Cosmic Rays And Particle Physics

Cosmic Rays and Particle Physics **The Physics of Cosmic X-ray, ?-ray, and Particle Sources Cosmic Rays and Particle Physics Proceedings of International Symposium on Cosmic Rays and Particle Physics** Cosmic Rays for Particle and Astroparticle Physics **Cosmic Rays at Earth** Cosmic Rays at Earth High Energy Cosmic Rays **Introduction to Particle and Astroparticle Physics The Particle Odyssey** The Particle Explosion **A Thin Cosmic Rain** *Physics of Nuclear Radiations* **Searching for Dark Matter with Cosmic Gamma Rays Accelerator X-Ray Sources Alpha-, Beta- and Gamma-Ray Spectroscopy Research on Particle Imaging Detectors** About Cosmic Rays Adverse Reproductive Outcomes in Families of Atomic Veterans **From Ultra Rays to Astroparticles** Problems and Solutions in Nuclear and Particle Physics **Ultra-high Energy Particle Astrophysics Astroparticle Physics The Interpretation of the Atom** Cosmic Rays *Cloud* **The Birth of Particle Physics Cosmic Rays in the Earth's Atmosphere and Underground** Particles and Astrophysics Physics and Astrophysics of Ultra High Energy Cosmic Rays *High Energy Cosmic Rays* The Tiger and the Shark **Particle and Astroparticle Physics Corpuscles and Radiation in Matter II / Korpuskeln und Strahlung in Materie II Detectors for Particle Radiation** Cosmic Bullets Techniques for Nuclear and Particle Physics Experiments **X-rays in Atomic and Nuclear Physics** *The Particle Hunters* **Advanced Concepts in Particle and Field Theory**

