W-PIE

WIDE ENERGY ACTIVE NEUTRON SPECTROMETER

Extremely high counting efficiency

All-in-one, single-assembly neutron spectrometer

Field-oriented, outdoor applications

- ^{3}He-free, low-voltage SiPM-based readout
- Automatic, on-line spectrum unfolding
- From thermal neutrons up to 10 GeV (or 100 MeV)
- Extreme sensitivity: up to 4 kcph background

The **W-PIE** neutron spectrometer is a unique device designed for on-line neutron spectrometry measurements. The system features an extremely high counting efficiency, making it suitable to perform neutron spectrometry and absolute flux measurement for applications such as:

- homeland security
- cargo inspections
- calibration laboratories
- background suppression in low-background high-energy physics experiments
- cosmic ray neutron sensing (CRNS) in agriculture
- snow water equivalent (SWE) measurements in hydrology

W-PIE employs ^{6}Li as neutron converter, ^{4}He as scintillating medium, and 24 independent low-voltage SiPMs as photosensitive components. The detector is surrounded by increasingly thick moderating assemblies, defining 4 detection sub-volumes each optimised for a specific spectral region. Signals are acquired and analysed by the built-in electronics and unfolding algorithm, or they can be saved as raw data for off-line analysis. The response function of **W-PIE**, calculated via Monte Carlo simulations, is available for either on-line and off-line analysis. The response function and unfolding algorithm have been validated after thoroughly testing with reference radioactive sources, with quasi-monoenergetic neutron fields, and in the high-energy reference neutron field facility CERF at CERN.

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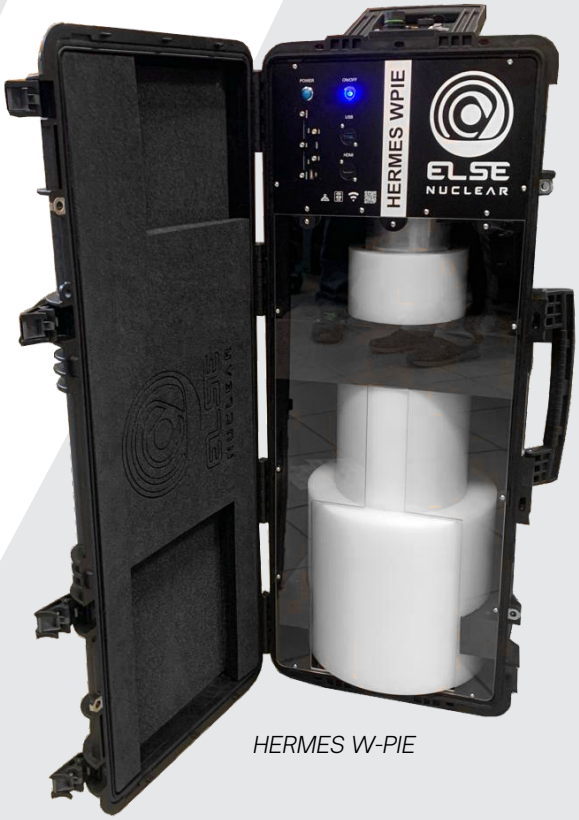
The device is available in two configurations:

- **W-PIE** - standard, high-energy version, with Cd and Pb inserts, designed to be sensitive to neutrons up to 10 GeV
- **HERMES W-PIE** - lightweight and standalone low energy version, without high-Z inserts, designed to be sensitive to neutrons up to about 100 MeV

The W-PIE version is powered over Ethernet and communicates with a PC through Ethernet connection.
The HERMES W-PIE version is a standalone unit featuring a single board computer, a 4G router, a GPS and a dual-SIM system allowing remote control.



HERMES W-PIE

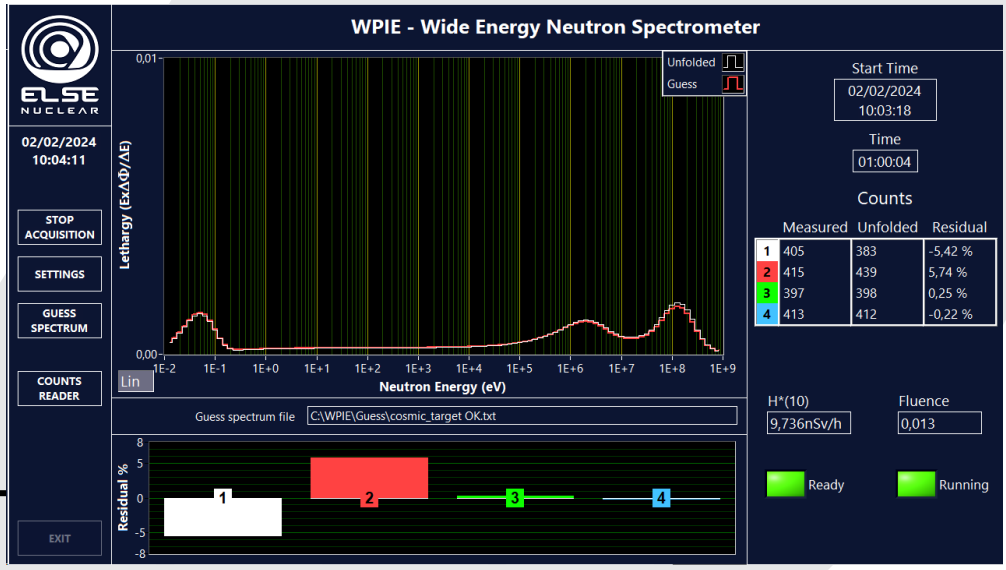
TECHNICAL SPECIFICATIONS

General characteristics

- He-4 gas scintillator: 12 l cylinder with LiF converter
- Energy range:
  - from thermal to 10 GeV (W-PIE)
  - from thermal to about 100 MeV (HERMES W-PIE)
- Neutron typical sensitivity: approx. 4000 counts per hour for typical ground level cosmic neutron background
- He-3-free, low voltage SiPM-based reading
- Online built-in unfolding algorithm
- Battery powered (HERMES W-PIE only)
- Possibility of remote control (HERMES W-PIE only)
- Dimensions:
  - Ø = 50 cm, H = 100 cm (W-PIE)
  - Ø = 40 cm, H = 100 cm (HERMES W-PIE)
- Weight:
  - approx. 120 kg (W-PIE)
  - approx. 40 kg (HERMES W-PIE)

Software characteristics

- On-line analysis of spectra through built-in unfolding algorithm
- Saving of the raw data for off-line analysis



W-PIE software interface

OPTIONS

- HERMES W-PIE low-energy version

ACCESSORIES AVAILABLE UPON REQUEST

- Outdoor long-term operation mounting kit
- Photovoltaic panel power supply system
- Warranty extension from 12 months to 24 months

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