

Cosmic Impact

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MOSHE DOYLE

Extremely Energetic Cosmic Neutrinos and Their Impact on Particle Physics and Cosmology Springer

Looks at asteroids, comets and meteorites, including what they are, how they are formed, how they have affected the history of Earth, and definitions of related terms.

Planetary Defense Oxford University Press

The authors discuss such topics as "impacts with asteroids, the greenhouse effect, nuclear winter, fringe catastrophism, supernovae and an assessment of risks." (New Scientist).

Impact! Springer Nature

Examines the relationship between Earth and the rest of the universe, and how phenomena in outer space affect Earth's weather systems and plant and animal life.

Evaluating the Biological Potential in Samples Returned from Planetary Satellites and Small Solar System Bodies World Scientific

This book explores the ponderomotive wave forces of space plasma, which have implications for a large number of cosmic plasma phenomena. Plasma is a state of matter comprising an equal amount of negative (electrons) and positive (ions) charged particles. The ionized state is the dominating state of matter in the cosmos for stars, galaxies and their corresponding intermediate regions. This book discusses the plasma state and its corresponding theoretical implications based on the analysis of space plasma data. The theory of ponderomotive forcing offers a most important tool for the analysis of "in situ" plasma data of acceleration processes in the terrestrial and Martian plasma environment. In addition, the solar wind interaction with objects in the solar system also provides a roadmap for the analysis and interpretations of other stellar and galactic objects, out of reach for direct "in-situ" measurements.

The Cosmic Connection Springer Science & Business Media

For the first time, scientists could have the knowledge to prevent a natural disaster epic in scale—an asteroid hitting the earth and in this exciting, adventuresome book, Carrie Nugent explains how. What are asteroids, and where do they come from? And, most urgently: Are they going to hit the Earth? What would happen if one was on its way? Carrie Nugent is an asteroid hunter—part of a group of scientists working to map our cosmic neighborhood. For the first time ever, we are reaching the point where we may be able to prevent the horrible natural disaster that would result from an asteroid collision. In *Asteroid Hunters*, Nugent reveals what known impact asteroids have had: the extinction of the dinosaurs, the earth-sized hole Shoemaker Levy 9 left in Jupiter just a few decades ago, how the meteorite that

burst over Chelyabinsk in Russia could have started a war, and unlucky Ms. Anne Hodges—the only person (that we know of) in US history to be the victim of a direct hit. Nugent also introduces the telescope she uses to detect near-Earth asteroids. Ultimately, detection is the key to preventing asteroid impact, and these specialized scientists are working to prevent the unthinkable from happening. If successful, asteroid hunting will lead to the first natural disaster humans have the know-how and the technology to prevent. The successful hunt and mapping of asteroids could mean nothing less than saving life on earth.

Cosmic Dust, Its Impact on Astronomy Infobase Publishing
 Cory Doctorow's *Attack Surface* is a standalone novel set in the world of New York Times bestsellers *Little Brother* and *Homeland*. Most days, Masha Maximow was sure she'd chosen the winning side. In her day job as a counterterrorism wizard for an transnational cybersecurity firm, she made the hacks that allowed repressive regimes to spy on dissidents, and manipulate their every move. The perks were fantastic, and the pay was obscene. Just for fun, and to piss off her masters, Masha sometimes used her mad skills to help those same troublemakers evade detection, if their cause was just. It was a dangerous game and a hell of a rush. But seriously self-destructive. And unsustainable. When her targets were strangers in faraway police states, it was easy to compartmentalize, to ignore the collateral damage of murder, rape, and torture. But when it hits close to home, and the hacks and exploits she's devised are directed at her friends and family—including boy wonder Marcus Yellow, her old crush and archrival, and his entourage of naïve idealists—Masha realizes she has to choose. And whatever choice she makes, someone is going to get hurt. At the Publisher's request, this title is being sold without Digital Rights Management Software (DRM) applied.