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Introduction to Particle and Astroparticle Physics Feb 24 2022 This book, written by researchers who had been professionals in accelerator physics before becoming leaders of groups in astroparticle physics, introduces both fields in a balanced and elementary way, requiring only a basic knowledge of quantum mechanics on the part of the reader. The early history of particle physics cannot be distinguished from the history of cosmic rays. With the advent of accelerators, however, the importance of cosmic rays in particle physics was lost. This situation persisted until the 1990s, when novel techniques allowed breakthrough discoveries, and exploration of new physics scales now requires returning to cosmic rays. The new profile of scientists in fundamental physics ideally involves the merging of knowledge in astroparticle and particle physics, but the duration of modern experiments is such that people cannot simultaneously be practitioners in both. Introduction to Particle and Astroparticle Physics is designed to bridge the gap between the fields. It can be used as a self-training book, a consultation book, or a textbook providing a "modern" approach to particles and fundamental interactions.
Problems and Solutions in Nuclear and Particle Physics Feb 12 2021 This book presents 140 problems with solutions in introductory nuclear and particle physics. Rather than being only partially provided or simply outlined, as is typically the case in textbooks on nuclear and particle physics, all solutions are explained in detail. Furthermore, different possible approaches are compared. Some of the problems concern the estimation of quantities in realistic experimental situations. In general, solving the problems does not require a substantial mathematics background, and the focus is instead on developing the reader's sense of physics in order to work out the problem in question. Consequently, sections on experimental methods and detection methods constitute a major part of the book. Given its format and content, it offers a valuable resource, not only for undergraduate classes but also for self-assessment in preparation for graduate school entrance and other examinations.
Ultra-high Energy Particle Astrophysics Jan 14 2021 Many kinds of radiation exist in the universe, including photons and particles with a wide range of energies. Some of the radiation is produced in stars and galaxies, and some is cosmological background radiation, a relic from the history of cosmic evolution. Among all this radiation, the most energetic are cosmic ray particles: nucleons, nuclei, and even extremely energetic gamma rays. There are some observational facts about cosmic rays to give suggestions on their origin. The most important one among them is that the energy spectrum of high energy cosmic rays above 10 GeV (where the magnetic field of the sun is no longer a concern) is well represented by a power law form. This indicates cosmic ray particles are products of non-thermal processes. Their energy extends over more than 13 decades from 107 eV up to 1020 eV. In terms of its structure, the spectrum can be divided into three regions: two 'knees' and one 'ankle'. The first 'knee' appears around 3×1015 eV where the spectral power law index changes from -2.7 to -3.0. The second 'knee' is somewhere between 1017 eV and 1018 eV where the spectral slope changes from -3.0 to around -3.3. The 'ankle' is seen at or after 3×1018 eV. Above that energy the spectral slope is around -2.7, but with a large uncertainty because of poor statistics and resolution. This book deals with the final and most energetic population, the Ultra High Energy Cosmic Rays (UHECRs).
Proceedings of International Symposium on Cosmic Rays and Particle Physics Aug 01 2022
Physics of Nuclear Radiations Oct 23 2021 Physics of Nuclear Radiations: Concepts, Techniques and Applications makes the physics of nuclear radiations accessible to students with a basic background in physics and mathematics. Rather than convince students one way or the other about the hazards of nuclear radiations, the text empowers them with tools to calculate and assess nuclear radiations and their impact. It discusses the meaning behind mathematical formulae as well as the areas in which the equations can be applied. After reviewing the physics preliminaries, the author addresses the growth and decay of nuclear radiations, the stability of nuclei or particles against radioactive transformations, and the behavior of heavy charged particles, electrons, photons, and neutrons. He then presents the nomenclature and physics reasoning of dosimetry, covers typical nuclear facilities (such as medical x-ray machines and particle accelerators), and describes the physics principles of diverse detectors. The book also discusses methods for measuring energy and time spectroscopies before concluding with applications in agriculture, medicine, industry, and art.
X-rays in Atomic and Nuclear Physics Aug 28 2019 Discusses the methods of X-ray production.
Accelerator X-Ray Sources Aug 21 2021 This first book to cover in-depth the generation of x-rays in particle accelerators focuses on electron beams produced by means of the novel Energy Recovery Linac (ERL) technology. The resulting highly brilliant x-rays are at the centre of this monograph, which continues where other books on the market stop. Written primarily for general, high energy and radiation physicists, the systematic treatment adopted by the work makes it equally suitable as an advanced textbook for young researchers.
Detectors for Particle Radiation Dec 01 2019 This textbook provides a clear, concise and comprehensive review of the physical principles behind the devices used to detect charged particles and gamma rays, and the construction and performance of these many different types of detectors. Detectors for high-energy particles and radiation are used in many areas of science, especially particle physics and nuclear physics experiments, nuclear medicine, cosmic ray measurements, space sciences and geological exploration. This second edition includes all the latest developments in detector technology, including several new chapters covering micro-strip gas chambers, silicion strip detectors and CCDs, scintillating fibers, shower detectors using noble liquid gases, and compensating calorimeters for hadronic showers. This well-illustrated textbook contains examples from the many areas in science in which these detectors are used. It provides both a coursebook for students in physics, and a useful introduction for researchers in other fields.
