



Contribution ID: 30

Type: Oral

Micromegas detectors for muography: Applications and recent developments in detection systems and data analysis

The use of muons produced in the atmosphere for the scanning of the internal structure of big objects is known as muon tomography or muography. Being a non-invasive technique, it has enlarged their possible applications in the last years mainly due to the performance achieved in particle detectors. Nowadays this technique is used in such different fields as archaeology, volcanology, nuclear safety or civil engineering. In particular, CEA group possesses large experience in the operation of gaseous Micromegas detectors and has already successfully used this technique to perform muography measurements for these applications.

However, the variety of applications and the proposal of new ones leads to the conception of new detection systems as well as to the development of new analysis tools. Thus CEA group is currently working in the development of a new concept muon telescope. It is based in a compact TPC equipped with a 2D pixelated Micromegas detector with multiplexed readout. This detector will overcome some of the limitations of the instruments currently used as they limited acceptance keeping other features required for muography as stability, robustness or portability.

In parallel, a dedicated simulation and analysis framework based on Geant4 and ROOT has been implemented. It allows the performance of preliminary feasibility studies for each measurement as well as the data analysis and interpretation. It has been conceived in a versatile and modular mode to be used for any of the potential muography applications as well as for any muon telescope used. One of its main features is its capability to manage the geometry of the studied objects importing them directly from 3D-CAD models, increasing the simulations accuracy.

In this presentation, main features of Micromegas-based telescopes used for tomography will be presented together with their main applications, paying special attention to the recently developed TPC concept. In addition, a brief explanation of the simulation framework and some of the obtained results will also be showed.

Author: Dr GOMEZ MALUENDA, Hector (CEA/IRFU - Université Paris-Saclay (FR))

Presenter: Dr GOMEZ MALUENDA, Hector (CEA/IRFU - Université Paris-Saclay (FR))

Session Classification: Timepix, Micromegas, chair: Bernd Schmitt

Track Classification: general