Current Topics in Astrofundamental Physics: The Cosmic Microwave Background Springer

The galactic cosmic-ray spectrum extends over 14 orders of magnitudes in energy and about 12 orders of magnitude in intensity, and it can be studied using two different methods: via the "direct detection" of the primary cosmic rays in space or at high altitude and via the "indirect detection" of secondary particles, namely the extensive air showers produced by a primary cosmic-ray particle impinging the atmosphere. In this Special Issue, both direct and indirect measurements are presented via from various experiments. Emphasis is placed on low-energy electrons and protons that are detected in flight as well as during geomagnetic storms. As for indirect detection, the muon flux determination and modulation at ground level are described in great detail. Some of the most interesting results are hereby presented, and a couple of new techniques in cosmic-ray detection are reported.

Fluorescent Nanodiamonds Icon Books

Examines how solar and terrestrial space phenomena affect sophisticated technological systems Contemporary society relies on sophisticated technologies to manage electricity distribution, communication networks, transportation safety, and myriad other systems. The successful design and operation of both ground-based and space-based systems must consider solar and terrestrial space phenomena and processes. *Space Weather Effects and Applications* describes the effects of space weather on various present-day technologies and explores how improved instrumentation to measure Earth's space environment can be used to more accurately forecast changes and disruptions. Volume highlights include: Damage and disruption to orbiting satellite equipment by solar particles and cosmic rays Effects of space radiation on aircraft at high altitudes and latitudes Response of radio and radar-based systems to solar bursts Disturbances to the propagation of radio waves caused by space weather How geomagnetic field changes impact ground-based systems such as pipelines Impacts of human exposure to the space radiation environment The American Geophysical Union promotes discovery in Earth and space science for the benefit of humanity. Its publications disseminate scientific knowledge and provide resources for researchers, students, and professionals. Find out more about the Space Physics and Aeronomy collection in this Q&A with the Editors in Chief

The Asteroid Threat Scribner

In the year 2015, 100 years after Fred Hoyle was born, the ideas relating to the cosmic origins of life are slowly gaining credence in scientific circles. Once regarded as outrageous heresy, evidence from a variety of disciplines — astronomy, geology, biology — is converging to support these once heretical ideas. This volume opens with recent review articles pointing incontrovertibly towards our cosmic heritage, followed by a collection of published articles tracing the development of the theory throughout the years. The discovery that microorganisms — bacteria and viruses — are incredibly resistant to the harshest conditions of space, along with the detection of an estimated 144 billion habitable planets around other star systems in our galaxy alone, makes it virtually impossible to maintain that life on one planet will not interact with life elsewhere. The emerging position is that life arose exceedingly rarely, possibly only once, in the history of the cosmos, but its subsequent spread was unstoppable. "Panspermiology" can no longer be described as an eccentric doctrine, but rather is the only doctrine supported by an overwhelming body of evidence. Fred Hoyle's work in this area may in the fullness of time come to be regarded as his most important scientific contribution. Contents:Recent ReviewsPapers from 2000–2014Papers from 1990–2000Papers from

1980-1990Papers from 1970-1980Prospects for the Future Readership: University students, researchers and historian of science interested in astrobiology or the work of Sir Fred Hoyle. Key Features:Compiled by the foremost proponent of the theory of panspermiaTraces the history of development of the idea of cometary panspermia from the time of its first proposal in 1979 to the present timeKeywords:Cosmic Theory of Life;Origin of Life;Fred Hoyle;Panspermia;Comets;Interstellar Dust;Evolution *Habitability and Cosmic Catastrophes* McGraw-Hill Companies The genesis of modern searches for observable meteoritic phenomena on the Moon is the paper by Lincoln La Paz in Popular Astronomy magazine in 1938. In it he argued that the absence of observed fashes of meteoritic impacts on the Moon might be interpreted to mean that these bodies are destroyed as luminous meteors in an extremely rarefied lunar atmosphere. The paper suggested the possibility of systematic searches for such possible lunar meteors. With these concepts in mind, I was surprised to note a transient moving bright speck on the Moon on July 10, 1941. It appeared to behave very much as a lunar meteor would - except that the poorly estimated duration would lead to a strongly hyperbolic heliocentric velocity. Thus, the idea of systematic searches for both possible lunar meteors and meteoritic impact fashes was born. It was appreciated that much time might need to be expended to achieve any positive results. Systematic searches were carried out by others and myself chiefly in the years 1945-1965 and became a regular program at the newly founded Association of Lunar and Planetary Observers, or ALPO.