The Birth of Particle Physics Aug 09 2020 A distinctive collection of essays, discussions, and personal descriptions of the evolution of particle physics.
Searching for Dark Matter with Cosmic Gamma Rays Sep 21 2021 Searching for Dark Matter with Cosmic Gamma Rays summarizes the evidence for dark matter and what we can learn about its particle nature using cosmic gamma rays. It has almost been 100 years since Fritz Zwicky first detected hints that most of the matter in the Universe that doesn't directly emit or reflect light. Since then, the observational evidence for dark matter has continued to grow. Dark matter may be a new kind of particle that is governed by physics beyond our Standard Model of particle physics. In many models, dark matter annihilation or decay produces gamma rays. There are a variety of instruments observing the gamma-ray sky from tens of MeV to hundreds of TeV. Some make deep, focused observations of small regions, while others provide coverage of the entire sky. Each experiment offers complementary sensitivity to dark matter searches in a variety of target sizes, locations, and dark matter mass scales. We review results from recent gamma-ray experiments including anomalies some have attributed to dark matter. We also discuss how our gamma-ray observations complement other dark matter searches and the prospects for future experiments.
A Thin Cosmic Rain Nov 23 2021 A scientific history of "cosmic rays" chronicles the discovery of a steady "rain" of atomic nuclei, beginning with the birth of subatomic particle physics in the 1890s and moving through the subsequent uncovering of muons, pions, kaons, hyperons, and other particles.
The Tiger and the Shark Mar 04 2020 The early twentieth century brought about the rejection by physicists of the doctrine of determinism - the belief that complete knowledge of the initial conditions of an interaction in nature allows precise and unambiguous prediction of the outcome. This book traces the origins of a central problem leading to this change in viewpoint and paradoxes raised by attempts to formulate a consistent theory of the nature of light. It outlines the different approaches adopted by members of different national cultures to the apparent inconsistencies, explains why Einstein's early (1905) attempt at a resolution was not taken seriously for fifteen years, and describes the mixture of ideas that created a route to a new, antideterministic formulation of the laws of nature. Dr Wheaton describes the experimental work on the new forms of radiation found at the turn of the century and shows how the interpretation of energy transfer from X-rays to matter gradually transformed a classical wave explanation of light to one based on particle like quanta of energy, and further, he explains how influential scientists came reluctantly to accept a wavelike interpretation of matter as well. This new and distinctively different account of one of the major theoretical shifts in modern physical thought will be of fundamental interest to physical scientists and philosophers, as well as to historians of science.
Physics and Astrophysics of Ultra High Energy Cosmic Rays May 06 2020 The International School on Physics and Astrophysics of Ultra High Energy Cosmic Rays (UHECR2000) was held at the Observatoire de Paris–Meudon on June 26-29, 2000. This was the ?rst international school speci?cally dedicated to ultra high energy cosmic rays. Its aim was to familiarize with and attract students, physicists and astronomers into this quickly developing newresearch ?eld. The mysterious and currently unknown origin of the most energetic par- cles observed in Nature has triggered in recent years theoretical speculations ranging from electromagnetic acceleration to as yet undiscovered physics - yond the Standard Model. It has also lead to the development of several new detection concepts and experimental projects, some of which are currently - der construction. By its nature, the ?eld of ultra high energy cosmic rays is therefore highly interdisciplinary and borrows from astrophysics and cosmology, via particle physics, to experimental physics and observational astronomy. One main aspect of the school was to emphasize and take advantage of this interd- ciplinarity. The lectures were grouped into subtopics and are reproduced in this volume in the following order: After a general introductory lecture on cosmic rays follow two contributions on experimental detection techniques, followed by three lectures on acceleration in astrophysical objects. The next four contri- tions cover all major aspects of propagation and interactions of ultra high energy radiation, including speculative issues such as newinteractions.
About Cosmic Rays May 18 2021
Adverse Reproductive Outcomes in Families of Atomic Veterans Apr 16 2021 Over the past several decades, public concern over exposure to ionizing radiation has increased. This concern has manifested itself in different ways depending on the perception of risk to different individuals and different groups and the circumstances of their exposure. One such group are those U.S. servicemen (the "Atomic Veterans" who participated in the atmospheric testing of nuclear weapons at the Nevada Test Site or in the Pacific Proving Grounds, who served with occupation forces in or near Hiroshima and Nagasaki, or who were prisoners of war in or near those cities at the time of, or shortly after, the atomic bombings. This book addresses the feasibility of conducting an epidemiologic study to determine if there is an increased risk of adverse reproductive outcomes in the spouses, children, and grandchildren of the Atomic Veterans.
Cloud Sep 09 2020
The Physics of Cosmic X-ray, ?-ray, and Particle Sources Oct 03 2022
The Particle Hunters Jul 28 2019 A second edition of one of our best popular physics titles.
Astroparticle Physics Dec 13 2020 Describes the branch of astronomy in which processes in the universe are investigated with experimental methods employed in particle-physics experiments. After a historical introduction the basics of elementary particles, Explains particle interactions and the relevant

