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Parallel Ionization Multiplier: a gaseous detector for the tracking of minimum ionization particles

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We report on gain and discharge rate measurements with micro-pattern gaseous detectors using micro-meshes. Some geometrical configurations of Parallel Ionization Multiplier (PIM) and MICROMEGAS, operated with Ne+10%CO2 gas mixture, are considered. Tests have been performed on the T9 proton-pion beam facility at CERN.

For MICROMEGAS configurations, the discharge rate, greater than 2x10-7, is correlated to the thickness of the amplification gap. On the other side, for lower probabilities, the amplification gap thickness does not seem to be discriminant, suggesting that strong processes take place.

With the PIM structure operated at a gain of 5000, the best configuration allows to achieve a rate lower than 10-9. Some elements are now understood to reduce this discharge rate with only two amplification stages, such as using ions with greater velocities or thinner amplification gap. R&D activities are under progress in order to complete this study and to know the spatial resolution.

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