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Principles of Fiber Optics  
*Jeff Hecht, Auburndale, Massachusetts, USA*

Light Sheet Microscopy and Imaging  
*Partha Pratim Mondal, Indian Institute of Science, Bengaluru, India*

Concepts and Foundations of Physics  
*Anirudh Singh, University of Fiji, Lautoka, Fiji*

Introduction to Optics and Optical Communications  
*Barry Elliott, Capitoline Consultants*

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Multiscale Modeling of Electrochemical Reactions and Processes (2020)  
*Yun Wang, Griffith University, Mount Gravatt, Australia*

Biomedical Optical Imaging  
*Jun Xia, State University of New York at Buffalo, Buffalo, New York, USA*  
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Photovoltaic Sustainability and Management  
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Electron Microscopy of Defects in Compound Semiconductors  
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An Overview of Vacuum Technology Methods  
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**PERSPECTIVES**

Einstein’s Elevator and Other Marvels: Great Physicists and Their Achievements  
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ABOUT OUR BOOKS
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The portfolio provides researchers resources to help them maintain proficiency, learn about new developments, or learn new techniques for data collection and analytics in a subject area. The books offer reference materials and research methodology as well as cutting-edge original research.

Books in this collection are published as one of four types:

- **Principles**: Presents a comprehensive overview of a topic, providing introductory material for new entrants and covering recent developments for experts.
- **Methods**: Provides tutorial content documenting experimental methods, protocols or best practices, and provides instructions at various levels of expertise.
- **Professional**: Recommends guidance on training and development for physics educators and professionals.
- **Perspectives**: Offers in-depth analysis of a specialist topic, written by experts in that field.

Learn about our publishing partnership collaborations

The American Association of Physics Teachers and AIP Publishing have partnered to launch a series of books that focus on training and development resources for professionals and physics educators.
Essential Electron Transport for Device Physics

Author:
A.F.J. Levi, University of Southern California, Los Angeles, California, USA

Summary:
*Essential Electron Transport for Device Physics* introduces key elements of electron transport most applicable to the study of semiconductor electron devices. It is a convenient reference and summary of fundamental knowledge to be understood before exploring more sophisticated electron device models and concepts. The contents serve as a foundation for scientists and engineers, without the need to invest in specialized detailed study. Easy to read and understand, this book offers:
- Concise descriptions of essential electron transport concepts
- Quantitative results, example problems and, as supplementary material, MATLAB code for most numerically generated figures.

About the Author:
Anthony Levi is a Professor of Electrical Engineering and Physics at the University of Southern California. He joined USC in 1993 after working for 10 years at AT&T Bell Laboratories. He invented hot electron spectroscopy, discovered ballistic electron transport in heterostructure bipolar transistors, and created the first micro-disk laser. Professor Levi’s current research includes optimal design of high-performance electronic and photonic systems and understanding the behavior of small quantum systems. He holds 17 US patents and is the author of several books on device physics and quantum mechanics.

Readership:
- Electron device physicists who seek a summary of essential knowledge to be understood before exploring more sophisticated models and concepts
- Students studying electron device physics

Related Journals:
- *Applied Physics Letters*
- *Journal of Applied Physics*
- *Journal of Chemical Physics*
Real and Complex Numbers for Physicists

Author: Nicolas A. Pereyra, University of Texas Rio Grande Valley, Edinburg, Texas, USA

Summary: *Real Numbers for Physicists* presents a rigorous, in-depth introduction to natural numbers, integers, rational numbers, and real numbers. It addresses a gap in the mathematical library and offers a strong foundation in analytics and problem-solving to its readers. A valuable resource for scientists working with real numbers, this book also helps instructors teaching number theory and the physical sciences and will strengthen students’ mathematical and problem-solving skills.

