arktis
RADIATION DETECTORS

Elegant solution:
No moderator
needed

Combined Fast and Thermal Neutron Detector

Extended energy range, immune to shock, vibration, magnetic fields

The Arktis full range detector provides a unique combination of fast and thermal neutron detection, simple integration, spectral information and unbeatable robustness.

Being sensitive to both fast and thermal neutrons allows greater sensitivity and optimized performance even when shielding is present. In addition, information on the source and shielding material can be obtained. 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. It can also be used in a distinction mode, where each thermal and fast neutron can be counted separately. 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 thermal neutrons and 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
- Gamma immunity up to at least 200 µSv/hr with 0.9 < GARRn** < 1.1
- TTL output
- The only plug and play combined fast neutron detector on the market
- Timing information
- 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.

Combined Fast and Thermal Neutron Detector

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Extended energy range, immune to shock and vibration

Benefit of combined fast and thermal neutron detection
Being sensitive to a large range of neutron energies provides much more information about the source and shiedling. This results in higher detection probabilities and easier concepts of operations.

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.

Thermal neutron detection
A ^{6}Li-based coating on the inside of the tube captures thermal neutrons, emitting highly energetic charged particles in the process. The energy of the charged particles is converted into light and collected the same way as the light produced in a fast neutron interaction. Each detected neutron results in a TTL pulse.

Unbeatable robustness
Stainless steel, inert gas and military grade solid state circuitry- that's it. Unlike conventional detectors, no restricted, fragile or otherwise sensitive materials such as crystals, photomultipliers (PMTs) and anode wires sensitive to vibaration and microphonics are used.

Detector setup and operation
The detector is powered with 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.

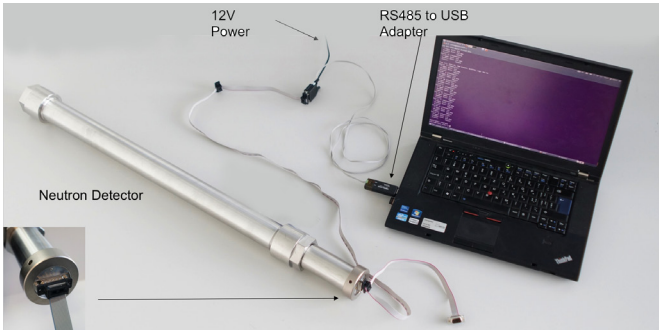

Figure 1: The detector is a plug and play solution with a self-contained control unit. Multiple detectors can be connected to large arrays.

	S-670e	S-870e
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
	Separate fast and thermal neutron counting in distinction mode	
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 Option to discriminate fast and thermal neutrons using the pulse width.	
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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