Astrophysics is the physics of the stars and, more widely, the Universe. It explores the structure and evolution of planetary systems, stars, galaxies, interstellar gas, and the cosmos as a whole. The field has expanded rapidly in the past century, with vast quantities of data gathered by telescopes exploiting the full electromagnetic spectrum, combined with the rapid advance of computing power, allowing increasingly effective mathematical modelling. Astrophysics: A Very Short Introduction illustrates how the application of fundamental principles of physics—the consideration of energy and mass, and momentum—along with relativity and quantum mechanics, has provided insights into phenomena ranging from supernovae and accretion discs to pulsars and spiral galaxies.

Black holes are a constant source of fascination to many due to their mysterious nature. Black Holes: A Very Short Introduction addresses a variety of questions, including what a black hole actually is, how they are characterized and discovered, and what would happen if you came too close to one. It explains how black holes form and grow—by stealing material that belongs to stars—as well as how many there may be in the Universe. It also explores the large black holes found in the centres of galaxies, and how black holes power quasars and lie behind other spectacular phenomena in the cosmos.

Niels Bohr: A Very Short Introduction

Niels Bohr: A Very Short Introduction

J. L. Heilbron
Niels Bohr: A Very Short Introduction covers the life and work of the pioneer of the quantum theory of the atom who ranks with Einstein in importance for the development of modern physics. In addition to his role as a scientist, Bohr was a statesman and Danish cultural icon, who built scientific institutions and pushed for the extension of international cooperation to all nation states. He also had deep interests in philosophy, literature, and humanism. This VSI considers how all of these aspects of Bohr’s personality influenced his ground-breaking work.

Chaos: A Very Short Introduction
Leonard Smith

Chaos: A Very Short Introduction shows that we all have an intuitive understanding of chaotic systems. It uses accessible maths and physics (replacing complex equations with simple examples like pendulums, railway lines, and tossing coins) to explain the theory, and points to numerous examples in philosophy and literature (Edgar Allen Poe, Chang-Tzu, and Arthur Conan Doyle) that illuminate the problems. The beauty of fractal patterns and their relation to chaos, as well as the history of chaos, and its uses in the real world and implications for the philosophy of science are all discussed in this Very Short Introduction.

Copernicus: A Very Short Introduction
Owen Gingerich

Nicolaus Copernicus (1473–1543) was the astronomer whose shocking vision of a sun-centered universe turned out to be the essential blueprint for a physical understanding of celestial motions. Copernicus: A Very Short Introduction offers a fascinating portrayal of the man who launched the modern vision of the universe. It sets Copernicus in the context of a rapidly changing world, where the recent invention of printing with movable type not only made sources more readily available to him, but also fueled Martin Luther’s transformation of the religious landscape. Copernicus’s heliocentric revolution is revealed as an aesthetic achievement not dictated by observational “proofs,” but another new way of looking at the ancient cosmos.

Cosmology: A Very Short Introduction
Peter Coles

Cosmology: A Very Short Introduction
Cosmology: A Very Short Introduction explains what cosmology is and what cosmologists do, looks at the history of the subject, the development of the Big Bang theory, and more speculative modern issues such as quantum cosmology, superstrings, and dark matter. The subject matter of cosmology is everything that exists. The whole system of things that is the Universe encompasses the very large and the very small, the astronomical scale of stars and galaxies and the microscopic world of elementary particles. Between the two lives a complex hierarchy of structure and pattern that comes from the interplay of forces and matter. The aim of cosmology is to place all known physical phenomena within a single coherent framework.

Galaxies: A Very Short Introduction
John Gribbin

Galaxies: A Very Short Introduction explores the building blocks of the Universe. Standing like islands in space, each is made up of many hundreds of millions of stars in which the chemical elements are made, around which planets form, and where on at least one of those planets intelligent life has emerged. Our own galaxy, the Milky Way, is just one of several hundred million other galaxies. Yet it was only in the 1920s that we realised that there is more to the Universe. Since then, many exciting discoveries have been made about our own galaxy and about those beyond.

