Contribution ID: **151** Type: **Poster**

Long term neutron irradiation studies of square meter sized resistive strip Micromegas detectors

Friday, 27 May 2022 08:39 (1 minute)

Resistive strip Micromegas (MICRO-MEsh GAseous Structure) detectors provide even at square meter sizes a high spatial resolution for the reconstruction of Minimum Ionizing Particles (MIPs) like muons. Micromegas detectors consist of three parallel planar structures. One Cathode, a grounded mesh and a segmented anode structure form the detector. Square meter sizes challenge the high-voltage stability during operation when using the frequently used gas mixture of Ar:CO_2 (93:7 vol%). To improve the HV-stability and enhance the discharge quenching different gas mixtures have been investigated. A very promising one has an admixture of isobutane which replaces part of the CO_2 to form a ternary gas of Ar:CO_2:iC_4H_{10} (93:5:2 vol%).
Long term irradiation studies investigating both gas mixtures with cosmic muon tracking efficiency measurements will be presented. The comparison shows a gain increase under Ar:CO_2:iC_4H_{10} in addition to the more HV-stable operation of the detector. This leads to a better timing resolution and higher pulse-heights improving the position reconstruction.
The longevity of the detector has been studied by irradiation with neutrons and gammas from a 10 GBq Am-Be source for a period of two years. It is investigated for any performance deterioration for each of the two gas mixtures with focus on pulse-height and changes of efficiency.
Additionally a characterization of the Am-Be neutron source was done, determining the effectively irradiated area as well as disentangling the effects from neutrons and photons on the detector. For this different shielding materials including lead, borated plastic and polyethylene are introduced between the source and the detector.

Collaboration

Primary author: VOGEL, Fabian (LMU München)

Co-authors: Prof. BIEBEL, Otmar (LMU München); GÖTZ, Stefanie (LMU München); Dr HERTENBERGER, Ralf (LMU München); JAGFELD, Christoph (LMU Munich); PENSKI, Katrin (LMU München); RINNAGEL, Maximilian (LMU München); Dr VALDERANIS, Chrysostomos (LMU München)

Presenter: VOGEL, Fabian (LMU München)

Session Classification: Gas Detectors - Poster session