Contribution ID: **216** Type: **Poster**

A 16-ch module for thermal neutron detection using ZnS:6LiF scintillators with embedded WLS fibers coupled to SiPMs and its dedicated readout electronics

In this contribution, we will present the design of a 16-channel module for a 1D position-sensitive detection of thermal neutrons and measurements performed at the spallation neutron source at PSI. This module could constitute a building block for large detectors in neutron scattering experiments. Its sensitive volume consists of 16 individual ZnS:6LiF bars optically isolated from each other and placed side by side without gap. The bars are 2.5˜mm wide, 2.8˜mm thick, and 200˜mm long. Each bar contains 12 homogeneously distributed embedded WLS fibers for collecting the scintillation light and the fiber bundle is coupled to a silicon photomultiplier (SiPM). This innovative structure with embedded WLS fibers provides both a high neutron absorption efficiency and a high scintillation light collection which is necessary to get a high trigger efficiency. The absence of optical crosstalk between the detection channels and their individual readout with SiPMs allow to reach the highest possible count rate capability. The count rate capability and the channel-to-channel uniformity of the 16-ch module that we measured at the spallation neutron source at PSI will be presented. A 16-channel FPGA-based readout board has been implemented with a dedicated digital signal processing algorithm. The algorithm, the readout board as well as the measurements of the trigger efficiency of the 16-channel detection module with this readout will be presented.

Author: Dr MOSSET, Jean-Baptiste (Paul Scherrer Institut)

Co-authors: Mr GROMOV, Alexey (Paul Scherrer Institut); STOYKOV, Alexey (Paul Scherrer Institut); Dr HILDEBRANDT, Malte (Paul Scherrer Institut); Dr SCHLUMPF, Niklaus (Paul Scherrer Institut); Mr GREUTER, Urs (Paul Scherrer Institut)

Presenter: Dr MOSSET, Jean-Baptiste (Paul Scherrer Institut)

Track Classification: Scintillating Detectors