Contribution ID: **726** Type: **Talk**

Optical readout of gaseous detectors: new developments and perspectives

Thursday 21 February 2019 11:55 (20 minutes)

Scintillation light detection by imaging sensors presents a versatile and intuitive readout modality for gaseous radiation detectors. Based on visible scintillation light emission from gas mixtures such as Ar/CF4, optical readout provides images with high spatial resolution.
We present novel readout approaches including ultra-fast imaging for beam monitoring in addition to studies of optically read out detector concepts demonstrating suitability for a number of applications ranging from X-ray radiography and fluorescence to 3D track reconstruction in an optically read out Time Projection Chamber (TPC) based on Gaseous Electron Multipliers (GEMs). Furthermore, optical readout of Micromegas on a transparent substrate was shown to be well-suited for X-ray imaging and single X-ray photon detection.
A novel readout approach combining optical and electronic readout for 3D track reconstruction based on transparent anodes was developed to allow reconstruction of intricate track trajectories. Furthermore, beam monitoring capabilities of optically read out GEM-based low material budget detectors were tested in a clinical proton beam facility.
Ultra-fast CMOS imaging sensors capable of frames rates of tens of thousands of frames per second enable high speed X-ray fluoroscopy and real-time beam monitoring at megapixel resolution. At reduced resolution, a million frames per second acquisition rates were used for 3D track reconstruction from image sequences recorded in a TPC.

Author: Dr BRUNBAUER, Florian Maximilian (CERN, Vienna University of Technology (AT))

Co-authors: MUNOZ, Daniel (C-rad); PFEIFFER, Dorothea (CERN); POLLACCO, Emanuel (IRFU CEA Saclay); OLIVERI, Eraldo (CERN); GARCIA FUENTES, Francisco Ignacio (Helsinki Institute of Physics (FI)); IGUAZ GUTIERREZ, Francisco Jose (IRFU/CEA-Saclay); NORBERG, Gunnar (C-RAD); ROPELEWSKI, Leszek (CERN); LUPBERGER, Michael (CERN); VAN STENIS, Miranda (CERN)

Presenter: Dr BRUNBAUER, Florian Maximilian (CERN, Vienna University of Technology (AT))

Session Classification: Gas Detectors

Track Classification: Gaseous Detectors