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That Tandem Reconnection and Cusp Electrodynamics Reconnaissance Satellites project aims to explore the interactions between magnetic fields of the Earth and sun. COVID-19-related research at UI

...

University of Iowa, Iowa State shatter external funding records, despite pandemic
Ortigue, Stephanie Sinigaglia, Corrado Rizzolatti, Giacomo Grafton, Scott T. and Tractenberg, Rochelle E. 2010. Understanding Actions of Others: The Electrodynamics of the Left and Right Hemispheres.

Electrical Neuroimaging

Spatial and spectral analysis is then performed to understand the electrodynamics of the brain. The BCI laboratory has recently established closed collaboration with researchers from many ...

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Percentages referred to the total number of significant differences ($n = 63$). 1 Department of Experimental & Clinical Sciences, G. d'Annunzio University of Chieti-Pescara, Chieti, Italy 2 Center ...

Exposure to Extremely Low-Frequency Magnetic Field Affects Biofilm Formation by Cystic Fibrosis Pathogens

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Therefore, there has been increasing interest in the strong confinement of photonic modes in nanophotonic waveguides and resonators that exhibit quantum electrodynamics (QED) effects. Now ...

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Science news

The goal of this program is to examine the use of non-thermal plasmas in areas of clinical practice where plasma can be a more effective medical tool than existing procedures or in cases where no ...

Major Research Initiative

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Mathias Frisch provides the first sustained philosophical discussion of conceptual problems in classical particle-field theories. Part of the book focuses on the problem of a satisfactory equation of motion for charged particles interacting with electromagnetic fields. As Frisch shows, the standard equation of motion results in a mathematically inconsistent theory, yet there is no fully consistent and conceptually unproblematic alternative theory. Frisch describes in detail how the search for a fundamental equation of motion is partly driven by pragmatic considerations (like simplicity and mathematical tractability) that can override the aim for full consistency. The book also offers a comprehensive review and criticism of both the physical and philosophical literature on the temporal asymmetry exhibited by electromagnetic radiation fields, including Einstein's discussion of the asymmetry and Wheeler and Feynman's influential absorber theory of radiation. Frisch argues that attempts to derive the asymmetry from thermodynamic or cosmological considerations fail and proposes that we should understand the asymmetry as due to a fundamental causal constraint. The book's overarching philosophical thesis is that standard philosophical accounts that strictly identify scientific theories with a mathematical formalism and a mapping function specifying the theory's ontology are inadequate, since they permit neither inconsistent yet genuinely successful theories nor thick causal notions to be part of fundamental physics.

Several significant additions have been made to the second edition, including the operator method of calculating the bremsstrahlung cross-section, the calculation of the probabilities of photon-induced pair production and photon decay in a magnetic field, the asymptotic form of the scattering amplitudes at high energies, inelastic scattering of electrons by hadrons, and the transformation of electron-positron pairs into hadrons.

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Classical Electrodynamics captures Schwinger's inimitable lecturing style, in which everything flows inexorably from what has gone before. Novel elements of the approach include the immediate inference of Maxwell's equations from Coulomb's law and (Galilean) relativity, the use of action and stationary principles, the central role of Green's functions both in statics and dynamics, and, throughout, the integration of mathematics and physics. Thus, physical problems in electrostatics are used to develop the properties of Bessel functions and spherical harmonics. The latter portion of the book is devoted to radiation, with rather complete treatments of synchrotron radiation and diffraction, and the formulation of the mode decomposition for waveguides and scattering. Consequently, the book provides the student with a thorough grounding in electrodynamics in particular, and in classical field theory in general, subjects with enormous practical applications, and which are essential prerequisites for the study of quantum field theory. An essential resource for both physicists and their students, the book includes a 'Reader's Guide,' which describes the major themes in each chapter, suggests a possible path through the book, and identifies topics for inclusion in, and exclusion from, a given course, depending on the instructor's preference. Carefully constructed problems complement the material of the text, and introduce new topics. The book should be of great value to all physicists, from first-year graduate students to senior researchers, and to all those interested in electrodynamics, field theory, and mathematical physics. The text for the graduate classical electrodynamics course was left unfinished upon Julian Schwinger's death in 1994, but was completed by his coauthors, who have brilliantly recreated the excitement of Schwinger's novel approach.

