NEURAPID

NEUtron RAPId Diagnostics

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Background

In the framework of the NESCOFI@BTF project (2011-2013) two diffrent detection systems able to perform a real time measurement of neutron spectra from eV to GeV were studied and developed:
CYSP (Cylindrical spectrometer) e SP^2 (spherical spectrometer)

CYSP (directional response)

- 7/8 thermal neutron detectors;
- 7/8 electronic chains in parallel (pulse mode);
- Continuous digital acquisition in data-streaming mode;

SP^2 (isotropic response)

- 31 thermal neutron detectors;
- 2 multichannel electronic chains in parallel (pulse mode);
- Continuous digital acquisition in data-streaming mode;

Application Fields

(i) LASER-BASED neutron production

Diagnostics

Response: directional

Requirements:

- Capability of measuring with ultra fast pulsed fields (shot duration: ~ fs).
- Sensitivity < 100 cm^{-2} / shot

Radiation protection/area monitoring

Response: isotropic

Requirements:

- Capability of measuring "dose per shot".
- Sensitivity < 50 nSv / shot

(ii) COSMIC RAYS MEASUREMENTS

Response: directional

Requirements:

- High sensitivity to measure fluxes down to 0.1 $cm^{-2}s^{-1}$.

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NEURAPID Mission: detector performances

To do:

1) Study and develop of thermal sensors with adequate fluence response;

2) Study and characterization of simple and fast acquisition systems;

3) Improvement of the detection systems to allow working in harsh environments.

2014:
Study of thermal neutron sensors

1) Development and characterization of large area semiconductor detectors sensitized to thermal neutrons (LATND)

- high fluence response to thermal neutrons;
- low cost;

But…

- high junction capacitance
- slow response;
- large dimensions;
- …

2) Development and characterization of doped plastic scintillators coupled to small semiconductor detectors (SSTND)

- high fluence response to thermal neutrons;
- Fast response;
- small dimensions;

But…

- expensive;
- photon sensitive;
- …

KEEP UP THE GOOD WORK!

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