Contribution ID: **35** Type: **WG6 - Wide bandgap materials**

The Study of SiC DC-LGAD and SiC AC-LGAD by Ultra-Violet Transient Current Technique (UV-TCT)

Thursday 5 December 2024 12:10 (20 minutes)

As a wide bandgap semiconductor material, silicon carbide (SiC) has been widely used in power devices due to its inherent advantages. In recent years, the use of SiC as a replacement for silicon in charged particle detectors for collider experiments has gained increasing attention. However, due to various limitations in SiC processing (such as ultra-low doping epitaxy and high energy ion implantation), fabricating devices with specific structures to meet the demands of charged particle detection remains highly challenging. The capability of future collider detectors to perform 4D tracking (time + position) has become a well-established requirement. Over the past decade, the silicon Low Gain Avalanche Detector (Si LGAD) has been extensively studied for its excellent timing performance and has demonstrated outstanding results in 4D tracking (delete this part). Owing to the unique properties of SiC, a SiC LGAD offers better theoretical timing performance and operability at room temperature after irradiation compared to the Si LGAD, making it a promising alternative.

In this report, we will present the characterization results both of 4H-SiC DC-LGAD and 4H-SiC AC-LGAD using the ultra-violet transient current technique (UV-TCT), including gain uniformity, timing resolution, and position resolution. These results preliminarily validate the 4D tracking capability of 4H-SiC LGADs.

Type of presentation (in-person/online)

online presentation (zoom)

Type of presentation (I. scientific results or II. project proposal)

I. Presentation on scientific results

Authors: YANG, Tao (Lawrence Berkeley National Laboratory); SEKELY, Ben (North Carolina State University); SATAPATHY, Yashas (North Carolina State University); ALLION, Greg (North Carolina State University); ATAR, Gil (North Carolina State University); BARLETTA, Philip (North Carolina State University); HABER, Carl (Lawrence Berkeley National Laboratory); HOLLAND, Steve (Lawrence Berkeley National Laboratory); MUTH, John (Lawrence Berkeley National Laboratory); PAVLIDIS, Spyridon (North Carolina State University); STUCCI, Stefania (Brookhaven National Laboratory); TISHELMAN, Abraham (Brookhaven National Laboratory)

Presenter: YANG, Tao (Lawrence Berkeley National Laboratory)

Session Classification: WG6 - WBG sensors