The Atomic Nature Of Matter

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The Atomic Nature Of Matter ***2020-08-01***

LIN SHANIYA

THE ATOM AND THE BOHR THEORY OF ITS STRUCTURE Classroom Complete Press
At the close of the nineteenth century and the beginning of the twentieth, our knowledge of the activities in the interior of matter experienced a development which surpassed the boldest hopes that could have been entertained by the chemists and physicists of the nineteenth century. The smallest particles of chemistry, the atoms of the elements, which hitherto had been approached merely by inductive thought, now became tangible realities, so to speak, which could be counted and whose tracks could be photographed. A series of remarkable experimental investigations, stimulated largely by the English physicist, J. J. Thomson, had disclosed the existence of negatively charged particles, the so-called electrons, $^4/_{2000}$ the mass of the smallest atom of the known elements. A theory of electrons, based on Maxwell's classical electrodynamical theory and developed mainly through the labours of Lorentz in Holland and Larmor in England, had brought the problem of atomic structure into close connection with the theory of radiation. The experiments of Rutherford proved, beyond a doubt, that atoms were composed simply of light, negative electric particles, and small heavy, positive electric particles. The new "quantum theory" of Planck was proving itself very powerful in overcoming grave difficulties in the theory of radiation. The time thus seemed ripe for a comprehensive investigation of the fundamental problem of physics—the constitution of matter, and an explanation in terms of simple general laws of the physical and chemical properties of the atoms of the elements. During the first ten years of the new century the problem was attacked with great zeal by many scientists, and many interesting atomic models were developed and studied. But most of these had more significance for chemistry than for physics, and it was not until 1913 that the work of the Danish physicist, Niels Bohr, paved the way for a really physical investigation of the problem in a remarkable series of papers on the spectrum and atomic structure of hydrogen. The ideas of Bohr, founded as they were on the quantum theory, were startling and revolutionary, but their immense success in explaining the facts of experience after a time won for them the wide recognition of the scientific world, and stimulated work by other investigators along similar lines. The past decade has witnessed an enormous development at the hands of scientists in all parts of the world of Bohr's original conceptions; but through it all Bohr has remained the leading spirit, and the theory which, at the present time, gives the most comprehensive view of atomic structure may, therefore, most properly bear the name of Bohr. It is the object of this book to give the reader a glimpse of the fundamental conceptions of this theory, together with some of the most significant results it has attained. The book is designed to meet the needs of those who wish to keep abreast of modern developments in science, but have neither time nor inclination to delve into the highly mathematical abstract literature in which the developments are usually concealed. It is with this in mind that the first four chapters have been devoted to a general survey of those parts of physics and chemistry which have close connection with atomic theory. No attempt has been made at a mathematical development, and the physical meaning of such mathematical formulæ as do occur has been clearly emphasized in the text. It is hoped, however, that even those readers whose acquaintance with atomic theory is more than casual, will find the book a stimulus to further study of the Bohr theory. Here we wish to record our best thanks to Mr. and Mrs. Lindsay for the ability and the great care with which they have carried out the translation from the Danish original...FROM THE BOOKS
Atomic Theory and the Description of Nature National Academies Press
A Nobel Prize–winning chemist explains the nature of radioactivity and the structure of the atom in nontechnical language in this classic scientific text, appropriate for upper-level undergraduates and graduate students. Beginning with the discovery of radioactivity, the text covers radium, the rays of radioactive substances, and radium's emanation. Additional topics include helium and radium, the theory of atomic disintegration, the origin of radium and its successive changes, radioactivity and the nature of matter, radioactivity and the evolution of the world, the thorium and actinium disintegration series, and the ultimate structure of matter. Concluding chapters examine the nuclear atom, isotopes, and x-rays. 1920 ed. 44 figures.
From Photons To Atoms: The Electromagnetic Nature Of Matter Prentice Hall
Until now, popular science has relegated the atom to a supporting role in defining the different chemical elements of the periodic table. This bold new title places its subject center stage, shining the spotlight directly onto the structure and properties of this tiniest amount of anything it is possible to identify. The book covers a huge range of topics, including the development of scientific thinking about the atom, the basic structure of the atom, how the interactions between atoms account for the familiar properties of everyday materials; the power and mystery of the atomic nucleus, and what the mysterious quantum realm of subatomic particles and their interactions can tell us about the very nature of reality. Sparkling text banishes an outdated world of dull chemistry, as it brightly introduces the reader to what everything is made of and how it all works, on the most fundamental level.
The Nature of Matter CRC Press
This book provides a hands-on experience with atomic structure calculations. Material covered includes angular momentum methods, the central field Schrödinger and Dirac equations, Hartree-Fock and Dirac-Hartree-Fock equations, multiplet structure, hyperfine structure, the isotope shift, dipole and multipole transitions, basic many-body perturbation theory, configuration interaction, and correlation corrections to matrix elements. The book also contains numerical methods for solving the Schrödinger and Dirac eigenvalue problems and the (Dirac)-Hartree-Fock equations.
Green Chemistry and the Ten Commandments of Sustainability BEYOND BOOKS HUB
Encompasses many different topics in and approaches to introductory chemistry. Discusses broad areas of chemistry including organic chemistry, biochemistry, environmental chemistry, and industrial chemistry. Historical developments of chemical concepts are covered, and biographical information is provided on key individuals responsible for the development of modern chemistry.
Quantifying Matter, Revised Edition Mark Twain Media
