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High speed position readout for MCP based space plasma instruments

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Position sensitive micro-channel plate detectors are attractive for space plasma instruments but have a number of limitations. Most of the techniques have limited global rate handling and require the MCP to run at high gain with MCP lifetime implications. In addition, available mass and power resources limit the number of channels of readout electronics.

A fast position sensing technique has been developed that is well suited for MCP-based space plasma applications. The output charge from the MCP falling on an anode pixel is capacitively split to two separate channels of readout electronics. Introducing a time difference between the channels and choosing an appropriate readout pattern provides unique identification of the position of the incoming event. The time difference can be due to differences in the amplitude of the signal as described in (J.S.Lapington, Nucl. Instr. and Meth., 513 (2003) 132) or due to discrete delays introduced in the system. The channels can be interleaved so that each readout channel can be connected to several pixels, reducing the total number of readout channels and the performance of the system can be optimised depending on the resolution, rate-handling and lifetime requirements of the instrument. Details of the application and preliminary results with an electrostatic plasma analyser are presented.

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