detection techniques, while modern aspects of astroparticle physics are described in a chapter on cosmology. Provides an orientation in the field of astroparticle physics that many beginners might seek and appreciate because the underlying physics fundamentals are presented with little mathematics, and the results are illustrated by many diagrams. Readers have a chance to enter this field of astronomy with a book that closes the gap between expert and popular level.

Cosmic Rays Oct 11 2020 Cosmic Rays is a two-part book that first elucidates the discovery, nature, and particles produced by cosmic rays. This part also looks into the primary cosmic radiation; radio waves from the galaxy; extensive air showers; origin of cosmic rays; and other cosmic radiations. Part 2 consists of reprinted papers involving cosmic rays. Papers 1 to 10 treat the nature of the radiation, arranged chronologically; in Papers 11 to 16 the scene moves away from the Earth.

Research on Particle Imaging Detectors Jun 18 2021 Much instrumentation has been developed for imaging the trajectories of elementary particles produced in high energy collisions. Since 1968, gaseous detectors, beginning with multiwire chambers and drift chambers, have been used for the visualisation of particle trajectories and the imaging of X-rays, neutrons, hard gamma rays, beta rays and ultraviolet photons.This book commemorates the groundbreaking research leading to the evolution of such detectors carried out at CERN by Georges Charpak, Nobel Prizewinner for Physics in 1992. Besides collecting his key papers, the book also includes original linking commentary which sets his work in the context of other worldwide research.

Cosmic Bullets Oct 30 2019 Recounts the discovery of cosmic rays, extremely energetic atomic nuclei that bombard the earth from space, and describes recent developments in their study

Alpha-, Beta- and Gamma-Ray Spectroscopy Jul 20 2021 Alpha-, Beta- and Gamma-Ray Spectroscopy Volume 1 offers a comprehensive account of radioactivity and related low-energy phenomena. It summarizes progress in the field of alpha-, beta- and gamma-ray spectroscopy, including the discovery of the non-conservation of parity, as well as new experimental methods that elucidate the processes of weak interactions in general and beta-decay in particular. Comprised of 14 chapters, the book presents experimental methods and theoretical discussions and calculations to maintain the link between experiment and theory. It begins with a discussion of the interaction of electrons and alpha particles with matter. The book explains the elastic scattering of electrons by atomic nuclei and the interaction between gamma-radiation and matter. It then introduces topic on beta-ray spectrometer theory and design and crystal diffraction spectroscopy of nuclear gamma rays. Moreover, the book discusses the applications of the scintillation counter; proportional counting in gases; and the general processes and procedures used in determining disintegration schemes through a study of the beta- and gamma-rays emitted. In addition, it covers the nuclear shell model; collective nuclear motion and the unified model; and alpha-decay conservation laws. The emissions of gamma-radiation during charged particle bombardment and from fission fragments, as well as the neutron-capture radiation spectroscopy, are also explained. Experimentalists will find this book extremely useful.

Techniques for Nuclear and Particle Physics Experiments Sep 29 2019 A treatment of the experimental techniques and instrumentation most often used in nuclear and particle physics experiments as well as in various other experiments, providing useful results and formulae, technical know-how and informative details. This second edition has been revised, while sections on Cherenkov radiation and radiation protection have been updated and extended.

From Ultra Rays to Astroparticles Mar 16 2021 The scope of the book is to give an overview of the history of astroparticle physics, starting with the discovery of cosmic rays (Victor Hess, 1912) and its background (X-ray, radioactivity). The book focusses on the ways in which physics changes in the course of this history. The following changes run parallel, overlap, and/or interact: - Discovery of effects like X-rays, radioactivity, cosmic rays, new particles but also progress through non-discoveries (monopoles) etc. - The change of the description of nature in physics, as consequence of new theoretical questions at the beginning of the 20th century, giving rise to quantum physics, relativity, etc. - The change of experimental methods, cooperations, disciplinary divisions. With regard to the latter change, a main topic of the book is to make the specific multi-diciplinary features of astroparticle physics clear.

