hits lost while keeping a power consumption budget of 20 mW/cm2 and a dead area ≤10 %. The objective of this work is to carefully dimension the different components of this on-chip readout architecture adjusting it to the requirements and constraints of the ITS3. To do so, a model of the on-chip architecture was developed using System Verilog. This model provided different readout performances under different parameter configurations, readout architectures, and data inputs. Apart from this, it provided key learnings for the readout architecture implementation such as the correlation between losses and collisions pile-up, or the best ordering for reading the memories. From this model, it was observed that ~3 on-chip data lines/cm2 of ~160 Mbit/s each and ~13 memories/cm2 of ~64 words depth each were sufficient to cope with the requirements.

Author: VIQUEIRA RODRIGUEZ, Manuel (CERN)

Presenter: VIQUEIRA RODRIGUEZ, Manuel (CERN)

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

PET technology, from the laboratory to the clinic

Thursday 6 July 2023 12:25 (25 minutes)

Positron Emission Tomography (PET) imaging constitutes the molecular imaging technique of excellence and is used to evaluate a radio-tracer uptake by an organ. To obtain PET images, patients are injected with radioisotopes that decay inside the patient body emitting a positron that subsequently annihilates with a core electron of the patient body, emitting two opposite 511 keV gamma-rays. PET detectors are optimized for the specific energy of 511 keV and their operation principle is based on opposed detectors measuring in coincidences these two emitted gamma-rays.

After the image reconstruction processes a tomographic emission image is generated. To provide

In this talk, the design, optimization, and implementation of these components is reviewed, sta

Author: GONZÁLEZ, Andrea (i3M)

Presenter: GONZÁLEZ, Andrea (i3M)

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

TOP (HR:GaAs:Cr) sensors for spectral photon counting X-ray detectors

Thursday 6 July 2023 14:45 (25 minutes)

Author: VESHCHEZEROV, Vadim (Zeelta)

Presenter: VESHCHEZEROV, Vadim (Zeelta)

Contribution ID: **28** Type: **Contributed e-poster**

Pix-ESL: a SystemC framework for architectural modelling of readout systems in HEP

Thursday 6 July 2023 16:35 (1h 25m)

The high cost of prototyping at advanced technology nodes, as well as the complexity of future detectors, necessitate the use of a system design technique widely used in industry: design space exploration through high-level architecture studies to establish
precise and optimal requirements. This work presents Pix-ESL: a programmable SystemC framework for simulating the readout chain from the front-end chips to the detector back-end. The model is transaction accurate, comprises an event generator and
connects with real-world physics events, and provides metrics such as readout efficiency, latency, and average queue occupancy. This contribution outlines the framework's structure as well as a case study based on Velopix2.

Author: DHALIWAL, Jashandeep (CERN)

Co-authors: Mr CERESA, Davide; Mr BRAMBILLA, Francesco Enrico; Mr ESPOSITO, Stefano

Contribution ID: **30** Type: **Contributed e-poster**

Local ground variations on the RD53B-ATLAS chip

Thursday 6 July 2023 16:35 (1h 25m)

The RD53B chip is a dedicated chip designed in two versions to meet the demands of the ATLAS and CMS detector at the High Luminosity LHC (HL-LHC). This requires an advanced Front End (FE) circuit able to handle the increased data rates and radiation levels. This poster presents studies on the RD53B-ATLAS chip performed with analog injections to probe the local ground variations. Results show voltage variations up to 16 mV across the pixel matrix due to the ground rail design.