The concept of the atom is very near scientific bedrock, touching first causes, fundamental principles, our conception of the nature of reality. This book is a translation from the French of a history of atomic thought and theory, from ancient Greece to the present day. Pullman grounds his coverage of scientific theory always in the religious and philosophical context of the times, covering the whole period of Western civilization, including in passing the major scientific philosophies of the Muslim world and India. The transition of atomism from a philosophical position to an experimental science, in the mid-19th century, is well handled, and the coverage is nicely rounded out by a treatment of the first visual proof of atoms' material existence by direct microscopic imaging of individual atoms, about ten years ago.
The Atom in the History of Human Thought World Scientific
You don't have to be a rocket scientist to understand matter and energy with our Physical Science 3-book BUNDLE. Students discover what matter is with Properties of Matter. Identify atoms, particles and molecules before exploring the three states of matter. Experiment with photosynthesis, an important chemical change. Then, explore the invisible world of Atoms, Molecules and Elements. See how the atomic model is made up of electrons, protons and neutrons. Get comfortable with the periodic table by recognizing each element as part of a group. Finally, unlock the mysteries of Energy. Dissect mechanical energy by identifying the different points on a roller coaster as using kinetic or potential energy. Measure the speed of sound in a group experiment. Each concept is paired with hands-on activities and experiments. Aligned to the Next Generation Science Standards and written to Bloom's Taxonomy and STEAM initiatives, additional crossword, word search, comprehension quiz and answer key are also included.
The Father of the Atom Greenwood
This introduction to Atomic and Molecular Physics explains how our present model of atoms and molecules has been developed over the last two centuries both by many experimental discoveries and, from the theoretical side, by the introduction of quantum physics to the adequate description of micro-particles. It illustrates the wave model of particles by many examples and shows the limits of classical description. The interaction of electromagnetic radiation with atoms and molecules and its potential for spectroscopy is outlined in more detail and in particular lasers as modern spectroscopic tools are discussed more thoroughly. Many examples and problems with solutions are offered to encourage readers to actively engage in applying and adapting the fundamental physics presented in this textbook to specific situations. Completely revised third edition with new sections covering all actual developments, like photonics, ultrashort lasers, ultraprecise frequency combs, free electron lasers, cooling and trapping of atoms, quantum optics and quantum information.
Atomic Structure Theory Springer Science & Business Media
An introduction to nuclear physics through a definition of the atom and an analysis of its functions and behavior. Includes a biographical listing of major scientists who have contributed to the field of nuclear physics, as well as a glossary of terms.
The Basics of Chemistry John Wiley & Sons
Excerpt from The Survival These are days of astonishing progress in physical science. Every year almost can be credited with some notable advance of a momentous kind. The twentieth century was heralded by the discovery of the atomic nature of electricity, which, long suspected by a few, then became the common property of all those who were in the van of progress and were actively engaged in investigation, whether in the study or the laboratory. Not only was electricity proved to consist of small particles, whose size, weight and velocities could be definitely ascertained and measured, but it was found that the very atoms of matter were electrically composed; and the foundation was laid of the Electrical Theory of Matter. About the Publisher Forgotten Books publishes hundreds of thousands of rare and classic books. Find more at www.forgottenbooks.com This book is a reproduction of an important historical work. Forgotten Books uses state-of-the-art technology to digitally reconstruct the work, preserving the original format whilst repairing imperfections present in the aged copy. In rare cases, an imperfection in the original, such as a blemish or missing page, may be replicated in our edition. We do, however, repair the vast majority of imperfections successfully; any imperfections that remain are intentionally left to preserve the state of such historical works.
The Nature of Matter Big Book Gr. 5-8 Springer
Originally published as part of the renowned Bergmann-Schaefer textbook series on experimental physics, this volume fills an important void by providing a thorough treatment of the basic: atoms, molecules, nuclei, and particles. Written by experimentalists, it forms a unique compendium of our practical knowledge of the basic elements While keeping all of the rigor necessary for a clean treatment, the authors go beyond theory and describe major experimental results that give readers a clear view of the practical side of nature.
Atomic Structure of Matter-space Taylor & Francis
Quantifying Matter, Revised Edition explains how scientists learned to measure matter and quantify some of its most fascinating and useful properties. It presents many of the most important intellectual achievements and technical developments that led to the scientific interpretation of substance, starting with the cosmic origin of the elements. Complete with full-color photographs, this newly updated reference describes the fundamental characteristics and properties of matter. Quantifying Matter, Revised Edition is designed to help any student or teacher with an interest in the measurement and behavior of matter discover what matter is, how scientists measure and characterize its various forms, and how the properties of matter have influenced the course of human civilization. Chapters include: Exploring the Nature of Matter The Origin of Matter The Search for Substance Quantifying Matter During the Scientific Revolution Understanding Matter's Electromagnetic Properties Periodic Table of the Elements Discovering the Radioactive Nature of Matter Exploring the Atomic Nucleus Contemporary View of Matter Manipulating Matter Atom by Atom.
Atoms, Molecules and Photons World Scientific
This book traces the history of ideas about the nature of matter and also the way that mankind has used material resources that the world offers. Starting with the ideas of ancient civilizations that air, earth, fire and water were the basic ingredients of all matter, it traces the development of the science of chemistry beginning within the ranks of the alchemists. First, the idea of elements grew and then the atomic nature of matter was verified. Physicists had entered the scene, showing the nature of atoms in terms of fundamental particles and then introducing the concept of wave-particle duality that altered the basic concepts of what matter was. Finally the physicists discovered a panoply of fundamental particles, some observed within atom-smashing machines and the existence of others merely postulated.In parallel with the above there is a description of various kinds of matter as it affects everyday life ? including the nature of matter associated with life itself. The way