Cosmic Rays at Earth Apr 28 2022 In 1912 Victor Franz Hess made the revolutionary discovery that ionizing radiation is incident upon the Earth from outer space. He showed with ground-based and balloon-borne detectors that the intensity of the radiation did not change significantly between day and night. Consequently, the sun could not be regarded as the sources of this radiation and the question of its origin remained unanswered. Today, almost one hundred years later the question of the origin of the cosmic radiation still remains a mystery. Hess' discovery has given an enormous impetus to large areas of science, in particular to physics, and has played a major role in the formation of our current understanding of universal evolution. For example, the development of new fields of research such as elementary particle physics, modern astrophysics and cosmology are direct consequences of this discovery. Over the years the field of cosmic ray research has evolved in various directions: Firstly, the field of particle physics that was initiated by the discovery of many so-called elementary particles in the cosmic radiation. There is a strong trend from the accelerator physics community to reenter the field of cosmic ray physics, now under the name of astroparticle physics. Secondly, an important branch of cosmic ray physics that has rapidly evolved in conjunction with space exploration concerns the low energy portion of the cosmic ray spectrum. Thirdly, the branch of research that is concerned with the origin, acceleration and propagation of the cosmic radiation represents a great challenge for astrophysics, astronomy and cosmology. Presently very popular fields of research have rapidly evolved, such as high-energy gamma ray and neutrino astronomy. In addition, high-energy neutrino astronomy may soon initiate as a likely spin-off neutrino tomography of the Earth and thus open a unique new branch of geophysical research of the interior of the Earth. Finally, of considerable interest are the biological and medical aspects of the cosmic radiation because of it ionizing character and the inevitable irradiation to which we are exposed. This book is a reference manual for researchers and students of cosmic ray physics and associated fields and phenomena. It is not intended to be a tutorial. However, the book contains an adequate amount of background materials that its content should be useful to a broad community of scientists and professionals. The present book contains chiefly a data collection in compact form that covers the cosmic radiation in the vicinity of the Earth, in the Earth's atmosphere, at sea level and underground. Included are predominantly experimental but also theoretical data. In addition the book contains related data, definitions and important relations. The aim of this book is to offer the reader in a single volume a readily available comprehensive set of data that will save him the need of frequent time consuming literature searches.