Author: HUIBERTS, Simon (University of Bergen)

Co-authors: Prof. STUGU, Bjarne (University of Bergen); LODDO, Flavio (National Institute for Nuclear Physics - Bari); Dr GARCIA-SCIVERES, Maurice (Lawrence Berkeley National Lab); Dr HEIM, Timon (Lawrence Berkeley National Laboratory)

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

Welcome talk by the Vice-Rector for Research of the University of Barcelona

Monday 3 July 2023 09:00 (5 minutes)

Presenter: Prof. GARCÍA FERNÁNDEZ, Jordi (Universitat de Barcelona)

Session Classification: Welcome and introduction

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

Introduction to the Insitute of Cosmos Sciences of the University of Barcelona (ICCUB)

Monday 3 July 2023 09:05 (10 minutes)

Presenter: LURI, Xavier (ICCUB)

Session Classification: Welcome and introduction

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

Practical Informations

Presenter: Dr GASCON FORA, David (ICCUB. Universitat de Barcelona)

Contribution ID: **34** Type: **Contributed e-poster**

Perovskite solution-grown crystals directly integrated to readout interface for high spatial resolution X-ray imaging

Monday 3 July 2023 16:35 (1h 25m)

Hybrid lead halide perovskites are a promising candidate for a new generation of highly sensitive direct-converting detectors for medical X-ray imaging. While the usage of existing semiconductor materials such as CdTe and Si is complicated by fabrication processes and their costs, highly-crystalline hybrid lead halide perovskite active layers can be deposited on read-out array backplanes directly by solution growth. Here we present thick and uniform methylammonium lead iodide single-crystal films, solution-grown directly on hole-transporting electrode arrays. Electrodes are created on a glass substrate with patterned Indium Tin Oxide (ITO) layer, providing direct integration with the interface of external read-out electronics. Accordingly, stable MAPbI3 X-ray detectors have been made with obtained 88% detection efficiency and 90 pGyair noise equivalent dose under 18 keV X-rays in photovoltaic mode, demonstrating high spatial resolution up to 11 lp mm-1.

Author: BARTOSH, Vitalii (Department of Chemistry and Applied Biosciences, ETH Zurich)

Co-authors: SAKHATSKA, Anastasiia (ETH Zurich); Mr TUREDI, Bekir (Department of Chemistry and Applied Biosciences, ETH Zurich); Mr WU, Erfu (Laboratory for Thin Films and Photovoltaics, Empa); Dr MATT, Gebhard J. (Department of Chemistry and Applied Biosciences, ETH Zurich); Dr SHORUBALKO, Ivan (Laboratory for Transport at Nanoscale Interfaces, Empa); SAKHATSKYI, Kostiantyn (ETH Zurich); Prof. KOVALENKO, Maksym V. (Department of Chemistry and Applied Biosciences, ETH Zurich); Mr LINTANGPRADIPTO, Muhammad Naufal (Division of Physical Sciences and Engineering, KAUST); Prof. MOHAMMED, Omar F. (Division of Physical Sciences and Engineering, KAUST); Prof. BAKR, Osman M. (Division of Physical Sciences and Engineering, KAUST); Dr NAPHADE, Rounak (Division of Physical Sciences and Engineering, KAUST); Dr YAKUNIN, Sergii (Department of Chemistry and Applied Biosciences, ETH Zurich)

Contribution ID: **35** Type: **Contributed e-poster**

Charge transport properties in perovskites X-ray detectors working at 0V external bias

Monday 3 July 2023 16:35 (1h 25m)

Metal halide perovskite (MHP) is a promising candidate material for the next-generation X-ray detector, particularly due to the excellent charge transport properties.
However, a mobility-lifetime product of electrons and holes as well as detector stability are compromised by high ionic conductivity under an external electrical field.
To resolve this issue, we explore charge transport properties of the methylammonium lead iodide (CH3NH3PbI3) single crystals, and we show while operating photovoltaic mode (under 0V bias) devices exhibit simultaneously near to unity charge collection efficiency and high x-ray attenuation efficiency for a few hundred μm thick crystals.

