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Small-pad resistive Micromegas for operation at very high rates

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We present the development of resistive micromegas with O(mm2) pad readout aiming at precision tracking in high rate environment without efficiency loss up to few MHz/cm2.
The anode copper pads (readout pads) are overlaid by an insulating layer carrying a pattern of resistive pads of the same size of the anode ones. The resistive pads are connected to the readout pads by intermediate resistors embedded in the insulating layer.
The signals are transmitted by capacitive coupling, while the charges are evacuated through the intermediate resistors.

A first prototype has been designed, constructed and tested. It consists of a matrix of 48x16 pads. Each pad with rectangular shape 0.8x2.8 mm2 and pitch of 1 and 3 mm in the two coordinates. The active surface is 4.8x4.8 cm2 with a total number of 768 channels.
The drift and amplification gaps of this micromegas prototype are 5 mm and 128 μm, respectively.
Characterization and performance studies of the detector have been carried out by means of radioactive sources, X-Rays, cosmic rays and test beam data.
Gain has been measured as a function of amplification and drift electric fields, also under high irradiation flux with radioactive sources and X-rays.
Measurements of the detector efficiency, cluster multiplicity, cluster size and spatial resolution using test beam data will be reported as well; in particular a spatial resolution of 190 μm has been obtained (in the 1 mm pad pitch view), as expected by detector construction parameters.

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