Cosmic Rays for Particle and Astroparticle Physics Jun 30 2022 The conference was aimed at promoting contacts between scientists involved in solar-terrestrial physics, space physics, astroparticle physics and cosmology both from the theoretical and the experimental approach. The conference was devoted to physics and physics requirements, survey of theoretical models and performances of detectors employed (or to be employed) in experiments for fundamental physics, astroparticle physics, astrophysics research and space environment — including Earth magnetosphere and heliosphere and solar-terrestrial physics. Furthermore, cosmic rays have been used to extend the scientific research experience to teachers and students with air shower arrays and other techniques. Presentations included the following subjects: advances in physics from present and next generation ground and space experiments, dark matter, double beta decay, high-energy astrophysics, space environment, trapped particles, propagation of cosmic rays in the Earth atmosphere, Heliosphere, Galaxy and broader impact activities in cosmic rays science. The open and flexible format of the Conference was conducive to fruitful exchanges of points of view among participants and permitted the evaluation of the progresses made and indicated future research directions. The participants were experienced researchers but also graduate students (MSc and PhD) and recent postdoctoral fellows. Errata(s) Nuclear and Non-Ionizing Energy-Loss for Coulomb Scattered Particles from Low Energy up to Relativistic Regime in Space Radiation Environment: Page 17 to Page 22 (245 KB) Contents:Broader Impacts Activites and Treatments:VHE Spectral Energy Distribution of Crab Nebula Compared with the Prediction of a Synchrotron Self-Compton Emission Model (V G Sinitsyna, A Y Alaverdian, A S Boldyrev, S S Borisov, R M Mirsafatikhov and V Y Sinitsyna)Nuclear and Non-Ionizing Energy-Loss for Coulomb Scattered Particles from Low Energy Up to Relativistic Regime in Space Radiation Environment (M J Boschini, C Consolandi, M Gervasi, S Giani, D Grandi, V Ivanchenko, S Pensotti, P G Rancoita and M Tacconi)Study of the Natural Radioactivity Influence on ARGO-YBJ Detector (I Bolognino, C Cattaneo, E Giroletti, G Liguori, P Salvini, P Vallania and C Vigorito)High-Accuracy Determination of Fabry-Perot Effective Mirror Spacing Used for the Receivers of Atmospheric Monitoring in VHE Gamma Ray Astronomy (S Maltezos, E Fokitis, N Maragos, V Gika, A Georgakopoulou, E Koubli and G Koutsourakis)AMS-02 Photon Data Reduction Approach (G Boella, M J Boschini, C Consolandi, S Della Torre, M Gervasi, D Grandi, E Memola, S Pensotti, P G Rancoita and M Tacconi)CZELTA: An Overview of the Czech Large-Area Time Coincidence Array (K Smolek, J ?ermák, J Hubík, S Pospíšil, P P?idal, J Smejkal, I Štekl, F Blaschke, P Lichard and V Vícha)Calibration of the CMS Electromagnetic Calorimeter with First LHC Data (V Sola)On the Detectability of Cosmic Ray Electron Spectral Features in the Microwave/mm-Wave Range (A Tartari, M Gervasi, G Sironi, M Zannoni and S Spinelli)Science in the Schools — the Extreme Energy Events Project (M Abbrescia, R Antolini, R Baldini Ferroli, G Bencivenni, E Bressan, A Chiavassa, C Cical, L Cifarelli, F Coccetti, D De Gruttola, S DePasquale, M DIncecco, F L Fabbri, V Frolov, M Garbini, C Gustavino, D Hatzifotiadou, P La Rocca, F Librizzi, A Maggiora, H Menghetti, S Miozzi, R Moro, M Panareo, G Piragino, F Riggi, F Romano, G Sartorelli, E Scapparone, M Selvi, S Serci, E Siddi, M C S Williams, A Zichichi and R Zuyeuski)A Cosmic Ray Detector Array for Schools in the Cambridge Region (S A Wotton, M J Goodrick, B Hommels and M A Parker)Observation of Electroscalar Radiation During a Solar Eclipse (O A Zaymidoroga and D V Podgainy)Young Researchers Focus on the Extreme Energy Universe (James L Pinfold)Cosmic Rays Experimental Observations and Searches:Galactic Cosmic Ray Production in Tycho's SNR and Geminga (V G Sinitsyna, A Y Alaverdian, S S Borisov, S I Nikolsky and V Y Sinitsyna)The CUORICINO and CUORE Neutrinoless Double Beta Decay Experiments (T I Banks)Results from DAMA/LIBRA (R Bernabei, P Belli, F Montecchia, F Nozzoli, F Cappella, A d'Angelo, A Incicchitti, D Prosperiy, R Cerulli, C J Dai, H L He, X H Ma, X D Sheng, Z P Yez and R G Wang)Recent Results from the Fermi Large Area Space Telescope (Emanuele Bonamente)Gamma-Ray Activity of Cygnus X-3 at Energy Range of 1-100 TeV During 15 Year Observations of SHALON (V G Sinitsyna, A Y Alaverdian, S S Borisov, S I Nikolsky and V Y Sinitsyna)Signatures of Middle Aged, Nearby Pulsars in the Cosmic Ray Lepton Spectrum? 