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Resistive MPGDs based on the WELL amplification concept

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In this work we present two innovative architectures of resistive MPGDs based on the WELL-amplification concept:

- the micro-Resistive WELL (μ-RWELL) is a compact spark-protected single amplification-stage Micro-Pattern Gas Detector (MPGD). The amplification stage, realized with a structure very similar to a GEM foil (called WELL), is embedded through a resistive layer in the readout board. A cathode electrode, defining the gas conversion/drift gap, completes the detector mechanics. The new architecture, showing an excellent space resolution, $\sim$50 μm, is a very compact device, robust against discharges and exhibiting a large gain (>10^4), simple to construct and easy for engineering and then suitable for large area tracking devices as well as digital calorimeters.
- the Fast Timing Micro-pattern (FTM): a new device with an architecture based on a stack of several coupled full-resistive layers where drift and multiplication stages (WELL type) alternate in the structure. The
signals from each multiplication stage can be read out from any external readout boards through the capacitive couplings, providing a signal with a gain of $10^4 - 10^5$. The main advantage of this new device is the improvement of the timing provided by the competition of the ionization processes in the different drift regions, which can be exploited for fast timing at the high luminosity accelerators (e.g. HL-LHC upgrade) as well as for applications like medical imaging.

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