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The Stabilized Voltage Divider –A Rate-Capable HV-Scheme for GEMs

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GEM detectors are widely used as tracking detectors in modern particle physics experiments. Typically, triple or quadruple stacks of GEM stages are used to provide the required gain. For discharge-safe operation, the potentials of the electrodes are often generated from a single input channel, using a *Passive Voltage Divider*. This circuit defines the required potentials through a resistor chain and limits the current in case of a shorted segment through its high output impedance. When it is subjected to high-rate, the large number of charges moving inside the detector lead to non-negligible potential drops. As the gain and therefore also the detector efficiency is highly sensitive to the potentials, the performance of the detector is degraded, calling for improvements of the high-voltage supply.

The newly developed *Stabilized Voltage Divider* (SVD) uses MOSFETs to provide the nominal potentials even under high rates up to several MHz/cm². The current flowing in case of a short circuit in the GEM is limited through a MOSFET that exhibits a low impedance during normal operation. Strong emphasis was put to ensure the adequate response of the SVD to discharges, minimizing the risk of damage to the detector's GEMs and readout. A detailed explanation on the working principle of the SVD will be given and measurements demonstrating the discharge behavior and superior rate capability of a triple-GEM-detector with an SVD will be presented.

Primary experiment

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