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RHIP, a Radio-Controlled High-Voltage Insulated Picoammeter and its usage in studying ion backflow in MPGD-based photon detectors

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A picoammeter system has been developed by prototyping and engineering. It consists in a current-voltage converter, based on an operational amplifier with very low input current, a high precision ADC, a radio controlled data acquisition unit and the computer-based control, visualization and storage. The picoammeter is characterized by a precision of the order of a tenth of picoamperes and it can measure currents between points laying at potentials of the order of a ten of kilovolts. The current-voltage converter and the radio transmitter are battery powered and a number of strategies have been implemented to limit the power consumption. The system is designed for multichannel application and up to 256 parallel channels can be controlled.

The overall implementation is cost-effective to make the availability of multichannel setups easily affordable. The design, implementation and performance of the picoammeter system are described in detail.

This system has been a key tool in our studies of ion backflow in MPGD-based photon detectors; we include reporting about these results.

On behalf of the COMPASS RICH group

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