The book addresses:

- In-depth introduction to real numbers geared toward physicists and natural scientists
- Different number systems without side-tracking into theoretical discussions
- Specific calculus-based knowledge and skills as applied to physics

About the Author:
Nicolas A Pereyra, PhD., is Associate Professor in Astrophysics at the University of Texas Rio Grande Valley. Dr. Pereyra’s research is focused on the development of computational models of physical systems. He is the author of other books about mathematics for physicists.

Readership:
- Physics students and instructors involved in courses on number theory
- Math Instructors who teach science students problems in physics

Related Journals:
- *American Journal of Physics*
- *Journal of Mathematical Physics*
Future Distribution Networks: Planning, Operation, and Control

Author:
Geev Mokryani, University of Bradford, Bradford, United Kingdom

Summary:
Future Distribution Networks: Planning, Operation, and Control presents a curated collection of leading information on the planning and operation of smart grids and next-generation distribution networks. It offers a look into the future of electricity networks that enable sustainable energy services and examines how these networks will link small- and medium-scale sources with consumer demand. It discusses how intelligent grid infrastructure provides flexibility for supply and demand.

The book contains:
- Structure and clarification to the concept of ‘smart grids’ offering a clear, agreed-upon definition
- Up-to-date information in smart grids and next-generation energy distribution networks, including industry and academic/laboratory contributions
- Recent developments in planning, operation and control of future distribution networks and smart grids with penetration of renewable energy sources

About the Author:
Geev Mokryani, Ph.D., is an Assistant Professor at the University of Bradford, UK. His research interests focus on optimization, planning, operation, and control of distribution networks with high penetration of renewable energy sources and energy storage systems. Dr. Mokryani is an associate editor of several top-rank journals and newsletters in the field of power and energy systems. He is a Senior Member of the IEEE and a Fellow of the Higher Education Academy.

Readership:
- Professionals in renewable energy or sustainable development fields
- Academic and industry researchers in the energy and energy distribution fields
- Undergraduate and graduate students studying electrical power engineering

Related Journals:
- Journal of Renewable and Sustainable Energy

Subject: Energy
ISBN (Online): 978-0-7354-2233-9
ISBN (Print): 978-0-7354-2230-8
Publication Date: 2020
The Physics of Radiation Dosimetry

Author:
Jerome Meli, Columbia University, New York, New York, USA

Summary:
The Physics of Radiation Dosimetry presents the fundamentals of radiation dosimetry through a logical sequencing of topics. This comprehensive treatment lays out basic concepts for the novice, then uses that foundation to introduce topics that all students will need to know—such as charged particle/matter interactions and photon/matter interactions.

This book offers:
- A solid, physics-based explanation of the topics presented
- Chapters containing sets of problems for students
- Easy to follow introductory radiation physics
- In depth discussions and derivations

About the Author:
Dr. Jerome Meli has a Ph.D. in Atomic Physics from University of Connecticut. He is currently an Adjunct Associate Professor at Columbia University in the Department of Applied Physics and Applied Mathematics. Previously, he was an Attending Physicist at Memorial Sloan-Kettering Cancer Center, Chief of Physics at St. Vincent's Medical Center in Bridgeport, CT, and a Radiological Physicist and Assistant Clinical Professor at Yale-New Haven Medical Center. Prior to his career as a medical physicist he was an Associate Professor of Physics at Fairfield University. Dr. Meli served on several committees of the American Association of Physicists in Medicine and has published research in medical physics, primarily in brachytherapy.

Readership:
- Medical physics residents and practitioners
- Graduate level students in medical physics

Related Journals:
- Journal of Applied Physics
- Review of Scientific Instruments
Fundamentals of Recoupling and Decoupling Techniques in Solid State NMR

Author:
Bo Chen, University of Central Florida, Orlando, Florida, USA

Summary:
Fundamentals of Recoupling and Decoupling Techniques in Solid State NMR provides broad coverage from the fundamentals through updated recoupling and decoupling techniques. It details step by step derivations and teaches readers how solid state NMR with Magic Angle Spinning exploits the interplay between mechanical rotation and radio frequency (RF) pulses to actively switch on (recoupling) and off (decoupling) desired interactions.

