

Seminar

Institute for Plasma Research

Title : Fabrication and Characterization of a 3D Positive Ion Detector and its Application

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Date : 27th September 2018 (Thursday)

Time : 3.30 PM

Venue : Seminar Hall, IPR

Abstract :

There is a growing interest to experimentally evaluate the track structure induced by ionizing particles in order to characterize the radiobiological quality of ionizing radiation for applications in radiotherapy and radiation protection. To do so, a novel positive ion detector based on the multilayer printed circuit board (PCB) technology has been proposed previously, which works under the principle of ion induced impact ionization. Based on this, an upgraded 3D positive ion detector was fabricated in order to improve its efficiency and use it for various applications. To improve the efficiency of the detector, cathodes with different insulators (Bakelite plate and Steatite Ceramics) and conducting layers (ITO, FTO, and Gold coated cathode) were studied under various gaseous media (propane, methane, argon, nitrogen, and air) using Am-241, Co-60, Co-57, Na-22, Cs-137, and Ba-133 sources. From this study, it was confirmed that the novel 3D positive ion detector that has been upgraded using gold as strip material, tungsten (87 %) coated copper (13 %) as the core wire, gold coated ceramic as cathode, and thickness of 3.483mm showed 9.2% efficiency under methane medium at 0.9 Torr pressure using an Am-241 source. It was also confirmed that when the conductivity of the cathode and thickness of the detector is increased, the performance of the detector would be improved significantly. The scope of the detector to use in the field of radiation protection, gamma spectrometry, and oncology were confirmed.
