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## Irradiation and longevity test of Resistive Micromegas detectors

*Friday, 8 July 2022 12:30 (15 minutes)*

A long-term irradiation and longevity test was conducted on two bulk-Micromegas detectors with screen-printed resistive strips, working with Ar:CO<sub>2</sub> gas mixture at the CERN GIF++ facility between 2015 and 2018. The results have been presented at previous conferences and are under publications. In that test the detectors have integrated a total charge of about 0.3 C/cm<sup>2</sup>.

One of the detectors irradiated at GIF++ is currently undergoing an ageing test with X-rays from Cu, this time with an Ar:CO<sub>2</sub>:C<sub>4</sub>H<sub>10</sub> mixture to study the effect of hydrocarbons like isobutane to the detector longevity. The resistive Micromegas under test has up to now accumulated a total charge exceeding 10 C/cm<sup>2</sup>, corresponding to about 100 years of equivalent irradiation of Muon detectors in the High Luminosity era of LHC and more than 20 at future colliders like FCC-hh.

The detectors is constantly irradiated with an X-rays beam of variable intensity and the current, the gas temperature and humidity as well as the pressure and the environmental parameters are continuously measured and registered. A second detector with identical construction and characteristics, operated at the same voltages and with the same gas but not irradiated, is used as reference chamber. Charge spectra with an <sup>55</sup>Fe source are acquired at regular intervals for both detectors to monitor the evolution of the gain and energy resolution.

The test is still continuing and will be followed by a deep inspection of the detector at the end of the irradiation period.

The talk will describe the experimental setup and test operation, and will focus on the main results and their interpretation. In particular we observe that the energy resolution stays largely unchanged, while the gain slowly reduces as the accumulated charge increases, an effect never measured before on resistive Micromegas.

### In-person participation

Yes

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