

## TOWARDS POSITION SENSITIVE THERMAL NEUTRON DETECTION BASED IN MULTILAYER $^{10}\text{B}$ CONVERTERS

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One of the most relevant issues in neutron detection is the search for alternatives to  $^3\text{He}$  as neutron converter. Its high absorption cross section for thermal neutrons used to make it the preferred absorber to build large area thermal neutron detectors. Its current unavailability triggered an intense search to find alternatives like gaseous detectors coated with  $^{10}\text{B}$  for neutron conversion. Such element is found in the solid state at NPT presenting an additional challenge regarding its deposition on surfaces with an optimum thickness. This is a critical parameter of the detector, since issues such as the self-absorption of the products of the nuclear reaction when the films are too thick can limit the detection efficiency of the final detector.

The use of many layers is an interesting solution to overcome these issues. This has been tried in several geometries, such as Multi-grid, Inclined detector, Jalousie and Cascade. In this presentation, a solution based in the Cascade concept where several thin boron layers are used, will be presented, using a cost effective Micropattern Gaseous Detector, the Thick-Gas Electron Multiplier (Thick-GEM), as neutron converter and electron transporter, together with a standard GEM-based charge amplification stage.

Preliminary results obtained with a first prototype mounted at IPEN's research reactor, using  $^{10}\text{B}_4\text{C}$  neutron converters produced in the deposition lab of the European Spallation Source will be shown and further developments towards position sensitive detection both for beam monitors and for high efficiency neutron detectors will be discussed.

This work was presented at Micropattern Gaseous Detectors, Trieste, Italy 2015 (poster) as well as at Summer School on Neutron Detection and Related Applications, Riva del Garda, Italy 2016 (poster) and São Paulo School on Light, Neutron and X-rays, São Paulo, Brazil, 2017 (poster)

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