This unique book offers:
- Coverage from the basic through the most advanced topics and incorporates step by step derivations and exercises
- Conceptual, experimental, and mathematical aspects of modern solid-state NMR
- Detailed instruction of tensor calculus and step-by-step derivation to help students learn magic angle spinning phase integration

About the Author:
Bo Chen, Ph.D., is Associate Professor of Physics at the University of Central Florida. His NMR lab focuses on how to apply and develop techniques to investigate the structure and dynamics of biomacromolecular assemblies, and to develop novel coarse-grain models to understand the self-assembly mechanism. He is the recipient of the AFOSR Young Investigator Award. Previously, Professor Chen was a Research Fellow at the National Institutes of Health.

Readership:
- Practicing physicists interested in learning more about this topic
- Upper level undergraduate students majoring in physics or a related discipline

Related Journals:
- Applied Physics Letters
Enhanced Power Grid Stability Using Doubly-Fed Induction Generators

Author:
Kenneth Okedu, National University of Science and Technology, Muscat, Oman

Summary:
Enhanced Power Grid Stability Using Doubly-Fed Induction Generators addresses the latest schemes, modeling, and control strategies for improving variable speed wind turbines. Throughout this book, simulations are carried out using modern software packages to model different types of symmetrical and asymmetrical faults for transient stability analysis and modeling techniques for wind turbine power systems.

Key features:
- Discusses doubly-fed induction generators, fault ride through, and other concepts for improving stability of power grids stability of power grids that utilize wind power
- Addresses grid performance — a necessary but often overlooked consideration in renewable power resources
- Demonstrates various approaches and appropriate control strategies which can be very effective to stabilize a grid connected wind farm

About the Author:
Kenneth Okedu, Ph.D., is Visiting Professor and Research Team Lead at the National University of Science and Technology, Department of Electrical and Computer Engineering, in Muscat, Oman. He has held positions with the Massachusetts Institute of Technology (USA) and the Kitami Institute of Technology (Japan), among other notable and respected institutions. He served as editor for three books and several journals including Journal of Electrical and Computer Engineering (Hindawi), Frontiers in Energy Research (Frontiers), and Trends in Renewable Energy. Prof. Okedu has twice been recognized by Publons as part of the top 1% of reviewers in engineering (2018 and 2019).

Readership:
- Practicing physicists interested in learning more about this topic
- Upper level undergraduate students majoring in physics or a related discipline

Related Journals:
- Journal of Renewable and Sustainable Energy
- Journal of Applied Physics
Analysis and Design of Membrane Processes: A Systems Approach

Author:
Mingheng Li, California State Polytechnic University, Pomona, California, USA

Summary:
Analysis and Design of Membrane Processes: A Systems Approach highlights the fundamentals and emerging technology in the field of industrial reverse osmosis desalination and membrane processes. It provides a unique, systems engineering perspective of membrane operation, focusing on analysis, design and optimization of membrane processes. An explanation of mathematical and optimization knowledge is introduced and then applied throughout the book.

Key topics include:
- Hydrodynamics and mass transfer in reverse osmosis (RO) membranes
- Predictive models for RO module performance
- Analysis and optimization of brackish and seawater RO desalination
- Energy production using pressure retarded osmosis (PRO)
- Integration of RO and PRO for energy-efficient desalination
- Dynamic operation of batch RO and batch PRO

About the Author:
Mingheng Li, Ph.D. is a chemical engineering professor at California State Polytechnic University. He is a senior member of AIChE (American Institute of Chemical Engineers) and was an Associate Editor, Journal of Renewable and Sustainable Energy (AIP Publishing), 2016-2019. His areas of interest include process systems engineering for materials, energy, and environmental applications.

