

# NESTED NEUTRON SPECTROMETER

The Nested Neutron Spectrometer (NNS) is an efficient, single-unit detector system used to measure neutron fluence spectra within nuclear power, accelerator, and research facilities.



The NNS is the long-awaited, simple solution, for the routine field use of the well-known Bonner Sphere method. At the heart of the NNS are 7 moderating cylindrical shells, placed one inside the other, providing a lighter-weight compact instrument for neutron field characterization.

The nested moderator design allows for quick and easy adjustments of the detector setup by a single operator. Consecutive measurements are completed for each moderator configuration to accurately determine neutron energy distributions from thermal energies to 20 MeV. For higher energies, an optional insert can extend its measurement range up to 1 GeV.

Included with the NNS system is a Windows™-based measurement analysis application. This application recreates the neutron spectrum from the user-provided count rates in order to complete the picture of the neutron environment.

## Key Features:

- Patented, compact configuration of nested cylindrical moderating shells, similar to Matryoshka nesting dolls
- Thermal neutron He-3 proportional counter, insensitive to gamma-rays
- Every system is provided with a calibration traceable to US and international standards laboratories
- Large neutron fluence rate measurement range (tested up to  $10^6 \text{ cm}^{-2} \text{ s}^{-1}$ )
- Customized insert available for neutron energy extension
- User-friendly data unfolding software included



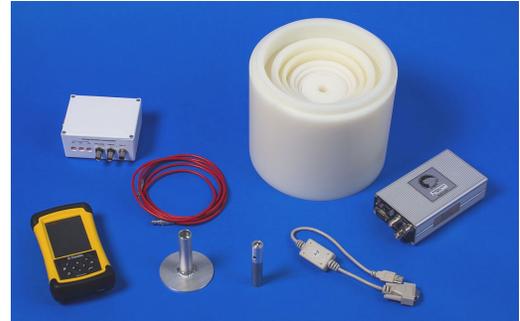
*A Bonner Sphere-type technique  
made simple for field use!*

## Included in the base system:

- NNS cylindrical assembly
- He-3 proportional counter with stand
- Pulse mode electronics and 75 ft long cables
- Table top or tripod NNS stand
- Calibration documents
- Spectrometer response functions
- NNS data acquisition and unfolding software
- Instrument travel and storage case

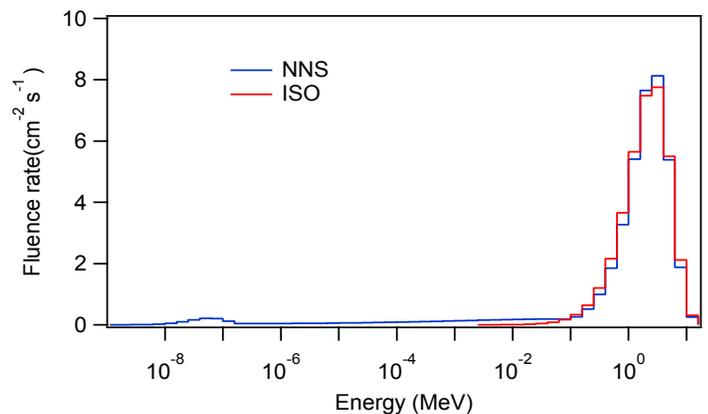
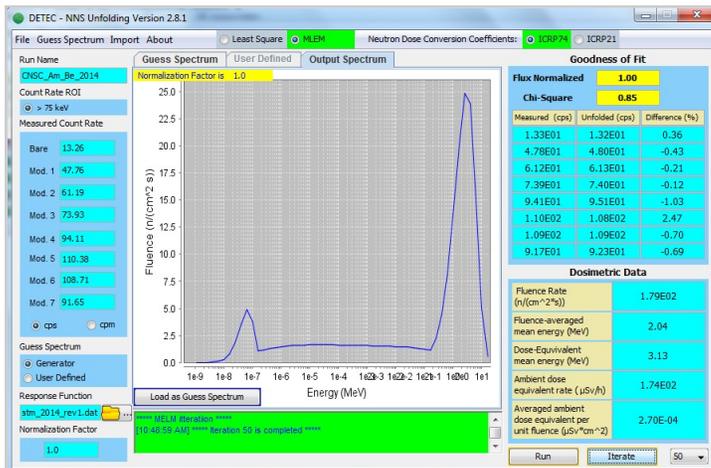
## Optional add-ons:

- High neutron flux accessories
- Additional proportional counters
- High neutron energy extension shell



## NNS UNFOLDING SOFTWARE

Detec's NNS Unfolding Software is an all-in-one analysis program, allowing non-expert users to perform the complex task of data unfolding. The user inputs the count rate measurements of each moderator shell configuration and the software recreates the ambient neutron energy spectrum.



| Dosimetric Data   |          |
|---|----------|
| Fluence Rate (n/(cm <sup>2</sup> s))                                      | 1.79E02  |
| Fluence-averaged mean energy (MeV)  | 2.04     |
| Dose-Equivalent mean energy (MeV)   | 3.13     |
| Ambient dose equivalent rate (μSv/h)                                      | 1.74E02  |
| Averaged ambient dose equivalent per unit fluence (μSv*cm <sup>-2</sup> ) | 2.70E-04 |

Accurate dose equivalent rates are calculated without approximation, by applying energy dependent radiological weighting factors to the NNS data.

The NNS system is a useful quality assurance and research tool that is ready for radiation protection applications at your facility.

For more information, contact us or visit our website:

[www.detecsciences.com](http://www.detecsciences.com)



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