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Results from AMS-01 (N Tomassetti)Cosmic Rays Propagation and Environment:The AMS-02 Proton Spectra and the Geomagnetic Field (P Bobik, M J Boschini, C Consolandi, S Della Torre, M Gervasi, D Grandi, K Kudela, S Pensotti and P G Rancoita)Stereo Observations of the Energetic Heavy Ions During the Minimum of Solar Cycle 23 (R Bu?ík, U Mall, A Korth and G M Mason)Electron and Positron Solar Modulation and Prediction for AMS02 (P Bobik, M J Boschini, C Consolandi, S Della Torre, M Gervasi, D Grandi, K Kudela, S Pensotti and P G Rancoita)How to Use Molecular Clouds to Study the Propagation of Cosmic Rays in the Galaxy (S Gabici)Proton Modulation in the Heliosphere for Different Solar Conditions and Prediction for AMS-02 (P Bobik, G Boella, M J Boschini, C Consolandi, S Della Torre, M Gervasi, D Grandi, K Kudela, E Memola, S Pensotti, P G Rancoita and M Tacconi)Proton and Antiproton Modulation in the Heliosphere for Different Solar Conditions and AMS-02 Measurements Prediction (P Bobik, M J Boschini, C Consolandi, S Della Torre, M Gervasi, D Grandi, K Kudela, S Pensotti and P G Rancoita)A Consistent Interpretation of Recent CR Nuclei and Electron Spectra (Giuseppe Di Bernardo, Carmelo Evoli, Daniele Gaggero, Dario Grasso, Luca Maccione and Mario Nicola Mazziotta)Cosmic Rays for Heliospheric Space Weather Storm Prediction (Frank Jansen and Jörg Behrens)Energetic Particles in the Magnetosphere of Earth: Selected Results and Problems (Karel Kudela, Leonid L Lazutin and Yuri I Logachev)Cosmic Rays of Leptons from Pulsars and Supernova Remnants (Roberto A Lineros)High Energy Phenomena in the Low Atmosphere; Particle Fluxes from Thunderstorm Clouds (Ashot Chilingarian and Bagrat Mailyan)The Cosmic-Ray Populations of Nearby Galaxies (P Martin)USINE: A New Public Cosmic Ray Propagation Code (Basic Phenomenology, Sample Results, and a Bit of USINE) (D Maurin)Propagation of Galactic Cosmic Rays and the AMS-02 Experiment (Miguel Pato, Dan Hooper and Melanie Simet)Galactic Cosmic Rays in the Dynamic Heliosphere (Marius Potgieter, Stefan Ferreira and Du Toit Strauss)A Markov Chain Monte Carlo Technique to Sample Transport and Source Parameters of Galactic Cosmic Rays (A Putze, L Derome, F Donato and D Maurin)PAMELA Through a Magnetic Lens (J P Roberts)Analysis of Possibility of Cosmic Rays Proton Anisotropy Phase and Amplitude and Electron Spectra Description at TeV-Region within the Bounds of the Same Set of Sources (Olga Strelnikova, Vladimir Ptuskin and Lyubov Sveshnikova)Interstellar Gamma Rays and Cosmic Rays: New Insights from FERMI-LAT and Integral (A W Strong)Energy Loss for Electrons in the Heliosphere and Local Interstellar Spectrum for Solar Modulation (P Bobik, G Boella, M J Boschini, C Consolandi, S Della Torre, M Gervasi, D Grandi, M Elmo, K Kudela, E Memola, S Pensotti, P G Rancoita, D Rozza and M Tacconi)Cosmic Rays from Astrophysical Sources:Cosmic Ray Acceleration in Supernova Remnants (P Blasi)?-Rays from Heavy Nuclei Accelerated in Supernova Remnants (D Caprioli, P Blasi and E Amato)Anisotropies in the Cosmic-Ray Electron Spectrum: A Way to Discriminate between Exotic and Astrophysical Sources? (I Cernuda)Cosmic-Ray Electrons and Positrons from Gamma-Ray Pulsars (M Dormody)Galactic Electrons and Positrons at the Earth: New Estimate of the Primary and Secondary Fluxes (J Lavalle)The 'PAMELA Anomaly' Indicates a Nearby Cosmic Ray Accelerator (P Mertsch and S Sarkar)Observations of Intermediate Synchrotron Peaked Blazars with the Fermi-LAT (C Monte)Shock Acceleration in Partially Neutral Plasmas (G Morlino, E Amato, P Blasi and D Caprioli)Pulsar Electrons Detection in AMS-02 Experiment. Model Status and Discovery Potential (Jonathan Pochon)The CR Connection: UHE Primaries and Secondaries from UHECR Sources (A M Taylor)? Carinae: A Very Large Hadron Collider (R Walter, C Farnier & J-C Leyder)Cosmic Rays from Exotic Sources:Gamma Rays from Dark Matter (T Bringmann)Introducing CLUMPY: A Public Code for Gamma-Ray Emission from Dark Matter Annihilation in the Galaxy (C Combet, A Charbonnier and D Maurin)Cosmic Rays and Dark Matter Indirect Detection (Timur Delahaye)Neutrinos from Dark Matter (M H Reno)Charged Cosmic Rays from Dark Matter (P Salati)Gamma-Ray and Neutrino Signatures of Unstable Dark Matter (David Tran)Gamma-Ray Anisotropies from Decaying Dark Matter (C Weniger) Readership: Postgraduate students, researchers and engineers. Keywords:Astroparticle;Particle;Space Physics;Cosmic Ray Physics;Heliosphere;Dark Matter;Double-Beta DecayKey Features:Complete review of the fieldUp-to-date results and informationBroad vision for the future in the field, indication of future research direction

