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Measurements and calculations of gas gain in Xe – 5% TMA mixture – pressure scaling.

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In this contribution we present a systematic study of single anode cylindrical detectors in gaseous Xenon using trimethylamine (TMA) as quencher gas. The choice of quench gas can have a significant effect on the gas gain and energy resolution. Gas gains (55Fe has been used as the radiation source) and energy resolutions for 109Cd radiation source (Ag Kα line of 22.1 keV X-rays) were measured for pressures between 250 and 1800 hPa and concentration of TMA of 5%. We observed stable operation at all pressures, and a strongly enhanced gas gain, by Penning-like energy-transfer processes. The experimental data have been fitted with Magboltz to investigate the Penning energy transfer rates and the secondary processes playing a role in avalanche formations. The probability of the Penning transfer rate and the second ionization Townsend coefficients were determined for all pressures. The gas gain fits with Penning and feedback corrections are all in excellence agreement with the experimental data. The maximum gas gain reached values as high as ~103 (~104) at 250 (1800) hPa. The Diethorn, Williams & Sara and of Aoyama models of the first Townsend coefficient have also been used to determine the basic gas properties. The obtained and presented results can be nice for micromegas-TPC operating in Xe-TMA mixture.

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