Readership:
- Researchers who are interested in membrane-based processes as well as undergraduate and graduate students
- Water industry professionals

Related Journals:
- Journal of Physical and Chemical Reference Data
- Journal of Renewable and Sustainable Energy
- The Journal of Chemical Physics
Soft-Matter Thin Film Solar Cells: Physical Processes and Device Simulation

Editors:
Jingzheng Ren, Hong Kong Polytechnic Institute, Hong Kong
Zhipeng Kan, Chongqing Institute of Green and Intelligent Technology, Chinese Academy of Sciences, Beijing, China

Summary:
Soft-Matter Thin Film Solar Cells: Physical Processes and Device Simulation provides a guide to modern innovations and developments in solar photovoltaic cells. Edited and written by global authorities in their respective fields, this book explores newly developed materials and incorporates numerical and computational experiments in materials research. It provides a top-level look into the research and utilization of a novel class of photovoltaic material.

Key topics covered in this book include:
- Origin, theoretical studies, and device simulation for perovskite solar cells
- Charge recombination, transfer states, and energy losses in organic solar cells
- Device physics in organic solar cells and drift diffusion simulations

About the Editors:
Jingzheng Ren, Ph.D., is an Assistant Professor at the Hong Kong Polytechnic University and an Honorary/Adjunct Associate Professor at the University of Southern Denmark. He has published more than 130 papers in SCI indexed international journals and authored/edited 7 books. Many of his papers have been selected as highly cited papers, have been highlighted by Renewable Energy Global Innovations/Advances in Engineering, or won the Best Paper Awards.

Zhipeng Kan, Ph.D., is Professor of Material Science and Engineering at the Chongqing Institute of Green and Intelligent Technology, Chinese Academy of Sciences. He has been published 45 times in international journals.

Readership:
- Investigators, postdoctoral fellows, and graduate and advanced undergraduate students
- Materials scientists and engineers in the solar energy sector, policy makers, and analysts

Related Journals:
- APL Photonics
- Journal of Renewable and Sustainable Energy
**F=ma Contests: 2011–2019 Solutions Manual**

Authors:
Branislav Kisačanin, Nvidia Corporation, Holmdel, New Jersey, USA
Eric K. Zhang, Harvard University, Cambridge, Massachusetts, USA

Summary:
*F=ma Contests: 2011–2019 Solutions Manual* presents clear and detailed solutions to problems from the annual F=ma contest hosted by the American Association of Physics Teachers (AAPT) between 2011 and 2019. The competition is the precursor to the USAPhO (United States National Physics Olympiad) and the IPhO (International Physics Olympiad). Bridging a significant gap in existing literature for competition preparation, this book:

- Presents scenarios in classical mechanics using pre-calculus, and occasionally calculus, to solve the problems presented in the competitions
- Demonstrates a wide variety of exam questions ranging from the simple to the highly complex
- Explains how problems can be solved in more than one way when viewed from different angles and using very different approaches.

About the Authors:
Dr. Branislav Kisačanin is a computer scientist at Nvidia Corporation and is a highly regarded expert in developing computer vision and artificial intelligence applications for use in autonomous driving. Dr. Kisačanin is also a passionate teacher of competitive math and physics at the AwesomeMath Summer Programs and the AwesomeMath Academy.

Eric K. Zhang is a Mathematics and Computer Science student at Harvard University. In 2018 and 2019 he won two gold medals representing the US at the International Olympiad in Informatics. After winning gold medals at the USAPhO in 2017, 2018, and 2019, Eric was invited to join the US Physics Team. Mr. Zheng taught competition math and computer science at AlphaStar Academy.

