arktis
RADIATION DETECTORS

Diagnostic neutron flux monitor with low background

Fast Neutron Detector

Operates in high gamma fields and magnetic fields

The Arktis fast neutron detector provides spectral and timing information, unbeatable robustness, simple integration and operation in challenging environments.

The easy to use fast neutron detector allows for a better understanding of the neutron flux in a given experimental area. A tunable and settable energy threshold allows to concentrate on the neutron energies of interest. The detector delivers a standard TTL output for each detected neutron, making it easily compatible with other detection systems and suitable for drop-in replacements. The Rugged-by-Design™ family of neutron detectors uses a SiPM* based signal readout, making it immune to shock and vibration, and scalable in length. The detectors are available in two standard lengths, or custom built to user specifications.

Key features

- Sensitive to fast neutrons
- Use natural helium (inert and abundant), not He-3
- Non-hazardous
- Rugged design, consisting only of gas, steel and solid-state circuitry
- Modular and scalable
- Not susceptible to microphonics, magnetic fields or vibration
- The only plug and play fast neutron detector on the market
- Gamma immunity up to at least 200 µSv/hr with 0.9 < GARRn** < 1.1
- TTL output
- Timing information for identification of events and time of flight measurements.
- Exploits low natural fast neutron background

* SiPM = Silicon Photomultiplier
**Gamma Absolute Rejection Ratio for neutrons, see R.Kouzes et al, "Neutron detection gamma ray sensitivity criteria", http://dx.doi.org/10.1016/j.nima.2011.07.030.

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Fast neutron detection

Fast neutrons are detected directly without the use of a moderator. They scatter elastically off the pressurized Helium-4 fill gas, producing scintillation light, detected by SiPM light sensors. On-board electronics perform digital pulse shape discrimination to reject gamma induced events and provide a TTL pulse for each detected fast neutron.

Helium-4 (natural helium) provides high cross section for fission neutrons. Helium-4 is an excellent scintillation medium as it is transparent to its own light and has low electron density, making it insensitive to gamma radiation.

Benefit of fast neutron detection

Compared to thermal neutron detectors, no moderator is needed which tends to distort timing and energy information about the incoming neutron. Thus fast neutron detectors allow for more precise timing information, spectral information and, if combined with high gamma immunity, are excellent for operation in measurement environments with high thermal neutron or gamma background.

Unbeatable robustness

Our detector is comprised only of stainless steel, inert gas and military grade solid state circuitry. Unlike conventional detectors, no restricted, fragile or otherwise sensitive materials such as crystals, photomultipliers (PMTs) and anode wires sensitive to vibaration, bagnetic fields and microphonics are used.

Detector setup and operation

The detector is powered by 12 V (no high voltage necessary) and comes with a control unit. Neutron counts can be read out via TTL or via USB. Plug and play handling and operation is key.

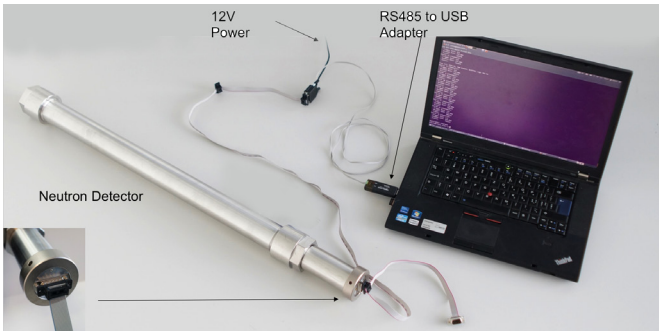

Figure 1: The detector is a plug and play solution with a self-contained control unit. Multiple detectors can be connected to large arrays.

	S-670	S-870
Package	Detector with TTL output	Detector with TTL output
Physical Specifications	875 mm total length, 600 mm sensitive length 52 mm diameter, 6.6 kg	1075 mm total length, 800 mm sensitive length 52 mm diameter, 8.1 kg
Neutron Sensitivity	0.12 cps/ng ^{252}Cf at 2 m	0.16 cps/ng ^{252}Cf at 2 m
Gamma Rejection	> 10^{-7}	
Power Requirement	2.5 W	3.2 W
Power Supply	12 V	
TTL Output	Female MCX coaxial output (MCX-BNC adapters available) TTL level 3.3 V, rise time < 5 ns; Drive current: 24 mA Pulse width: standard 80 ns, can be programmed from 10-2560 ns	
Control Cables	Flat ribbon cables (standard cable length 2 m)	
Operating Temperature	-30°C - 50°C (-22°F - 122°F)	
Storage Temperature	-50°C - 60°C (-58°F - 140°F)	
Conformity	CE	

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