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Development of a detector for a gravity measurement on positronium at the AEgIS experiment at CERN

Thursday 28 May 2020 09:18 (18 minutes)

The primary goal of the AEgIS experiment is to measure the gravitational acceleration on antimatter by means of deflectometry/interferometry. This requires the simultaneous detection of the impact position and time of arrival of the atoms at a detector with high resolution. The detection of a low-velocity positronium (Ps) beam with (88 ± 5) μm spatial resolution was demonstrated [1]. Based on this methodology, a hybrid imaging/timing detector with increased spatial resolution was developed. The detection scheme is based on field-ionization of the Ps atoms, followed by the imaging of the ionization products by a microchannel plate (MCP). The read out of the MCP with a TimePix3 chip provides time resolution on a ns-scale. Sub-pixel resolution is achieved by applying an event centroiding algorithm. The concept of the detector is presented in detail and results of first performance tests are shown.

[1] C. Amsler et al., Nuclear Instr. and Methods in Physics Research B 457 (2019) 44-48

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