Principles of Quantum Electrodynamics concentrates on one of the best understood parts of quantum field theory, quantum electrodynamics. It emphasizes the physical basis of the theory and avoids purely mathematical details. For this reason, the book should not be taken as a handbook of field theory, but rather as a compendium of the most characteristic and interesting results which have been obtained up to now. The book is organized into four parts. Part I develops the general mathematical framework, covering units and orders of magnitude, classical electrodynamics, and the general formalism of the quantum theory of fields. Part II deals with free fields. It examines some problems concerning the physical interpretation of the theory and asks whether the quantization procedure adopted actually introduces quantum characteristics and, if so, how these are expressed by the formalism. It also investigates the expectation values of more complicated expressions. Part III examines the effects of a mechanism which produces the particles under consideration; i.e., an external source of the fields. Part IV deals with quantum fields in interaction. The focus is on the case of a quantized electromagnetic field, the source of which is a quantized Dirac field.

Principles and Clinical Diagnostic Applications of Surface-Enhanced Raman Spectroscopy summarizes the principles of surface-enhanced Raman scattering/spectroscopy (SERS) and plasmonic nanomaterials for SERS, with a focus on SERS applications in clinical diagnostics. This book covers the key concepts from the fundamentals, materials, experimental aspects, and applications of SERS in clinical diagnostics with discussions on label-free/direct SERS assay, design and synthesis of SERS nanotags, SERS nanotags for point-of-care diagnostics, microfluidic SERS assay, and in vitro and in vivo sensing and imaging. Written by experts from around the world, this comprehensive volume showcases the recent progress of SERS applications in clinical diagnostics and helps readers understand when and how to use SERS in a clinical setting. Introduces the basics of SERS and suitable nanomaterials for SERS application Gives an overview of the cutting-edge research on SERS applications for clinical diagnosis, including the latest advances in our understanding of underlying principles to enable material design and clinical applications Gradually builds from the fundamental concepts to the applications of SERS for clinical diagnostics

Published in 1989: The short history of medical use of NMR is given. A brief introduction to the fundamental principles of NMR and the strategies of creating NMR image, as well as the exposure levels

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of various types of fields involved, are given.

Special Relativity, Electrodynamics, and General Relativity: From Newton to Einstein is intended to teach students of physics, astrophysics, astronomy, and cosmology how to think about special and general relativity in a fundamental but accessible way. Designed to render any reader a "master of relativity, all material on the subject is comprehensible and derivable from first principles. The book emphasizes problem solving, contains abundant problem sets, and is conveniently organized to meet the needs of both student and instructor. Fully revised and expanded second edition with improved figures
Enlarged discussion of dynamics and the relativistic version of Newton ' s second law Resolves the twin paradox from the principles of special and general relativity Includes new chapters which derive magnetism from relativity and electrostatics Derives Maxwell ' s equations from Gauss ' law and the principles of special relativity Includes new chapters on differential geometry, space-time curvature, and the field equations of general relativity Introduces black holes and gravitational waves as illustrations of the principles of general relativity and relates them to the 2015 and 2017 observational discoveries of LIGO

Volume forty-two in the internationally acclaimed Advances in Clinical Chemistry series, contains chapters submitted from leading experts from academia and clinical laboratory science. Authors are from a diverse field of clinical chemistry disciplines and diagnostics ranging from basic biochemical exploration to cutting edge microarray technology. In keeping with the tradition of the series, this volume emphasizes novel laboratory advances with application not only to both clinical laboratory diagnostics, but as well as practical basic science studies. This volume of Advances in Clinical Chemistry is an indispensable resource and practical guide for twenty-first century practitioners of clinical chemistry, molecular diagnostics, pathology, and clinical laboratory sciences in general.

This classic work presents the main results and calculational procedures of quantum electrodynamics in a simple and straightforward way. Designed for the student of experimental physics who does not intend to take more advanced graduate courses in theoretical physics, the material consists of notes on the third of a three-semester course given at the California Institute of Technology.

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