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High Granularity Resistive Micromegas for high particle rates environment.

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We present the latest performance studies of high-granularity resistive Micromegas (MM) detectors for tracking applications in high-rate environment. Nowadays MM are being used as tracking detectors in HEP experiment upgrades as in ATLAS experiment at LHC. To fulfill the requirements of stable and efficient operations up to particle fluxes as high as 10 MHz/cm2 coming from future High Energy Physics experiments, we produced and characterized several prototypes of resistive MM detectors with high granularity readout plane, with 1x3 mm2 size pads, and different resistive protection schemes, exploiting a pad-patterned layer or two uniform Diamond Like Carbon (DLC) layers.
In the pad-patterned layout each pad is totally separated from the neighbors. The anode pads are overlaid by resistive pads, both interconnected by intermediate "embedded"resistors.
In the double uniform resistive layers layout, each layer is obtained by a thin sputtering deposition of DLC on insulating foils. The two resistive layers are interconnected between them and to the readout pads with a network of conducting links with a few mm pitch, to evacuate the charge.
Characterization, performances, and stability studies of many prototypes have been carried out by means of radioactive sources, X-Rays, and particle beams. A comparison of the performance obtained with the different resistive layouts is reported, focusing on the response under high irradiation and high-rate exposure leading to an assessment of their potential. To cope with the high number of readout channels and allow for the size scalability of the detector avoiding dead areas, we are studying the integration of the readout electronics in the back of the detector. Preliminary results obtained with the first prototype with embedded front-end chip will also be presented.

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