Authors: SAKHATSKA, Anastasiia (ETH Zurich); Dr TUREDI, Bekir (ETH Zurich); Mr WU, Erfu (Empa); Dr MATT, Gebhard (ETH Zurich); Dr SHORUBALKO, Ivan (Empa); SAKHATSKYI, Kostiantyn (ETH Zurich); Prof. KOVALENKO, Maksym (ETH Zurich); Mr LINTANGPRADIPTO, Muhammad Naufal (KAUST); Prof. MOHAMMED, Omar (KAUST); Prof. BAKR, Osman (KAUST); Dr NAPHADE, Rounak (KAUST); Dr YAKUNIN, Sergii (ETH Zurich); BARTOSH, Vitalii (Department of Chemistry and Applied Biosciences, ETH Zurich)

Contribution ID: **36** Type: **Contributed e-poster**

Stable perovskite single-crystal X-ray imaging detectors with single-photon sensitivity

Monday 3 July 2023 16:35 (1h 25m)

A major thrust of medical X-ray imaging is to minimize the X-ray dose acquired by the patient, down to single-photon sensitivity. Such characteristics have been demonstrated with only a few direct-detection semiconductor materials such as CdTe and Si; nonetheless, their industrial deployment in medical diagnostics is still impeded by elaborate and costly fabrication processes. Hybrid lead halide perovskites can be a viable alternative owing to their facile solution growth. However, hybrid perovskites are unstable under high-field biasing in X-ray detectors, owing to structural lability and mixed electronic–ionic conductivity. Here we show that both single-photon-counting and long-term stable performance of perovskite X-ray detectors are attained in the photovoltaic mode of operation at zero-voltage bias, employing thick and uniform methylammonium lead iodide single-crystal films (up to 300 μm) and solution directly grown on hole-transporting electrodes. The operational device stability exceeded one year. Detection efficiency of 88% and noise-equivalent dose of 90 pGyair are obtained with 18 keV X-rays, allowing single-photon-sensitive, low-dose and energy-resolved X-ray imaging.

Author: SAKHATSKYI, Kostiantyn (ETH Zurich)

Co-authors: SAKHATSKA, Anastasiia (ETH Zurich); Dr TUREDI, Bekir (ETH Zurich); Mr WU, Erfu (Empa); Dr MATT, Gebhard (ETH Zurich); Dr SHORUBALKO, Ivan (Empa); Prof. KOVALENKO, Maksym (ETH Zurich); Mr LINTANGRADIPTO, Muhammad Naufal (KAUST); Prof. MOHAMMED, Omar (KAUST); Prof. BAKR, Osman (KAUST); Dr NAPHADE, Rounak (KAUST); Dr YAKUNIN, Sergii (ETH Zurich); BARTOSH, Vitalii (Department of Chemistry and Applied Biosciences, ETH Zurich)

Contribution ID: **37** Type: **Contributed e-poster**

Terzina on-board of the NUSES satellite: a pathfinder for EAS Cherenkov light detection from space

Tuesday 4 July 2023 16:35 (1h 25m)

Ultra High Energy Cosmic Rays (UHECRs) above 100 PeV could be detected from space by pointing to the Earth's limb when the optical emission from extensive air showers (EAS) is produced. A space-born experiment could also play a key role in the multi-messenger field if the detection of Earth-skimming neutrinos will be ensured. The validation process for this detection of rare UHE events goes through precursors such as the NUSES space mission, designed to be operated in a Sunsynchronous, quasi-polar, low Earth orbit. On board the satellite platform, developed by TAS-I, two payloads will be equipped: Terzina, mainly discussed in this contribution, and ZIRE', devoted to low energy cosmic and gamma rays, space weather, and magnetosphere-ionosphere-lithosphere coupling. The Terzina telescope aims to detect UHECRs through the Cherenkov light emission from EAS that they create in the Earth's atmosphere. The Cherenkov photons are aligned along the shower axis inside about $\sim 0.2 - 1^{\circ}$. In this contribution, we focus on describing the telescope detection goals, geometry, optical and electronics design and its photon detection camera composed of Silicon Photo-Multipliers. Moreover, we describe the full Monte Carlo simulation developed to estimate Terzina's performance for UHECR detection. Terzina will be able to study the potential for future physics missions (e.g. POEMMA) devoted to UHECR detection and to UHE neutrino astronomy.

