

Title: Microdosimetry with GEMTEQ, a novel gas microdosimeter with a highly pixelated readout

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Abstract: Microdosimetry is the study of the temporal and spatial distributions of absorbed energy in biological matter and is crucial for the deep understanding of radiation effects in human tissue, for example of a carbon ion beam used in cancer treatments. The GEMTEQ detector is based on two CERN technologies, a small triple Gas Electron Multiplier setup with about 9 cm³ active volume and a quad Timepix ASIC featuring more than a quarter million pixels and a pixel pitch of 55 µm. The GEMTEQ is operated with tissue-equivalent gas. First microdosimetric measurements in neutron and photon fields were performed and results obtained with the GEMTEQ were compared to those obtained with standard microdosimeters. The GEMTEQ was also operated as a Time Projection Chamber and the 3D particle track analysis is on-going. In order to further increase the equivalent spatial resolution of the GEMTEQ and to increase the portability of the system, the development of a sealed and low-pressure detector version has started.

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