## VCI2025 - The 17th Vienna Conference on Instrumentation



Contribution ID: 200

Type: Talk

## Characterization and Irradiation Studies of the Novel nLGAD Concept

Thursday 20 February 2025 16:55 (20 minutes)

Low Gain Avalanche Detectors (LGADs) show outstanding precision timing performance for high-energy physics (HEP) particle detection and will be employed in detector upgrades for the High-Luminosity LHC. However, traditional p-type LGADs face limitations in detecting low-penetrating particles, such as soft X-rays and low-energy protons. To address this, n-type LGADs (nLGADs) have been developed. This study presents an overview of the efforts to characterize nLGADs produced at IMB-CNM, focusing on initial device characteristics and their performance after proton irradiation. Step-by-step irradiation with low fluences and high-fluence exposures were conducted to explore the impact on the device performance. Investigations cover the electrical characterisation of the devices before and after irradiation. Advanced techniques like Two Photon Absorption -Transient Current Technique (TPA-TCT) and UV TCT were employed to study electric field distributions and the reduction of gain after irradiation. Neutron irradiation of nLGADs is currently underway to complement existing studies by comparing radiation-induced degradation from different particle types, providing insights into donor removal in the gain layer. Combined with prior research on acceptor removal in standard pLGADs, this work offers valuable input for advancing nLGAD technology and developing future HEP detector concepts, such as the compensated LGAD.

## **Primary experiment**

Author: KRAUS, Veronika (Vienna University of Technology (AT))

**Co-authors:** Mr VILLEGAS DOMINGUEZ, Jairo Antonio; BIVEINYTE, Margarita; MOLL, Michael (CERN); WIEHE, Moritz (CERN); Dr HIDALGO, Salvador (Instituto de Microelectronica de Barcelona (IMB-CNM-CSIC))

Presenter: KRAUS, Veronika (Vienna University of Technology (AT))

Session Classification: Semiconductor LGAD 2

Track Classification: LGAD