



Contribution ID: 30

Type: Poster

## The M-Cube project: Large area Micromegas for homeland security

*Tuesday, October 13, 2015 4:15 PM (0 minutes)*

The development of large and robust MPGDs has opened the door to a vast new field of applications. Among them, the detection of Special Nuclear Material (SNM) in goods transportation has the highest potential in terms of emerging market and mass production. Most of the current detection methods are based on artificial radiations (X-rays, gammas or neutrons), which all suffer from several drawbacks: high cost, risks associated to artificial radiations (outside and inside containers), possibility to hide SNM with shielding and limited spatial extension of the source. Several projects have therefore emerged in the last years to overcome these drawbacks by making use of cosmic radiation as a probe. Natural, free, without any radiation risk, penetrating heavy shielding, this radiation has however a relatively modest flux of the order of 150 particles/m<sup>2</sup>/s. This technique thus requires i) very precise and performant detectors to extract the maximum of information from each cosmic ray, ii) industrialized fabrication process for large scale production, and iii) at a reasonable price. Among the different technologies currently investigated, the multiplexed Micromegas seems to be the most promising detector, offering excellent spatial resolutions with very limited electronics. The M-Cube project started at CEA-Saclay plans to build and operate a container scanner prototype with about 20 detectors representing a surface of 5m<sup>2</sup>. The detectors have a 2D readout with a resistive strip film, and reach 2D efficiencies above 97%. The Dream electronics developed for Clas12 further allows for self-triggering capabilities, and its performance has been successfully tested. The scanner prototype will be assembled in the next months, and detection time of Lead or Uranium bricks will soon be measured with a smaller scanner. Simulation has confirmed that this device has the best intrinsic performance of the devices currently developed in the world, and can in particular fulfill the criteria defined by the American DNDO (Domestic Nuclear Detection Office). Last but not least the development of such a project enhances the interest of industrials to master the fabrication process, which can in turn largely benefit to fundamental research and future experiments.

**Primary author:** Dr PROCUREUR, Sebastien (CEA-Saclay)

**Co-authors:** Dr ATTIE, David (CEA-Saclay); Mr MANDJAVIDZE, Irakli (CEA-Saclay); Mr BOUTEILLE, Simon (CEA-Saclay)

**Presenter:** Dr PROCUREUR, Sebastien (CEA-Saclay)

**Session Classification:** Poster session & coffee break

**Track Classification:** Applications