

ATTRACT TWD Symposium: Trends, Wishes and Dreams in Detection and Imaging Technologies



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Progress on simulation and first prototype results on a beam monitor based on MPGD detectors for hadron therapy

Study and development of an innovative beam monitor based on MPGDs for the characterization of proton therapy beams.

Summary

Remarkable scientific and technological progress during the last years has led to the construction of accelerator based facilities dedicated to hadron therapy. This kind of technology requires precise and continuous control of position, intensity and shape of the ions or protons used to irradiate cancers. Patient safety, accelerator operation and dose delivery should be optimized by a real time monitoring of beam intensity and profile before and during the treatment, by using non-destructive, high spatial resolution detectors. In the framework of AMIDERHA (AMIDERHA - Enhanced Radiotherapy with HAdron) project funded by the Italian Ministry of Education and Research the authors have studied and developed an innovative beam monitor based on Micro Pattern Gaseous Detectors (MPGDs) called TPC-GEM (TPG) detector, characterized by high spatial resolution and rate capability. Due to the low amount of material in the active volume, it is “not invasive”, therefore the beam characteristics are preserved, so minimizing the uncertainties on beam position, intensity, energy and stability.

The aim of this talk is to give an overview of the Monte Carlo simulations of the beam monitor prototype carried out to optimize the geometrical set up and to predict the behavior of the detector. The experimental results of the beam monitor characterization using an X-ray tube will also be presented, as well as the future developments.

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