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Development of a sealed MRPC with mylar spacers for high luminosity TOF systems

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The high luminosity Time-of-Flight (TOF) systems call for timing detectors with both good time resolution and adequate rate capability, which have been fulfilled by the Multigap Resistive Plate Chamber (MRPC) assembled with low-resistive glass electrodes. However, recent tests and operations with high rate MRPCs have given evidence to the luminosity effects, such as the dark current rise and related higher noise rate, which may vitiate the stability in experimental operations. This work conducts a comparative test and confirms the fishline spacers as a source of dark current rise. Then, a sealed MRPC with mylar spacers instead is proposed, developed, and tested. The prototype showed good luminosity tolerance during the X-ray test, and its performances of 95% efficiency and 80 ps time resolution have been validated in cosmic tests.

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