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R&D on a new type of micropattern gaseous detector: the Fast Timing Micropattern detector

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Micropattern gaseous detectors (MPGD) underwent significant upgrades in recent years, introducing resistive materials to build compact spark-protected devices. Exploiting this technology further, various features such as space and time resolution, rate capability, sensitive area, operational stability and radiation hardness can be improved. This contribution introduces a new type of MPGD, namely the Fast Timing Micropattern (FTM) detector, utilizing a fully resistive WELL structure. It consists of a stack of several coupled layers where drift and WELL multiplication stages alternate in the structure, yielding a significant improvement in timing properties due to competing ionization processes in the different drift regions. Two FTM prototypes have been developed so far. The first one is uWELL-like, where multiplication takes place in the holes of a kapton foil covered on both sides with resistive material. The second one has a resistive Micromegas-like structure, with multiplication developing in a region delimited by a resistive mesh. The structure of these prototypes will be described in detail and the results of the characterization study performed with an X-Ray generator with two different gas mixtures will be presented. First results on rate capability and time resolution based on data collected with cosmic rays and muon/pion test beams will also be presented.

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