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Setup Optimization Toward Accurate Ageing Studies of Construction Materials of Gaseous Detectors

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An infrastructure has been set up at the GSI detector laboratory to study the influence of construction materials on the ageing properties of gas filled detectors, such as multi wire proportional chambers (MWPC), gas electron multipliers (GEM) etc. Two identical MWPCs have been used for these tests, one of them has been contaminated with the outgasing material under investigation, and the other has been used as reference. The gain ratio of these two chambers has been used to measure the onset of ageing if any.

In the ageing studies, is important to distinguish the permanent degradation of the gain ratio due to ageing and the temporary variation due to the effect of ambient parameters. To distinguish the above mentioned difference, a high precision measurement is required to be performed in reasonable time period. In this aspect the temperature effect on the behavior of the gas mixing station which contains two Mass Flow Controllers (MFC) has been studied systematically. The periodic gain ratio variation has been observed with mixing station and with premixed gas. Ageing test on different construction materials have been performed.

In this article, details of the experimental setup at the GSI detector laboratory, systematic optimization tests, and ageing test results on different construction materials will be presented.

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