that early man used the materials directly given by nature, such as stone, wood and animal skins, is followed by the use of materials requiring some process to be employed ? e.g. metals which include bronze and also concrete. Some important modern materials are discussed, such as synthetic fibres and plastics and semiconductors, and potentially important future products from new developments in nanotechnology.

Constituents of Matter Cambridge University Press

This reference book contains information about the structure and properties of atomic and molecular particles, as well as some of the nuclear parameters. It includes data which can be of use when studying atomic and molecular processes in the physics of gases, chemistry of gases and gas optics, in plasma physics and plasma chemistry, in physical chemistry and radiation chemistry, in geophysics, astrophysics, solid-state physics and a variety of cross-discipli nary fields of science and technology. Our aim was to collect carefully selected and estimated numerical values for a wide circle of microscopic parameters in a relatively "not thick" book. These values are of constant use in the work of practical investigators. In essence, the book represents a substantially revised and extended edi tion of our reference book published in Russian in 1980. Two main reasons made it necessary to rework the material. On the one hand, a great deal of new high-quality data has appeared in the past few years and furthermore we have enlisted many sources of information previously inaccessible to us. On the other hand, we have tried to insert extensive information on new, rapidly progressing branches of physical research, such as multiply charged ions, Rydberg atoms, van der Waals and excimer molecules, complex ions, etc. All this brings us to the very edge of studies being carried out in the field.

