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Performance Studies of Bulk Micromegas with Different Amplification Gaps

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The bulk Micromegas detector is considered to be a promising candidate for building TPCs for several future experiments including the projected linear collider. The standard bulk with a spacing of 128 micron has already established itself as a good choice for its performances in terms of gas gain uniformity, energy and space point resolution and its capability to efficiently pave large readout surfaces with minimum dead zone. The present work aims to make a comparative study of the performance of this standard detector with other bulk Micromegas detectors having different amplification gaps. For this purpose four detectors with amplification gaps of 64, 128, 192 and 220 micron have been tested at room temperature and normal gas pressure. Different detector characteristics such as gain, energy resolution and electron transparency have been measured in various argon based gas mixtures to evaluate the effect of the variation of amplification gap on these parameters. In addition, preliminary measurements of ion backflow fraction of these detector have been carried out using an X-Ray tube that can deliver photons of different energy at a variable intensity. Further, in one of our recent works we have reported (vide VCI2013) the results of a numerical study to determine the effect of dielectric spacers on different detector features. In the present work we will like to report the results of a related study to estimate how these effects vary as the amplification gaps of the bulks change.

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