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Discharge propagation in GEM detectors

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Micropattern gaseous detectors (MPGDs) are a group of modern gaseous ionizing detectors consisting of microelectrode structures developed to overcome many of the difficulties of traditional gaseous detectors such as multiwire proportional chambers. The gas electron multiplier (GEM) is one of the most prolific MPGDs currently in use and slated to be used for many future detectors or current detector upgrades. Recent research conducted on discharges in GEM detectors will be presented. Delayed propagating discharges to the readout plane are a potential threat to the stable operation of GEM detectors and can cause permanent damage to the detector. An experimental setup enabling simultaneous electrical and optical measurements is used to provide novel insights regarding the physical mechanism of the delayed discharge, including the microsecond time delay between the primary and secondary discharges. Based on these measurements, indicators of the onset of the delayed propagating discharge are identified by means of the charge transfer to the readout electrode and potential methods to prevent or mitigate the delayed discharge propagation are proposed.

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