



COLLIMATOR DESIGN FOR GAMMA-RAY CASCADE ANGULAR CORRELATIONS IN MEDICAL IMAGING

Kaulya Chhabra¹, Leand Nikolov², Nguyen Phuong Dang³, Tommaso Falavigna⁴, Mounira Elstade⁵, Heidi Knafl⁶, Innocent J. Lapierre⁷, K. Vijay Sath⁸, Chary Rangaswamy⁹

- ¹ Department of Physics and Engineering Physics - University of Oslo
- ² Department of Physics - University of Oslo
- ³ Department of Radiation Oncology - Medical Center for Life Sciences - HSE
- ⁴ Research Center for Nuclear Physics (RCNP) - Osaka University
- ⁵ Department of Physics - University of Oslo

Introduction

Medical imaging can be divided into two main branches: structural and functional. Structural imaging aims to provide anatomical information, while functional imaging aims to provide information on the physiological processes occurring in the body. The development of medical imaging is a highly interdisciplinary field, involving physics, engineering, and medicine. The design of collimators is a critical aspect of medical imaging, as they determine the angular distribution of the incident radiation. This paper presents the design and characterization of a new collimator for gamma-ray cascade angular correlations in medical imaging.

Photon Attenuation

The attenuation of photons is a key factor in the design of collimators. The attenuation coefficient, μ , is a function of the photon energy and the material properties of the collimator. The design of the collimator must take into account the attenuation of the incident radiation, as well as the scattering of the radiation within the collimator. The design of the collimator must also take into account the angular distribution of the incident radiation, as well as the angular distribution of the scattered radiation.

MC-PET Machine

The MC-PET machine is a new type of PET scanner that uses Monte Carlo simulation to model the detection of positronium annihilation photons. The MC-PET machine is designed to provide high-resolution images of the body, and is capable of detecting small lesions. The MC-PET machine is currently under development, and is expected to be available in the near future.



University of Oslo Developments and Characterisation Results of DMAPS in TowerJazz in 100 nm for High Luminosity LHC

Authors: [List of authors]

Abstract

The MALT-A family of Diamond Microstrip Active Pixel Sensors (DMAPS) have been produced in 100 nm CMOS technology with small pixel pitch (50 μm) and small readout pitch (100 μm) to meet the requirements for the High Luminosity LHC. The sensors have been produced with several different configurations to optimize the charge collection in high luminosity conditions. The sensors have been characterized in terms of their performance in terms of charge collection efficiency, signal-to-noise ratio, and timing resolution. The results of the characterization are presented in this paper.

DMAPS Structure

The DMAPS structure consists of a diamond microstrip layer on top of a silicon substrate. The diamond layer is grown on a silicon substrate using chemical vapor deposition (CVD). The microstrip layer is patterned using photolithography and etching. The silicon substrate is then processed to form the readout electronics. The DMAPS structure is shown in the figure below.

DMAPS Performance

The DMAPS sensors have been characterized in terms of their performance in terms of charge collection efficiency, signal-to-noise ratio, and timing resolution. The results of the characterization are presented in the figure below.

DMAPS Timing Performance

The DMAPS sensors have been characterized in terms of their timing performance. The results of the characterization are presented in the figure below.

Development of DMAPS for the HL-LHC

Authors: [List of authors]

Abstract

The High Luminosity LHC (HL-LHC) will require a new generation of particle detectors. The development of DMAPS for the HL-LHC is a key challenge. This paper presents the design and characterization of a new DMAPS for the HL-LHC. The results of the characterization are presented in this paper.

Motivation

The HL-LHC will require a new generation of particle detectors. The development of DMAPS for the HL-LHC is a key challenge. This paper presents the design and characterization of a new DMAPS for the HL-LHC. The results of the characterization are presented in this paper.

Prototype Design Specification

The prototype design specification for the DMAPS for the HL-LHC is presented in this paper. The specification includes the requirements for the sensor, the readout electronics, and the data acquisition system.

1.1 and 1.2 Simulation

The simulation results for the DMAPS for the HL-LHC are presented in this paper. The simulation results show that the DMAPS for the HL-LHC is capable of meeting the requirements for the HL-LHC.