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MPGD's spatial and energy resolution studies with an adjustable point-like electron source

Micropattern Gaseous Detectors (MPGD), like Micromegas or GEM, are used or foreseen in particle physics experiments for which a very good spatial resolution is required. We have developed an experimental method to separate the contribution of transverse diffusion and the multiplication process by varying the number of primary electrons generated by a point-like source. A pulsed nitrogen laser is focused by an optical set-up on the drift electrode, which is made of a thin metal layer deposited on a quartz lamina. The number of primary electrons can be adjusted from a few to several thousands on a spot which size is less than 100 μm RMS. The detector can be positioned with an accuracy of 1 μm by a motorized three dimensional system. This method was applied to a small Micromegas detector with a gain set between 10 3 and 2.104 and an injection of 60 to 2000 photoelectrons. Spatial resolutions as small as 5 μm were measured with 2000 primary electrons. An estimation of the minimum value of the energy resolution can also be extracted.

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