Nuclear Electronics with Quantum Cryogenic Detectors, 2nd Edition

Vladimir Polushkin

DESCRIPTION

NUCLEAR ELECTRONICS WITH QUANTUM CRYOGENIC DETECTORS

An ideal, comprehensive reference on quantum cryogenic detector instrumentation for the semiconductor and nuclear electronics industries

Quantum nuclear electronics is an important scientific and technological field that overviews the development of the most advanced analytical instrumentation. This instrumentation covers a broad range of applications such as astrophysics, fundamental nuclear research facilities, chemical nano-spectroscopy laboratories, remote sensing, security systems, forensic investigations, and more. In the years since the first edition of this popular resource, the discipline has developed from demonstrating the unprecedented energy resolving power of individual devices to building large frame cameras with hundreds of thousands of pixel arrays capable of measuring and processing massive information flow.

Building upon its first edition, the second edition of Nuclear Electronics with Quantum Cryogenic Detectors reflects the latest advances by focusing on novel microwave kinetic inductance detection devices (MKIDs), the microwave superconducting quantum interferometers (MSQUIDs) extending by orders of magnitude the scalability of cryogenic detectors implementing newly developed multiplexing techniques and decoding algorithms. More, it reflects on the interaction of quantum cryogenic detectors—which in turn can be paired with semiconductor large frame cameras to provide a broad picture of a sky or chemical sample—and quantum devices, making this second edition of Nuclear Electronics a one-stop reference for the combined technologies. The book also provides an overview of latest developments in front-end electronics, signal processing channels, and cryogenics—all components of quantum...
spectroscopic systems—and provides guidance on the design and applications of the future quantum cryogenic ultra-high-resolution spectrometers.

*Nuclear Electronics with Quantum Cryogenic Detectors* readers will also find:

- Fully revised material from the first edition relating to cryogenic requirements
- Brand new chapters on semiconductor radiation sensors, cooling and magnetic shielding for cryogenic detector systems; front-end readout electronic circuits for quantum cryogenic detectors; energy resolution of quantum cryogenic spectrometers; and applications of spectrometers based on cryogenic detectors
- A number of brand-new chapters dedicated to applications using MSQUID multiplexing technique, an area that will dominate the cryogenic detector field in the next decades

*Nuclear Electronics with Quantum Cryogenic Detectors* provides a comprehensive overview of the entire discipline for researchers, industrial engineers, and graduate students involved in the development of high-precision nuclear measurements, nuclear analytical instrumentation, and advanced superconductor primary sensors. It is also a helpful resource for electrical and electronic engineers and physicists in the nuclear industry, as well as specialist researchers or professionals working in cryogenics applications like biomagnetism, quantum computing, gravitation measurement, and more.

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**ABOUT THE AUTHOR**

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