Author: TRIMARELLI, Caterina

Contribution ID: **38** Type: **Contributed e-poster**

Innovative 3D coded mask for wide-field gamma imaging

Wednesday 5 July 2023 16:35 (55 minutes)

Visualization of radioactive hotspots is essential in various fields of physics, ranging from the nuclear industry to high-energy astrophysics. One common technique for radioactivity visualization is coded aperture imaging. It involves using a position-sensitive detector accompanied by a coded aperture mask that is used to modulate the incoming radioactive photon flux. However, an acknowledged issue of this method is the limited field of view of cameras that use coded apertures. Therefore, we aim to design and manufacture innovative coded masks with 3D geometries that permit a wide field of view of up to 2π steradian and an angular resolution of less than a degree. To achieve this, we evaluated the 3D coded mask with Timepix3 and Caliste-HD photon detectors and enhanced standard reconstruction algorithms to operate with complex mask geometries.

Author: SUSAIEV, Yaroslav (CEA List)

Co-authors: Mr LIMOUSIN, Olivier (CEA Irfu); Mr SCHOEPFF, Vincent (CEA List)

Contribution ID: **39** Type: **Contributed e-poster**

A Scalable Frame-Based Readout Architecture for Monolithic Pixel Detectors with Local ADC and Time Digitization

Wednesday 5 July 2023 16:35 (55 minutes)

We proposes a novel readout architecture for monolithic pixel sensors for photon and particle detection, capable of handling event rates on the order of tens of kilohertz, while maintaining accurate timing resolution and energy deposition measurements. Our solution involves a scalable and versatile architecture with a local ADC integrated outside the pixels, but within the active-matrix area. Pixels are organized in a macro block, "super-pixel", that acts as a standalone data processing unit, and sends data on a serial bus at 200 MHz. The integration of multiple super-pixels in parallel optimizes readout time for larger matrices, thanks to a distributed digital logic and local charge measurement. This architecture has been applied to the development of the ASIC in a 130 nm SiGe BiCMOS technology for the FASER pre-shower detector at CERN, proving this concept on silicon.

Author: FENOGLIO, Carlo Alberto (Universite de Genève)

Contribution ID: **40** Type: **Contributed e-poster**

A 60 µW front-end for 10 ps resolution monolithic pixel sensors in a 130nm SiGe BiCMOS process

Wednesday 5 July 2023 16:35 (55 minutes)

This paper introduces a monolithic sensor for detecting ionizing radiation, integrated in a fast and low noise SiGe Bi-CMOS process. The front-end is designed for enhanced timing and low power consumption. The aim is to achieve sub-10 picosecond timing resolution, a significant improvement over the previous prototype, which demonstrated a time resolution of 20 ps. This prototype has been developed in the framework of the MONOLITH H2020 ERC project.

Author: PICARDI, Antonio (CERN)

Contribution ID: **41** Type: **Contributed e-poster**

100uPet project

Tuesday 4 July 2023 16:35 (1h 25m)

Positron Emission Tomography (PET) is a powerful imaging technique used in various fields, including medical research and diagnosis. One of the key aspects of PET is achieving ultra-high resolution, which greatly enhances the accuracy and precision of molecular imaging. The 100 µPET project, born by the synergy between the University of Geneva, the University of Luzern, and the École Polytechnique Fédérale de Lausanne, is a novel approach that aims to advance the development of a small-animal PET scanner with ultra-high-resolution molecular imaging capabilities. This is accomplished by employing a compact, modular stack composed of 60 layers of monolithic pixel detectors and flexible printed circuits (FPC) arranged in 4 towers that will surround the tissue to analyze, resulting in unprecedented scanner depth-of-interaction and volumetric granularity. This design is particularly challenging concerning developing the module-flex hosting the monolithic sensors. Experimental investigations were conducted to evaluate the electrical performance and reliability of different flip-chip bonding between monolithic sensors and FPC using Non Conductive Paste (NCP), together with the use of dummy chip designed to emulate the interface of the actual sensor, which is currently being designed. This poster presents an overview of the project with a focus on the flip-chip feasibility studies.