Gravity: A Very Short Introduction
Timothy Clifton

Gravity is one of the four fundamental interactions that exist in nature and is essential for understanding the behaviour of the Universe, and all astrophysical bodies within it. Yet it remains puzzling. Gravity: A Very Short Introduction looks at the development of our understanding of gravity since the early observations of Kepler, Newtonian theory, and Einstein’s theory of gravity. It also discusses the recent detection of waves of gravitational radiation that were predicted by Einstein. This VSI concludes by considering the testing and application of General Relativity in astrophysics and cosmology, and looks at dark energy and efforts such as string theory to combine gravity with quantum mechanics.

The History of Astronomy: A Very Short Introduction
Michael Hoskin

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date: 27 January 2020
The History of Astronomy: A Very Short Introduction traces the history of Western astronomy, from prehistoric times to the origins of astrophysics in the mid-nineteenth century and the technical developments since the Second World War. Astronomy, perhaps the first of the sciences, was already well developed by the time of Christ — the arithmetical astronomy of the Babylonians was merged with the Greek geometrical approach. This legacy was transmitted to the West via Islam and led to the Copernican revolution, which in turn led to Kepler and Newton, who provided the principles on which the exploration of the solar system and the stars continued in the eighteenth- and nineteenth centuries.

The History of Physics: A Very Short Introduction
J. L. Heilbron
Print Publication Year: 2018 Published Online: Jan 2018
Publisher: Oxford University Press
DOI: 10.1093/actrade/9780199684120.001.0001
Item type: book

How does today’s physics—highly professionalized; inextricably linked to government and industry—link back to its origins as a liberal art in ancient Greece? The History of Physics: A Very Short Introduction tells the 2,500-year story, exploring the changing place and purpose of physics in different cultures; highlighting the implications for humankind’s self-understanding. It introduces Islamic astronomers and mathematicians calculating the Earth’s size; medieval scholar-theologians investigating light; Galileo, Copernicus, Kepler, and Newton, measuring, and trying to explain, the universe. It visits: the House of Wisdom in 9th-century Baghdad; Europe’s first universities; the courts of the Renaissance; the Scientific Revolution and 18th-century academies; and the increasingly specialized world of 20th/21st-century science.

Light: A Very Short Introduction
Ian A. Walmsley
Print Publication Year: 2015 Published Online: Sep 2015
Publisher: Oxford University Press
DOI: 10.1093/actrade/9780199682690.001.0001
Item type: book

Light enables us to see the world around us, and this sensation of vision has led to a fascination with the nature and properties of light. Light: A Very Short Introduction discusses early attempts to explain light; the opposing particulate and wave theories by scientists such as Isaac Newton and Christiaan Huygens; how light was recognized as an electromagnetic wave in the 19th century; and the 20th-century development of the quantum mechanics view of wave–particle duality. It also describes the many applications of light—domestic and scientific—including microwaves, DVDs, and lasers. It concludes by considering some of the most exciting new developments using quantum light sources in communications and computing.
Magnetism: A Very Short Introduction
Stephen J. Blundell

Magnetism: A Very Short Introduction explains the mysteries and importance of magnetism. For centuries magnetism has been used for various exploits: as a great healer, a navigation aid through compasses, and through motors, generators, and turbines it has given us power. Our understanding of electricity and magnetism, from the work of Galvani, Ampère, Faraday, and Tesla is explored, and how Maxwell and Faraday's work led to the unification of electricity and magnetism is explained. With a discussion of the relationship between magnetism and relativity, quantum magnetism, and its impact on computers and information storage, how magnetism has changed our fundamental understanding of the Universe is shown.

Matter: A Very Short Introduction
Geoff Cottrell

Matter: A Very Short Introduction explains matter—the stuff of which your body and the universe is made—from elementary particles, to atoms, humans, planets, up to the superclusters of galaxies. Familiar solids, liquids, and gases are described, as well as plasmas, exotic forms of quantum matter, and antimatter. This VSI outlines the quantum properties of atoms, the fundamental forces of nature, and how the different forms of matter arise. The origins of matter are traced to the Big Bang, 13.8 billion years ago. However, all the familiar normal matter constitutes only 5% of the matter that exists. The remainder comes in two mysterious forms: dark matter and dark energy, which are discussed.

Measurement: A Very Short Introduction
David J. Hand

Measurement is a fundamental concept central to the sciences, social sciences, medicine, economics, government, and indeed also to everyday life. The history of measurement goes back to the ancient world. Its story has been one of gradual standardization, although different types of measurement, levels of accuracy, and systems of units, apply in different contexts. Measurement: A Very Short Introduction explains the common mathematical framework underlying all measurement, the main approaches to measurement, and the challenges involved. Following a brief historical account of measurement, it discusses
measurement as used in the physical sciences and engineering, the life sciences and medicine, the social and behavioural sciences, economics, business, and public policy.

