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A 2D scintillator-based proton detector for high repetition rate experiments

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Spatial and energy characterization of the proton beams can play nowadays an important role for the potential use of such sources for several applications in different fields of physics, chemistry and material science as well as biology, medicine and cultural heritage. Interest in scintillation-based diagnostics is growing in the community studying ultra-short laser accelerated particles. This type of diagnostic is capable of being set in the high repetition rate (HRR) mode while maintaining the characteristics of conventional passive diagnosis (RCF). Here we present a scintillator-based detector able to measure both the proton energy and its transversal spatial distribution along the particle propagation axis and capable of being set at HRR. The detector has been designed and built at the Spanish Center for Pulsed Lasers (CLPU) in Salamanca and consists of a series of scintillators placed similarly as an RCF stack but positioned with a relative angle one respect to the others in order to leave a free field of view for an imaging system looking at the rear side of each layer and the imaging system can be arranged depending on the spatial constraint of the experiment [1]. First tests of the detector with a linear accelerator and extreme conditions of plasma laser interaction experiment will be introduce, giving very promising results for this new class of online detectors in laser-plasma physic experiments.

References

[1] M. Huault et al., A 2D scintillator based proton detector for HRR experiments, High Power Laser Science and Engineering, Volume 7, e60, 2019.