



14 MeV Neutrons: Physics and Applications

By Vladivoj Valkovic

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Despite the often difficult and time-consuming effort of performing experiments with fast (14 MeV) neutrons, these neutrons can offer special insight into nucleus and other materials because of the absence of charge. **14 MeV Neutrons: Physics and Applications** explores fast neutrons in basic science and applications to problems in medicine, the environment, and security.

Drawing on his more than 50 years of experience working with 14 MeV neutrons, the author focuses on:

- Sources of 14 MeV neutrons, including laboratory size accelerators, small and sealed tube generators, well logging sealed tube accelerators, neutron generators with detection of associated alpha particles, plasma devices, high flux sources, and laser-generated neutron sources
- Nuclear reactions with 14 MeV neutrons, including measurements of energy spectra, angular distributions, and deductions of reaction mechanism
- Nuclear reactions with three particles in the final state induced by neutrons and the identification of effects of final state interaction, quasi-free scattering, and charge-dependence of nuclear forces
- Charged particle and neutron detection methods, particularly position-sensitive detectors
- Industrial applications of nuclear analytical methods, especially in the metallurgy and coal industries
- Quality assurance and quality control measures for nuclear analytical methods
- Nuclear and atomic physics-based technology for combating illicit trafficking and terrorism
- Medical applications, including radiography, radiotherapy, in vivo neutron activation analysis, boron neutron therapy, collimated neutron beams, and dosimetry

This book reflects the exciting developments in both fundamental nuclear physics and the application of fast neutrons to many practical problems. The book shows how 14 MeV neutrons are used in materials detection and analysis to effectively inspect large volumes in complex environments.

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Editorial Review

About the Author

Vladivoj Valković is a retired professor of physics, a fellow of the American Physical Society and Institute of Physics, and the founder and director of the Croatian-based company Analysis & Control Technologies Ltd. (A.C.T.d.o.o.), which implements environmental security projects. Dr. Valković has authored 13 books and more than 380 scientific and technical papers in many journals. His research interests include nuclear physics and the application of instrumentation and techniques to problems in biology, medicine, environmental research, and trace element analysis. He recently developed the idea of autonomous ship container inspection.

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