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Review of results and measurements obtained with GEMPIX detector

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GEMpix is a gas detector obtained by the arrangement of a triple Gas Electron Multiplier (GEM) chamber with an C-MOS front-end electronic based on four Timepix chips, with 512 x 512 squared pixels, 55 micron wide. It was designed at CERN in the framework of the European M.Curie ARDENT project for detector developments in radio protection. A new software based on the pre-existent Pixelman has been written to obtain online cluster reconstruction and an optimized readout. Since then it has been used for the measurements of ^{55}Fe presence in radioactive waste and for the 3D reconstruction of the energy released in a water phantom by an hadron therapy treatment beam. In addition good results, in comparison with the gafchromic films, have also been obtained for the beam spot reconstruction in external beam radiotherapy with photons.

Recently the detector has been used for studying soft X-ray emissivity from laser produced plasmas and has been tested on the ABC laser facility (ENEA, Frascati) and the Eclipse laser facility (CELIA, Bordeaux, France). In this second case, in particular, the detector has been tested using different laser targets, in order to study its capability to discriminate different energy spectra. Its spatial resolution, instead, has been studied first by evaluating the detector response to single fluorescence X-ray photons in our lab and then by means of an Uttner mask placed before the detector window directly on the laser plasma X-ray emission. Some preliminary measurements have been performed also at the KSTAR Tokamak in South Korea in order to reconstruct the time evolution of the burning plasma observed through a pin-hole camera system along a tangential line of sight.

Finally the GEMpix is used for small TPC in the preliminary studies for Darkmatter research.

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