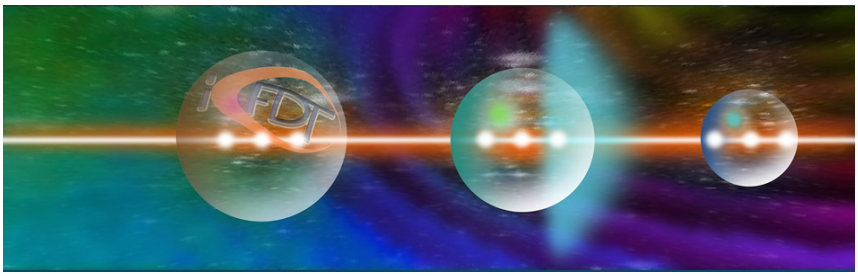

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Soft x-ray and gamma detectors based on Timepix chips for Laser Produced Plasmas

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The x-rays and gammas diagnostic on Laser Produced Plamas (LPPs) is a challenging task. In both cases the photons emission comes in burst that last from few tens of ps to few ns, depending on the power and the laser pulse time width. A measurement of the photon flux cannot be performed using traditional diagnostics systems. In this work we propose the innovative usage of two detectors: the GEMpix [1] for soft x-rays and the Silicon Timepix3 [2] for gammas . The GEMpix is a proportional gas detector based on 3 consecutive Gas Electron Multiplier (GEM) foils with a front-end electronic based on four Timepix [3] chips, with 512 x 512 squared pixels each 55 um wide. It allows a 6 orders of magnitude range on the photons flux. It gives the possibility to work on Time over Threshold (ToT) mode where each pixel provides a digital measure of the released charge in the gas mixture. In addition, the charge can be amplified through the GEM foils with 4 order of magnitude spanning gain offering, in this way, a big dynamic range. Some results obtained on the Eclipse laser facility (CELIA, Bordeaux, France) will be presented [4]. In some LLPs experiments, also a high energy gamma photons flux is expected and its measure is often mandatory for the characterization of the plasma physics. To this end, we have used the new Timepix3 Silicon chip. It is constituted by 256 x 256 pixels bump-bonded on a 300 um thick Silicon layer. As a result of the gammas interaction, some characteristic tracks are detected as a main consequence of the Compton interaction. It is possible to define some morphological parameters as: cluster size, total charge, roundness, linearity and so on. The detector response can be characterized using some gammas and electron sources with different energies. After its laboratory calibration, this detector has been mounted on the VEGA laser facility (Salamanca, Spain) during an experiment aimed to produce photo-neutrons. The use of a 2D detector allows a clusterization procedure that gives, as a final result, the possibility to discriminate between different energy bands. In the present work the very first results are presented.

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