Author: IODICE, Luca (University of Geneve)

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

Custom CMOS image sensors and ROIC design for visible and beyond

Thursday 6 July 2023 15:15 (25 minutes)

The field of CMOS image sensors has seen a sustained growth in the last 30 years. This is expected to continue in the foreseable future, with new applications and technologies coming to the market every year. IMASENIC's mission is to develop advanced custom image sensors and imaging systems to help our customers differentiate and achieve leading market positions. This presentation will give an overview of the image sensor market and of IMASENIC's unique value proposition. Several examples of the most recent products and technology developments done by IMASENIC will be detailed.

Author: BOFILL PETIT, Adrià (IMASENIC)

Presenter: BOFILL PETIT, Adrià (IMASENIC)

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

Accelerating Innovation - Knowledge Transfer: from CERN to Society

Thursday 6 July 2023 15:40 (25 minutes)

Author: PINHO, Rita (CERN)

Presenter: PINHO, Rita (CERN)

Contribution ID: **44** Type: **Contributed e-poster**

Charge Sensitive Amplifiers with Bi- and Trilinear Signal Compression Feature for LGAD Detectors

Thursday 6 July 2023 16:35 (1h 25m)

This work is concerned with the design of Charge Sensitive Amplifiers (CSAs) featuring dynamic signal compression. Two different CSA variants have been developed to reach low-noise performance while dealing with signals covering more than three decades in dynamic range. The CSAs have been designed in a 65 nm CMOS technology as part of the front-end circuit for the readout of Low Gain Avalanche Diodes (LGADs) based particle detectors for the next generation of space-borne experiments.

Author: GIROLETTI, Simone (INFN - U. di Pavia)

Contribution ID: **45** Type: **Contributed e-poster**

Prediction of Dark Count Rate (DCR) Degradation in Neutron-Irradiated Single Photon Avalanche Diodes

Wednesday 5 July 2023 16:35 (55 minutes)

Experimental data has confirmed that the performance of Single Photon Avalanche Diodes (SPADs) can strongly degrade due to radiation, particularly in terms of Dark Count Rate (DCR).

The objective of this study is to anticipate the DCR increase in CMOS SPADs after irradiation. The study is carried out on two SPAD arrays (called A1 and A3), fabricated in a 150 nm technology and subjected to neutron irradiation at increasing fluences, up to 4.2×10^10 1 MeV neutron equivalent 〖⊠⊠〗 ^(−2).

Author: SHOJAEI, Fatemeh (INFN - U. di Pavia)

Contribution ID: **48** Type: **Contributed e-poster**

Toward sub-100 ps ToF-PET systems employing the FastIC ASIC with analog SiPMs

Tuesday 4 July 2023 16:35 (1h 25m)

Pushing the limits of the readout system in standard ToF-PET scanners will improve tomographic image reconstruction quality. Scintillation crystals optically coupled to photo-detectors, together with fast readout electronics, are the key elements to improve Coincidence Time Resolution (CTR). The 8-channel FastIC ASIC is capable of processing fast signals with a precise time stamp and a linear energy measurement with ≈ 12 mW power consumption per channel.
This work provides a complete analysis of the performance of the FastIC ASIC coupled to different scintillators and photo-detectors from different manufacturers, giving special attention to FBK sensors.

Author: PORTERO, Sara (ICCUB)

Co-authors: MARISCAL, Antonio (Institut de Ciences del Cosmos UB); SILVA, Juan José (ICCUB); MANERA, Rafel (ICCUB)