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Silicon carbide devices for radiation detection: a review of the main performances

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Silicon Carbide (SiC) is a semiconductor with a wide, indirect bandgap. It is one of the hardest materials present in nature. The strong bonds determine a large bandgap, implying a high refractive index and a broad transparency over the visible spectrum. Other properties, such as ultraviolet (UV) wavelength absorption, radiation hardness, make this material attractive for alternative application fields, such as high-temperature electronics, biomedical sensors, UV photo-sensors, charged particle and X-ray detectors. For these reasons, SiC are indicated as a valid substitute of Si detectors. In this contest, within the SiCILIA project, a collaboration between the INFN and IMM-CNR, aiming at the realization of innovative detection systems based on SiC, new, large area, p-n junction SiC devices were developed. In this work, we will show an overview of different application fields in which the new SiC devices were investigated. These detectors were tested for particles detection and identification showing excellent performances in terms of energy resolution and particles identifications. Moreover, the detectors were irradiated with ions, neutrons and electrons in several facilities; in all cases SiC devices exhibit good resistance to the radiation damages.

Collaboration

Role of Submitter

The presenter will be selected later by the Collaboration

Primary authors: ALTANA, Carmen (Istituto Nazionale di Fisica Nucleare); TUDISCO, Salvatore (INFN - LNS)

Co-authors: CIAMPI, Caterina (GANIL); LA VIA, Francesco; PASQUALI, Gabriele (Istituto Nazionale di Fisica Nucleare); LANZALONE, Gaetano (Istituto Nazionale di Fisica Nucleare); CALCAGNO, Lucia (Istituto Nazionale di Fisica Nucleare); COSENTINO, Luigi Giovanni (Istituto Nazionale di Fisica Nucleare); DE LUCA, Saverio (Istituto Nazionale di Fisica Nucleare); AMADUCCI, Simone (Istituto Nazionale di Fisica Nucleare)

Presenter: TUDISCO, Salvatore (INFN - LNS)

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