Readership:
- Physicists and other scientists interested in physics problem solving
- Supplementary reading in physics courses for non-physics majors
- High school students preparing for the F=ma exam

Related Journals:
- *American Journal of Physics*
Teaching High School Physics: The Nature of Physics Teaching

Authors:
Carl J. Wenning, Illinois State University, Normal, Illinois, USA
Rebecca E. Vieyra, University of Maryland, College Park, Maryland, USA

Summary:
Teaching High School Physics is centered on the principle that teachers need to be educated rather than trained and helps to form a substantive and substantiated foundation for a new way of teaching. Providing a mix of theory and practice, these books describe more than 40 important topics and encourage an inquiry-oriented approach to physics teaching. Teaching High School Physics offers a detailed reference guide to the many subjects being addressed in today's reform movements. They include numerous examples and helpful resources.

The Nature of Physics Teaching:
- Explores the role of educational research, teaching philosophies, and scientific epistemology as a foundation for good teaching
- Places a strong emphasis on learning by inquiry
- Prepares teachers with a solid philosophical and practical foundation focusing on the nature of physics teaching

About the Authors:
Carl J. Wenning, Ed.D., holds a B.S. in Astronomy from The Ohio State University, an M.A.T. in Planetarium Education from Michigan State University, and an Ed.D. in Curriculum & Instruction from Illinois State University. Dr. Wenning was founder and editor-in-chief of The Journal of Physics Teacher Education Online (JPTEO) where he served from 2002–2011. He was director of the ISU Physics Teacher Education program from 1994 until his retirement in 2008.

Rebecca E. Vieyra, M.A.S.Ed., holds a B.S. in Physics Teacher Education from Illinois State University and a Master's degree in Science Education Leadership from the Illinois Institute of Technology. She is currently pursuing a Ph.D. in science education at the University of Maryland-College Park. Ms. Vieyra is a winner of the Presidential Award for Excellence in Mathematics and Science Teaching and served as an Albert Einstein Distinguished Educator Fellow at NASA's Aeronautics Research Mission Directorate. She received National Board teacher certification in physics in 2011.

Readership:
- Prospective high school physics teachers and candidates and current physics teachers
- Experienced in-service physics teachers

Related Journals:
- American Journal of Physics
- The Physics Teacher
Teaching High School Physics:
Interacting with Students

Authors:
Carl J. Wenning, Illinois State University, Normal, Illinois, USA
Rebecca E. Vieyra, University of Maryland, College Park, Maryland, USA

Summary:
*Teaching High School Physics* is centered on the principle that teachers need to be educated rather than trained and helps to form a substantive and substantiated foundation for a new way of teaching. Providing a mix of theory and practice, these books describe more than 40 important topics and encourage an inquiry-oriented approach to physics teaching. *Teaching High School Physics* offers a detailed reference guide to the many subjects being addressed in today's reform movements. They include numerous examples and helpful resources.

*Interacting with Physics Students:*
- Addresses practical techniques for supporting student learning in the day-to-day classroom
- Details how to facilitate active engagement and cooperation in an equitable manner, manage learning difficulties and differentiations, and other situations teachers face in the classroom
- Prepares teachers with a solid philosophical and practical foundation focusing on interactions with students

About the Authors:
Carl J. Wenning, Ed.D., holds a B.S. in Astronomy from The Ohio State University, an M.A.T. in Planetarium Education from Michigan State University, and an Ed.D. in Curriculum & Instruction from Illinois State University. Dr. Wenning was founder and editor-in-chief of The Journal of Physics Teacher Education Online (JPTEO) where he served from 2002–2011. He was director of the ISU Physics Teacher Education program from 1994 until his retirement in 2008.

Rebecca E. Vieyra, M.A.S.Ed., holds a B.S. in Physics Teacher Education from Illinois State University and a Master’s degree in Science Education Leadership from the Illinois Institute of Technology. She is currently pursuing a Ph.D. in science education at the University of Maryland-College Park. Ms. Vieyra is a winner of the Presidential Award for Excellence in Mathematics and Science Teaching and served as an Albert Einstein Distinguished Educator Fellow at NASA’s Aeronautics Research Mission Directorate. She received National Board teacher certification in physics in 2011.