Nuclear Physics Discovery Publishing House

In this captivating classroom supplement, students examine atoms, the building blocks of nature! Topics covered include matter, atomic structure, electrons, Mendeleyev, the periodic table, elements, compounds, solutions, mixtures, and more! Information is presented in fascinating passages and reinforced with a variety of activities. A complete answer key is also included. Mark Twain Media Publishing Company specializes in providing captivating, supplemental books and decorative resources to complement middle- and upper-grade classrooms. Designed by leading educators, the product line covers a range of subjects including mathematics, sciences, language arts, social studies, history, government, fine arts, and character. Mark Twain Media also provides innovative classroom solutions for bulletin boards and interactive whiteboards. Since 1977, Mark Twain Media has remained a reliable source for a wide variety of engaging classroom resources.

The Nature of the Atom Infobase Holdings, Inc

In the present book those results of physical research which are of importance for an understanding of nature have been compiled in a short and, in so far as the author was capable, popular presentation. The whole can be arranged in four sections. The first section concerns bodies as they appear to us and as we perceive them directly by means of our eyes. By further research we have learnt that these bodies are built out of very small particles which we call atoms. Even though these atoms cannot be seen directly with the eye, yet we still have quite certain proofs of their existence and of many of their properties. The whole of our knowledge concerning the atomic structure of matter has been discussed in the second section. The work of the last few decades has allowed us to penetrate still further into the inner structure of matter. The structure of the atom itself is examined in the third section. Finally, there exists a whole series of phenomena, which have been explained on the assumption that, in addition to ponderable matters, there is something still else which fills all interstellar space, a medium which is called the aether. The phenomena which take place in this medium are discussed in the last section of the book.

The Atomic Theory Routledge

One way to understand the world is by looking at its most basic building blocks. All the substances in the world are made up of atoms, which interact with each other by exchanging or sharing electrons. All atoms can be organized into the periodic table of elements, which groups atoms by their chemical properties. Deep within the atom lies the nucleus, which itself contains the elementary particles called quarks. By building powerful particle accelerators and enormous detectors, physicists are able to probe the most fundamental constituents of matter. Filled with full-color photographs and illustrations and bolstered by its readable text and helpful references, The Nature of Matter, Third Edition is a compelling guide that identifies the essential qualities and characteristics by which matter is recognized.

Materials, Matter & Particles Springer Science & Business Media

Contents: Fundamental Particles, Rutherford s Nuclear Atom, X-Rays and Atomic Number, Electromagnetic Radiation, Quantum Nature of Radiation, Failure of Rutherford s Atomic Model, The Bohr Theory of the Atom, Wave-Mechanical Picture of the Atom, The Uncertainty Principle, The Wave Equation, Application of Wave Mechanics, The Wave Equation for the Hydrogen Atom, Quantum Numbers, The Radial and Angular Wave Functions, Atomic Orbitals, Many-Electron Atoms, Electronic Configuration of Elements.

THE ATOM AND THE BOHR THEORY OF ITS STRUCTURE AN ELEMENTARY PRESENTATION HELGE HOLST Oxford University Press, USA

"A biography of ancient Greek philosopher Democritus, who believed that all matter was made up of indivisible and indestructible particles called atoms moving around in a void"--Provided by publisher.

Revival: Modern Physics (1930) BEYOND BOOKS HUB

Niels Bohr (1885-1962) was a Danish physicist who played a key role in the development of atomic theory and quantum mechanics, he was awarded the Nobel Prize for Physics in 1922. Originally written for various journals during the 1920s, these articles investigate the epistemological significance of discoveries in quantum physics.