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CERN developments of optical readout for MPGDs

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In recent years, MPGDs found applications beyond High Energy Physics mainly due to their imaging capabilities. Typically, MPGDs have the signals read out electronically, this means that each channel has its own amplification and digitisation chain. Despite being unavoidable in some occasions, an alternative to this approach exists: the so-called optical readout. Scintillation light produced during the amplification avalanche can be detected, making the gaseous detector a scintillating plate with extraordinary light yield. The first ideas of taking pictures of scintillating gases go back to the beginning of the '80. For instance, Charpak and collaborators used an image intensifier camera to photograph a parallel plate avalanche detector filled with Ar/CH₄/TEA. The choice of the gas mixture was mainly driven by the scintillation spectrum. Unfortunately, not many gases scintillate in the visible window, for which most of the light sensors are optimised. CF₄ is one of them, and the mixture of Ar/CF₄ 80/20 emits orange light in a broad peak around 630 nm. Modern MPGDs coupled with modern cameras are very promising tools to deliver fast and good quality images: This robust and versatile device is ideal for imaging purposes and can find several applications, for instance x-ray radiography and fluoroscopy, energy-resolved photon counting, and x-ray crystallography. The focus of the talk will be put on the recent developments of the optical readout for MPGDs at CERN.

Primary author: RESNATI, Filippo (CERN)

Presenter: RESNATI, Filippo (CERN)

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