Readership:
- Prospective high school physics teachers and candidates and current physics teachers
- Experienced in-service physics teachers

Related Journals:
- *American Journal of Physics*
- *The Physics Teacher*
Teaching High School Physics: Managing the Physics Classroom

Authors:
Carl J. Wenning, Illinois State University, Normal, Illinois, USA
Rebecca E. Vieyra, University of Maryland, College Park, Maryland, USA

Summary:
Teaching High School Physics is centered on the principle that teachers need to be educated rather than trained and helps to form a substantive and substantiated foundation for a new way of teaching. Providing a mix of theory and practice, these books describe more than 40 important topics and encourage an inquiry-oriented approach to physics teaching. Teaching High School Physics offers a detailed reference guide to the many subjects being addressed in today's reform movements. They include numerous examples and helpful resources.

Managing the Physics Classroom:
- Prepares physics teachers with a solid philosophical and practical foundation on how to manage the classroom
- Addresses the professional practice of teaching from curriculum development to lesson planning to assessment to evaluation
- Informs readers about how to engage in the physics education community as a leader

About the Authors:
Carl J. Wenning, Ed.D., holds a B.S. in Astronomy from The Ohio State University, an M.A.T. in Planetarium Education from Michigan State University, and an Ed.D. in Curriculum & Instruction from Illinois State University. Dr. Wenning was founder and editor-in-chief of The Journal of Physics Teacher Education Online (JPTEO) where he served from 2002–2011. He was director of the ISU Physics Teacher Education program from 1994 until his retirement in 2008.

Rebecca E. Vieyra, M.A.S.Ed., holds a B.S. in Physics Teacher Education from Illinois State University and a Master's degree in Science Education Leadership from the Illinois Institute of Technology. She is currently pursuing a Ph.D. in science education at the University of Maryland-College Park. Ms. Vieyra is a winner of the Presidential Award for Excellence in Mathematics and Science Teaching and served as an Albert Einstein Distinguished Educator Fellow at NASA's Aeronautics Research Mission Directorate. She received National Board teacher certification in physics in 2011.

Readership:
- Prospective high school physics teachers and candidates and current physics teachers
- Experienced in-service physics teachers

Related Journals:
- American Journal of Physics
- The Physics Teacher
Teaching About Geometric Optics

Author: Jane Nelson, The Rock School, Gainesville, Florida, USA
        Jim Nelson, The Rock School, Gainesville, Florida, USA

Summary: Teaching About Geometric Optics guides physics teachers to help students develop a foundational understanding of geometric optics. The cornerstone of photonics systems, geometric optics, have applications in a wide range of industries including technology, medical, and military sectors. This book covers the basics of light propagation, reflection and refraction and the use of simple optical elements such as mirrors, prisms, lenses, and optical fibers.

Key elements include:
- 46 activities on geometric optics, covering a wide range of topics
- Easy implementation, with a copy-ready student sheet and teacher notes included
- References to appropriate Next Generation Science Standards

About the Authors:
Jane Nelson is a national Physics Teaching Resource Agent (PTRA) and has led over 100 PTRA workshops, including an NSF funded five year program to improve high school physics instruction across the state of Alabama. Ms. Nelson was awarded the AAPT Distinguished Service Award in 2011, the Presidential Awardee for Excellence in Science Teaching in 1988, and was inducted into the National Teachers Hall of Fame in 2002. She is the author of numerous articles on physics teaching and co-author for the high school textbook, Physics Principles and Problems (Glencoe/McGraw Hill).

Jim Nelson has led over 100 PTRA workshops, including an NSF funded five year program to improve high school physics instruction across the state of Alabama. Mr. Nelson was President of the American Association of Physics Teachers (AAPT) in 2004 and President of the Florida Association of Science Supervisors in 2001. In 1986 he was a Presidential Awardee for Excellence in Science Teaching. He has authored numerous journal articles on physics teaching as well as co-authored with Jane Nelson two books: Teaching about Magnets and Magnetism Resource Guide (AAPT) and Teaching About Kinematics Resource Guide (AAPT).