**Moons: A Very Short Introduction**

David A. Rothery

Print Publication Year: 2015 Published Online: Dec 2015  
Publisher: Oxford University Press  
DOI: 10.1093/actrade/9780198735274.001.0001  
Item type: book

Moons: A Very Short Introduction introduces the reader to the varied and fascinating moons of our Solar System. Beginning with the early discoveries of Galileo and others, it describes their variety of mostly mythological names, and the early use of Jupiter’s moons to establish position at sea and to estimate the speed of light. It discusses the structure, formation, and profound influence of our Moon, those of the other planets, and ends with the recent discovery of moons orbiting asteroids, whilst looking forward to the possibility of discovering microbial life beyond Earth and of finding moons of exoplanets in planetary systems far beyond our own.

**Nothing: A Very Short Introduction**

Frank Close

Print Publication Year: 2009 Published Online: Sep 2013  
Publisher: Oxford University Press  
DOI: 10.1093/actrade/9780199225866.001.0001  
Item type: book

Nothing: A Very Short Introduction explores the science and history of the elusive Void: from Aristotle, who insisted that the vacuum was impossible, via the theories of Newton and Einstein, to the very latest discoveries and why they can tell us extraordinary things about the cosmos. This VSI tells the story of how scientists have explored the Void and the discoveries that they have made there. It describes how they discovered that the vacuum is filled with fields and how it may contain hidden dimensions of which we were previously unaware. These new discoveries may provide answers to some of cosmology's most fundamental questions.

**Nuclear Physics: A Very Short Introduction**

Frank Close

Print Publication Year: 2015 Published Online: Jul 2015  
Publisher: Oxford University Press  
DOI: 10.1093/actrade/9780198718635.001.0001  
Item type: book

Nuclear Physics: A Very Short Introduction gives an account of how this area of physics has progressed since the discovery of the electron at the end of the 19th century, which implied that the atom was not fundamental and had a more complex structure. It includes the recognition of how heavy nuclei are built up in the cores of stars and in supernovae, the identification of quarks and gluons, and the development of quantum chromodynamics.
Exploring key concepts such as the stability of different configurations of protons and neutrons in nuclei, it shows how nuclear physics brings the physics of the stars to Earth and provides us with important applications, particularly in medicine.

Particle Physics: A Very Short Introduction
Frank Close

Particle Physics: A Very Short Introduction takes us on a journey into the atom to examine known particles such as quarks, electrons, and the ghostly neutrino. Along the way this VSI provides fascinating insights into how discoveries in particle physics have actually been made, and discusses how our picture of the world has been radically revised in the light of these developments. The VSI concludes by looking ahead to new ideas about the mystery of antimatter, the number of dimensions that there might be in the universe, and to what the next 50 years of research might reveal.

Physics: A Very Short Introduction
Sidney Perkowitz

Physics, the fundamental science of matter and energy, encompasses all levels of nature from the sub-atomic to the cosmic, and underlies much of the technology around us. Physics: A Very Short Introduction provides an overview of how this pervasive science came to be and how it works. It presents the theories and outcomes of pure and applied physics from ideas of the Greek natural philosophers to modern quantum mechanics, cosmology, digital electronics, and energy production. Considering its most consequential experiments, including recent results in elementary particles, gravitational waves, and materials science, it also discusses the effects of physics on society, culture, and humanity’s vision of its place in the universe.

Planets: A Very Short Introduction
David A. Rothery

Planets: A Very Short Introduction demonstrates the excitement, uncertainties, and challenges faced by planetary scientists, and provides an overview of our Solar System and its origins, nature, and evolution. Terrestrial planets, giant planets, dwarf planets and various other objects such as satellites (moons), asteroids, trans-Neptunian objects, and
exoplanets are discussed. Our knowledge about planets has advanced over the centuries, and has expanded at a rapidly growing rate in recent years. Controversial issues are outlined, such as What qualifies as a planet? What conditions are required for a planetary body to be potentially inhabited by life? Why does Pluto no longer have planet status? And Is there life on other planets?