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Time structure measurement of the ATLAS RPC gap current

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The current absorbed by an RPC represents the sum of the charge delivered in the gas by the ionizing events interesting the gap, integrated by the electrodes time constant.
This is typically of the order of tens of ms thus dominating the gas discharge time scale and characterizing the granular structure observed in the current signal.
In most cases this structure is considered as noise to be further integrated to observe the average gap current, used often as a detector monitoring parameter or to precisely measure the uncorrelated background rate effects. A remarkable case is given if a large number of particles is passing trough the detector within an integration time constant producing a current peak clearly detectable above the average noise. The ATLAS RPC system is equipped with a dedicated current monitoring based on an ADC capable of reading out the average value as well as the transient peaks of the currents above a given threshold. A study on such data was used to spot the gap HV noise, to monitor the cosmic rays shower multiplicity and to detect the LHC splash events and provide additional analogical information when the event multiplicity exceeded the number of available strips in the digital readout.
The first results of this technique are here presented along with the strategy to improve the performance in terms of readout speed and signal to noise ratio.

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