Readership:
- Physics educators and teachers seeking to teach the fundamentals in other science disciplines
- College and high school students

Related Journals:
- American Journal of Physics
- The Physics Teacher

Subject: Education
ISBN (Online): 978-0-7354-2217-9
ISBN (Print): 978-0-7354-2214-8
Publication Date: 2020
Synthetic Solar Irradiance: Modeling Solar Data

Editor:
Jamie M. Bright, Solar Energy Research Institute of Singapore, Singapore

Summary:
*Synthetic Solar Irradiance: Modeling Solar Data* is the first book to cover the principles and methods of this emerging field. Filling a void in the industry, this timely book is edited by one of the world’s premiere authorities on synthetic solar irradiance with contributions from other leading experts. It covers key applications of synthetic solar irradiance and established mathematical approaches for synthetic time series production.

Key topics include:
- Use cases of key definitions, literature, and data availability
- Determining success of generated synthetic irradiance
- Challenges and alternatives facing synthetic solar irradiance

About the Editor:
Jamie M. Bright, BEng., Meng., MSci., Ph.D., is a researcher at the Solar Energy Research Institute of Singapore. He is an Associate Editor for the *Journal of Renewable and Sustainable Energy* (AIP Publishing). Dr. Bright has also provided synthetic irradiance data to multiple PV solar farms in Australia through his company Bright Consulting. He works to provide state-of-the-art forecasts of solar energy via a research project funded by the Energy Market Authority of Singapore.

Readership:
- Solar engineering researchers, power and electrical engineers, applied mathematicians, applied computer scientists
- Professionals in the solar resource assessment and solar farm industries
- Individuals working with fluctuations of power being injected into the grid from solar panels

Related Journals:
- *Applied Physics Letters*
- *Journal of Applied Physics*
- *Journal of Renewable and Sustainable Energy*
Phase Transitions in Grey Matter: Brain Architecture and Mind Dynamics

Author:
Joaquin Marro, University of Granada, Granada, Spain
Joaquin J. Torres, University of Granada, Granada, Spain

Summary:
Phase Transitions in Grey Matter: Brain Architecture and Mind Dynamics relates the complex systems that we know as ‘mind’ and ‘brain’ to simple concepts in physics such as ‘phase transition’ and ‘criticality’ and establishes a close mathematical link between them. A serious review of live issues in science—from interaction and correlation to emergence, scale invariance, attractors, noise and chaos—this book demonstrates their relevance to intelligence and consciousness. The result is a significant and useful portrait of what ‘mind’ currently means to science and aggregates widely dispersed and sometimes hard to find topics into one resource.

Key highlights:
- Provides a coherent basis for the existence of criticality in the brain, and shows how some of its main outstanding properties may be understood
- Deeply explores the assumption that phase transition is the most relevant concept to understand the mind
- Offers a strong foundation for those interested in making a complete and useful portrait of the brain

About the Authors:
Joaquin Marro, Ph.D., is Professor Emeritus at the University of Granada, where he spent 30 years and founded the “Granada Seminar” and the “Institute Carlos 1 for Theoretical and Computational Physics”. His focus for more than 20 years has been mathematical modeling of the brain structure and activity. He is the author of more than 200 research papers and several books.

Joaquin J. Torres, Ph.D., is a Professor of physics at the University of Granada. His distinctions include being awarded the “Ramon y Cajal” grant from the Spanish Ministry of Research. He is a frequent author of research papers, and serves as an Associate Editor on several journals, including Neurocomputing (Elsevier) and Frontiers in Computational Neuroscience and Scientific Reports (Frontiers).

Readership:
- Practitioners and those curious about recent advances in neurosciences
- Advanced graduate and graduate students in physics, applied mathematics, biology and medicine

Related Journals:
- Chaos