Contribution ID: **38** Type: **not specified**

Studying signals in particle detectors with resistive elements such as the 2D resistive-strip bulk Micromegas.

Wednesday 14 December 2022 09:40 (20 minutes)

The uninterrupted advancements of modelling and simulation tools, such as Garfield++, has guided the widespread development and understanding of particle detector technologies. Since novel detector structures are proposed regularly, with resistive detectors becoming an ever-increasing fraction of these, it is vital to reflect this progress in the capabilities of the modelling tools. This talk covers the applying of an accurate and universal way of calculating the signals induced in structures with restive elements using an extended form of the Ramo-Shockley theorem to detector configurations such as the 2D resistive-strip bulk Micromegas. Re-introduced by the ATLAS New Small Wheel (NSW) community with their Micromegas design, resistive electrodes are now applied to different detectors within the Micro Pattern Gaseous Detector (MPGD) family to improve their performance and robustness. In a test beam campaign at the H4 beam line of the CERN SPS, two 2D resistive-strip bulk Micromegas with different surface resistivities (100 kΩ/□ and 1 MΩ/□) were studied. Their recorded signals are used to highlight the effect of the resistive strips on the signal shapes as well as to compare them to the modelling results. For this geometry, the dynamic weighting potential needed for the simulations was obtained numerically using a finite element solver. COMSOL Multiphysics provides the needed time-dependent solutions, which, coupled with Garfield++, allows for the targeting of a universal modelling toolkit for the microscopic modelling of the signal induction in particle detectors. Besides this benchmark study, the presentation will focus on how these tools are used to characterize other geometries, such as the 3D Diamond sensor. In addition to deepening the understanding of existing structures, these studies are important for designing and optimising the next generation of particle detectors and their application to specific needs driven by HEP experiments and other applications.

Presenter: JANSSENS, Djunes (Vrije Universiteit Brussel (BE))

Session Classification: Session 8