

Micro Pattern Gas Detector Optical Readout for Directional Dark Matter Searches

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The Time Projection method is ideal to track low kinetic energy charged particles. Large volumes can be readout with a moderate number of channels providing a complete 3D reconstruction of the tracks within the sensitive volume.

The total released energy and the energy density along the tracks can be both measured allowing for particle identification and to solve the head-tail ambiguity of the track. Moreover, gas represents a very interesting target to study Dark Matter interactions. In gas, nuclear recoils induced by a Dark Matter particle scattering can yield tracks long enough to be detected.

We describe here a prototype TPC with a GEM amplification stage. The readout is based on the detection of the light produced in the GEM with a high granularity CMOS sensor in conjunction with a photomultiplier. The prototype was exposed to γ , neutron source and minimum ionizing particles, obtaining very promising results in terms of detection efficiency, energy resolution and particle identification.

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