SCIENTIFICA

Neutron Detector Heads
Position sensitive **N**eutron **D**etectors for neutron diffraction

Design overview

Position sensitive Neutron detector heads are manufactured for neutron scattering applications. Active area size and design can be customized. Detection technology is based on ^{6}Li-ZnS (Ag) scintillating material. Various pixel technologies are available, based on clear fibers (POF 1mm diameter) and wavelength shifting fibers (1mm/0.25mm diameter), and different configurations depending the application requirements.

The example in pictures, a lab prototype, has:

- 8 fiber collectors. PMT or other light sensors placed here.
- 20 pixel coded into 8 channels
- 2x LEDs for testing purpose
- Anodized aluminum finish

Functional highlights

- Number and size of pixels can be defined and manufactured customized for the application.
- Also, multiple pixel configurations can be implemented for comparing their performance simultaneously
- PMTs modules are manufactured to be coupled to the collectors.
- Pixel codification can be customized.
- Light tight
- B4C thermal neutron shielding
- Thin aluminum foil window in the active area to minimize the neutron scattering

Applications

- Medium resolution high-flux neutron diffractometer.
- Powder diffraction instruments.
- Research in neutron detection

References

These detectors are being used in:

- ISIS (UK)
- ESS Bilbao

Specification

- 8 PMT channels.
- 20 pixels.
- Dual coincidence codification.
- Light tight box
- CF: clear fibers.
  - 10 pixels of 60.75 x 3 mm
  - 10 pixels of 10 x 3 mm
  - Venetian configuration

- WF: wavelength shifting fibers
  - 4 different types of pixel integrated in the same head (10x4mm/pixel)
  - Different number of fibers per pixel.
- B4C shielding blocks
- 2 LEDs coupled to fibers for event simulation

- Compatible PMT Modules available with integrated Front-End and discriminator.
- Signal Processing electronics with proprietary discrimination algorithm based on FPGA technology. Reference: NDM v1.0

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