Expanding Worldviews: Astrobiology, Big History and Cosmic Perspectives Cambridge University Press

This book collates papers presented at two international conferences (held at the Australian National University in 2018 and Birkbeck College London in 2019) exploring the relationships between big history and astrobiology and their wider implications for society. These two relatively new academic disciplines aim to integrate human history with the wider history of the universe and the search for life elsewhere. The book will show that, despite differences in emphasis, big history and astrobiology share much in common, especially their interdisciplinary approaches and the cosmic and evolutionary perspectives that they both engender. Specifically, the book addresses the unified, all-embracing, nature of knowledge, the impact of big history on humanity and the world at large, the possible impact of SETI on astrobiology and big history, the cultural signature of Earth's inhabitants beyond our own planet, and the political implications of a planetary worldview. The principal readership is envisaged to comprise scholars working in the fields of astrobiology, big history and space exploration interested in forging interdisciplinary links between these diverse topics, together with educators, and a wider public, interested in the societal implications of the cosmic and evolutionary perspectives engendered by research in these fields.

Astrobiology Springer Science & Business Media

Good, No Highlights, No Markup, all pages are intact, Slight Shelfwear, may have the corners slightly dented, may have slight color changes/slightly damaged spine.

Research on Cosmic Rays and Their Impact on Human Activities HarperCollins

Most scientists now agree that some sixty-five million years ago, an immense comet slammed into the Yucatan, detonating a blast twenty million times more powerful than the largest hydrogen bomb, punching a hole ten miles deep in the earth. Trillions of tons of rock were vaporized and launched into the atmosphere. For a thousand miles in all directions, vegetation burst into flames. There were tremendous blast waves, searing winds, showers of molten matter from the sky, earthquakes, and a terrible darkness that cut out sunlight for a year, enveloping the planet in freezing cold. Thousands of species of plants and animals were obliterated, including the dinosaurs, some of which may have become extinct in a matter of hours. In *Impact*, Gerrit L. Verschuur offers an eye-opening look at such catastrophic collisions with our planet. Perhaps more important, he paints an unsettling portrait of the possibility of new collisions with earth, exploring potential threats to our planet and describing what scientists are doing right now to prepare for this awful possibility. Every day something from space hits our planet, Verschuur reveals. In fact, about 10,000 tons of space debris fall to earth every year, mostly in meteoric form. The author recounts spectacular recent sightings, such as over Allende, Mexico, in 1969, when a fireball showered the region with four tons of fragments, and the twenty-six pound meteor that went through the trunk of a red Chevy Malibu in Peekskill, New York, in 1992 (the meteor was subsequently sold for \$69,000 and the car itself fetched \$10,000). But meteors are not the greatest threat to life on earth, the author points out. The major threats are asteroids and comets. The reader discovers that astronomers have located

