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Resistive High Granularity Micromegas for Future Detectors

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In the framework of the ECFA Roadmap for Detector R&D the presented work aims to establish the use of single amplification stage resistive MPGD based on Micromegas (MM) technology as a tracking/tagging detector for future HEP experiments. The main characteristics of the proposed solution are: ability to efficiently operate up to 10 MHz/cm2 counting rate; high granularity readout with small pads (˜ 1 mm2); good spatial and time resolutions (below 100 ⊠m and 10 ns, respectively). Optimization of the spark protection system, stability and robustness under operation are the primary challenges of the project. Several MM detectors have been built and tested, with different sizes, ranging from small active area (4.8x4.8 cm2), to medium size (400 cm2) up to large active area (40x50 cm2), implementing different configurations of the resistive spark protection layer. Two families can be defined based on the different charge evacuation method: pad-patterned embedded resistors and double-layer of Diamond Like Carbon structures foils.
Characterization and performance studies, conducted using radioactive sources, X-rays and particle beams, will be presented. A comparison of the results obtained with different resistive layouts is provided, with a particular focus on the response under high-rate exposure. Key results on efficiency, tracking and timing performance from test-beam data will be presented, including also preliminary data on the first large size prototype.

Primary experiment

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