



Magnetoencephalography: From Signals to Dynamic Cortical Networks (Series in Bioengineering)

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Magnetoencephalography (MEG) is an invaluable functional brain imaging technique that provides direct, real-time monitoring of neuronal activity necessary for gaining insight into dynamic cortical networks. Our intentions with this book are to cover the richness and transdisciplinary nature of the MEG field, make it more accessible to newcomers and experienced researchers and to stimulate growth in the MEG area. The book presents a comprehensive overview of MEG basics and the latest developments in methodological, empirical and clinical research, directed toward master and doctoral students, as well as researchers. There are three levels of contributions: 1) tutorials on instrumentation, measurements, modeling, and experimental design; 2) topical reviews providing extensive coverage of relevant research topics; and 3) short contributions on open, challenging issues, future developments and novel applications. The topics range from neuromagnetic measurements, signal processing and source localization techniques to dynamic functional networks underlying perception and cognition in both health and disease. Topical reviews cover, among others: development on SQUID-based and novel sensors, multi-modal integration (low field MRI and MEG; EEG and fMRI), Bayesian approaches to multi-modal integration, direct neuronal imaging, novel noise reduction methods, source-space functional analysis, decoding of brain states, dynamic brain connectivity, sensory-motor integration, MEG studies on perception and cognition, thalamocortical oscillations, fetal and neonatal MEG, pediatric MEG studies, cognitive development, clinical applications of MEG in epilepsy, pre-surgical mapping, stroke, schizophrenia, stuttering, traumatic brain injury, post-traumatic stress disorder, depression, autism, aging and neurodegeneration, MEG applications in cognitive neuropharmacology and an overview of the major open-source analysis tools.



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Editorial Review

From the Back Cover

"Magnetoencephalography (MEG) provides a time-accurate view into human brain function. The concerted action of neurons generates minute magnetic fields that can be detected---totally noninvasively---by sensitive multichannel magnetometers. The obtained millisecond accuracy complements information obtained by other modern brain-imaging tools. Accurate timing is quintessential in normal brain function, often distorted in brain disorders. The noninvasiveness and time-sensitivity of MEG are great assets to developmental studies, as well.

This multiauthored book covers an ambitiously wide range of MEG research from introductory to advanced level, from sensors to signals, and from focal sources to the dynamics of cortical networks. Written by active practitioners of this multidisciplinary field, the book contains tutorials for newcomers and chapters of new challenging methods and emerging technologies to advanced MEG users. The reader will obtain a firm grasp of the possibilities of MEG in the study of audition, vision, somatosensation, sensorimotor integration, pain, and cognitive functions both in healthy subjects and several neurological and psychiatric disorders. Development is covered from fetal and pediatric studies to the effects of aging. This volume brings fresh and welcome diversity to the existing MEG literature."

MEG book review by Riitta Hari, Academician of Science, Aalto University

Users Review

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Terry Snider:

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Claudia Butler:

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