some 350 NEAs ("Near Earth Asteroids"), objects whose orbits cross the orbit of the earth, the largest of which are 1627 Ivar (6 kilometers wide) and 1580 Betula (8 kilometers). Indeed, we learn that in 1989, a bus-sized asteroid called *Aclepius* missed our planet by 650,000 kilometers (a mere six hours), and that in 1994 a sixty-foot object passed within 180,000 kilometers, half the distance to the moon. Comets, of course, are even more deadly. Verschuur provides a gripping description of the small comet that exploded in the atmosphere above the Tunguska River valley in Siberia, in 1908, in a blinding flash visible for several thousand miles (every tree within sixty miles of ground zero was flattened). He discusses Comet Swift-Tuttle--"the most dangerous object in the solar system"--a comet far larger than the one that killed off the dinosaurs, due to pass through earth's orbit in the year 2126. And he recounts the collision of Comet Shoemaker-Levy 9 with Jupiter in 1994, as some twenty cometary fragments struck the giant planet over the course of several days, casting titanic plumes out into space (when Fragment G hit, it outshone the planet on the infrared band, and left a dark area at the impact site larger than the Great Red Spot). In addition, the author describes the efforts of Spacewatch and other groups to locate NEAs, and evaluates the idea that comet and asteroid impacts have been an underrated factor in the evolution of life on earth. Astronomer Herbert Howe observed in 1897: "While there are not definite data to reason from, it is believed that an encounter with the nucleus of one of the largest comets is not to be desired." As Verschuur shows in *Impact*, we now have substantial data with which to support Howe's tongue-in-cheek remark. Whether discussing monumental tsunamis or the innumerable comets in the Solar System, this book will enthrall anyone curious about outer space, remarkable natural phenomenon, or the future of the planet earth.

Vindication of Cosmic Biology John Wiley & Sons Incorporated Cosmic collisions have forever shaped the planets in our solar system, sculpting Earth and our Moon. They are still happening right in our neighborhood, as we saw in July 1994 when comet fragments bombarded the surface of Jupiter. What if a collision of that magnitude were to occur on Earth? Would the effect be anywhere near that of the collision that wiped out the dinosaurs 65 million years ago? Scientists have just begun to track distant asteroids and comets that may pose a threat to Earth in years to come. In *Scientific American Focus: Cosmic Collisions* Dana Desonie traces the history of cosmic collisions and proposes various solutions to what many view as our impending doom, answering these questions and more: -How often does Earth experience a cosmic collision? -Did a massive collision kill off the dinosaurs? -How do scientists track and predict collisions? -What did we learn from the Jupiter collision of 1994? -How real is the threat of a collision in our future? -How can we defend our planet?

Assessment and Mitigation of Asteroid Impact Hazards

Mdpi AG

Presents a realistic, workable plan for defusing a potentially lethal threat from a rogue asteroid or comet. The explosion of a large meteor over Chelyabinsk, Siberia, in February 2013 is just the latest reminder that planet Earth is vulnerable to damaging and potentially catastrophic collisions with space debris of various kinds. In this informative and forward-looking book, veteran aerospace writer William E. Burrows explains what we can do in the future to avoid far more serious impacts from "Near-Earth Objects" (NEOs), as they are called in the planetary defense community. The good news is that humanity is now equipped with the advanced technology necessary to devise a long-term strategy to protect the planet. Burrows outlines the following key features of an effective planetary defense strategy: * A powerful space surveillance system capable of spotting a serious threat from space at least twenty-five years in advance * A space craft "nudge" that would throw a collision-course asteroid off target long before it poses the threat of imminent impact * A weapons system to be used as a last-ditch method to blast an NEO should all else fail. The author notes the many benefits for world stability and increasing international cooperation resulting from a united worldwide effort to protect the planet. Combining realism with an optimistic can-do attitude, Burrows shows that humanity is capable of overcoming a potentially calamitous situation. *Space Physics and Aeronomy, Space Weather Effects and Applications* Simon and Schuster

For the first time since the Apollo program, NASA and space agencies abroad have plans to bring samples to Earth from elsewhere in the solar system. There are missions in various stages of definition to gather material over the next decade from Mars, an asteroid, comets, the satellites of Jupiter, and the interplanetary dust. Some of these targets, most especially Jupiter's satellites Europa and Ganymede, now appear to have the potential for harboring living organisms. This book considers the possibility that life may have originated or existed on a body from which a sample might be taken and the possibility that life still exists on the body either in active form or in a form that could be

reactivated. It also addresses the potential hazard to terrestrial ecosystems from extraterrestrial life if it exists in a returned sample. Released at the time of the International Committee on Space Research General Assembly, the book has already established the basis for plans for small body sample retruns in the international space research community.

