GEMPix

The GEMPix detector combines existing CERN-developed technologies - GEM (Gas Electron Multiplier), a type of gaseous ionisation detector and Medipix, a family of photon-counting pixel detectors. In combination, the features of each technology are enhanced and the resultant technology is a hybrid device able to detect all types of radiation with a high spatial resolution.

The purpose of the technology is to measure and visualise the low-energy deposits in gas or tissue-equivalent samples. Due to the wide gain range of the chamber, the new device could also be used to measure particle beam structure (i.e. protons and carbon ions) in hadrontherapy with good spatial resolution. It may be used also for X-ray monitoring in burning plasmas physics.

Applications

- Dosimetry, microdosimetry and sub-microdosimetry
- Radiobiology; analysis of biological effects of radiation on tissue samples
- Conventional radiation therapy and hadrontherapy
- Measurements of low-energy photons in radioactive waste monitoring
- 2D beam imaging in radiation therapy
- 3D energy deposition reconstruction in hadrontherapy
- X-ray monitoring in burning plasma physics

Features

- Use of triple-GEM technology allows a wide-gain range in particle detection.
- With Timepix, an advanced version of Medipix, measurement of energy released inside the gas and time of arrival of the drifted electrons are possible, allowing 3D reconstruction of the particle track and particle identification.

Energy released by a carbon ion beam measured by GEMPix in a water phantom

Benefits of Working with CERN

- Outputs of the world's leading scientific research institute
- Research-developed and experimentally-validated technologies
- World-class infrastructures and facilities
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