Rogue Asteroids and Doomsday Comets Springer Science & Business Media

This book follows the evolutionary trail all the way from the Big Bang 13.7 billion years ago to conscious life today. It is an accessible introductory book written for the interested layperson - anyone interested in the 'big picture' coming from modern science. It covers a wide range of topics including the origin and evolution of our universe, the nature and origin of life, the evolution of life including questions of birth and death, the evolution of cognition, the nature of consciousness, the possibility of extraterrestrial life and the future of the universe. The book is written in a narrative style, as these topics are all parts of a single story. It concludes with a discussion on the nature and future of science.

The Cosmic Cancer Springer Science & Business Media

The search for life in the universe is one of the most challenging topics of science. It is not a modern topic at all, since more than 100 years ago, it was speculated that on the Moon, there are oceans and seas; on Venus, there are swamps and also Mars is inhabited. However, now we have the scientific background and the scientific tools to answer this question and it is also certain that the answer would have deep implications for our culture, philosophy, and religions. If we find that life has developed on other planets or satellites of giant planets, then this would be the final breakdown of our central position in the universe. But is life a widespread phenomenon? How vulnerable is it to changing conditions and even catastrophic events? These topics will be discussed in this book. If life is in the extreme case a unique phenomenon found only on planet Earth, which seems to be highly unrealistic, then also it is important to discuss how it is adaptable to changing external conditions. Can we survive a cosmic catastrophe? How do these catastrophes change habitability? Which forms of life are more vulnerable? It was mentioned that now science has made great progress to answer such questions. Let us give some examples. In modern biology, in connection with organic chemistry, the origin of life is studied.

Impact Prometheus Books

This volume is a compilation of the research presented at the International Asteroid Day workshop which was celebrated at Barcelona on June 30th, 2015. The proceedings discuss the beginning of a new era in the study and exploration of the solar system's minor bodies. International Asteroid Day commemorates the Tunguska event of June 30th, 1908. The workshop's goal was to promote the importance of dealing proactively with impact hazards from space. Multidisciplinary experts contributed to this discussion by describing the nature of comets and asteroids along with their offspring, meteoroids. New missions to return material samples of asteroids back to Earth such as Osiris-REx and Hayabusa 2, as well as projects like AIM and DART which will test impact deflection techniques for Potentially Hazardous Asteroids encounters were also covered. The proceedings include both an outreach level to popularize impact hazards and a scientific character which covers the latest knowledge on these topics, as well as offering proposals of promising new techniques that will help gain new insights of the properties of these challenging bodies by studying meteoroids and meteorites. Asteroids, comets, meteoroids and meteorites are introduced with descriptions of their nature, origin, and solar system pathways.

Catastrophic Events Caused by Cosmic Objects Springer Science & Business Media

The book presents the fundamental physics underlying our increased understanding of the early universe, the cosmic microwave background, large scale structure formation, the dark matter problem, and the interplay between them, focusing on the cosmic microwave background. There is an emphasis on the mutual impact of fundamental physics and cosmology, both at theoretical and experimental / observational levels, within a deep and well defined programme that additionally provides a careful interdisciplinarity. Special sections cover fractals and scaling laws in astrophysics and cosmology, and high energy and neutrino astrophysics. The nature of the domain demands different approaches and points of view (either complementary or contradictory). Readers are provided with the basics of the different competitive lines of research, affording them an excellent opportunity to learn about the real state of the disciplines and increasing their critical awareness. Readership: Experimental and theoretical physicists, astrophysicists and astronomers from a variety of backgrounds. An excellent reference for the young postdoctoral scientist. Also useful for advanced undergraduate students and senior scientists.