Cosmic Rays at Earth May 30 2022 In 1912 Victor Franz Hess made the revolutionary discovery that ionizing radiation is incident upon the Earth from outer space. He showed with ground-based and balloon-borne detectors that the intensity of the radiation did not change significantly between day and night.

Consequently, the sun could not be regarded as the sources of this radiation and the question of its origin remained unanswered. Today, almost one hundred years later the question of the origin of the cosmic radiation still remains a mystery. Hess' discovery has given an enormous impetus to large areas of science, in particular to physics, and has played a major role in the formation of our current understanding of universal evolution. For example, the development of new fields of research such as elementary particle physics, modern astrophysics and cosmology are direct consequences of this discovery. Over the years the field of cosmic ray research has evolved in various directions: Firstly, the field of particle physics that was initiated by the discovery of many so-called elementary particles in the cosmic radiation. There is a strong trend from the accelerator physics community to reenter the field of cosmic ray physics, now under the name of astroparticle physics. Secondly, an important branch of cosmic ray physics that has rapidly evolved in conjunction with space exploration concerns the low energy portion of the cosmic ray spectrum. Thirdly, the branch of research that is concerned with the origin, acceleration and propagation of the cosmic radiation represents a great challenge for astrophysics, astronomy and cosmology. Presently very popular fields of research have rapidly evolved, such as high-energy gamma ray and neutrino astronomy. In addition, high-energy neutrino astronomy may soon initiate as a likely spin-off neutrino tomography of the Earth and thus open a unique new branch of geophysical research of the interior of the Earth. Finally, of considerable interest are the biological and medical aspects of the cosmic radiation because of it ionizing character and the inevitable irradiation to which we are exposed. This book is a reference manual for researchers and students of cosmic ray physics and associated fields and phenomena. It is not intended to be a tutorial. However, the book contains an adequate amount of background materials that its content should be useful to a broad community of scientists and professionals. The present book contains chiefly a data collection in compact form that covers the cosmic radiation in the vicinity of the Earth, in the Earth's atmosphere, at sea level and underground. Included are predominantly experimental but also theoretical data. In addition the book contains related data, definitions and important relations. The aim of this book is to offer the reader in a single volume a readily available comprehensive set of data that will save him the need of frequent time consuming literature searches.

Cosmic Rays in the Earth's Atmosphere and Underground Jul 08 2020 The present monograph as well as the next one (Dorman, M2005) is a result of more than 50 years working in cosmic ray (CR) research. After graduation in December 1950 Moscow Lomonosov State University (Nuclear and Elementary Particle Physics Division, the Team of Theoretical Physics), my supervisor Professor D. I. Blokhintsev planned for me, as a winner of a Red Diploma, to continue my education as an aspirant (a graduate student) to prepare for Ph. D. in his very secret Object in the framework of what was in those time called the Atomic Problem. To my regret the KGB withheld permission, and I, together with other Jewish students who had graduated Nuclear Divisions of Moscow and Leningrad Universities and Institutes, were faced with a real prospect of being without any work. It was our good fortune that at that time there was being brought into being the new Cosmic Ray Project (what at that time was also very secret, but not as secret as the Atomic Problem), and after some time we were directed to work on this Project. It was organized and headed by Prof. S. N. Vernov (President of All-Union Section of Cosmic Rays) and Prof. N. V. Pushkov (Director of IZMIRAN); Prof. E. L. Feinberg headed the theoretical part of the Project.

The Particle Odyssey Jan 26 2022 1. The world of particle physics 2. Voyage into the atom 3. The structure of the atom 4. The extraterrestrials 5. The cosmic rain 6. The challenge of the big machines 7. The particle explosion 8. Colliders and image chambers 9. From charm to top 10. The 'whys' of particle physics 11. Futureclash 12. Particles at work Table of particles Further reading/acknowledgements Picture credits Index

Particles and Astrophysics Jun 06 2020 This book is an introduction to "multi-messenger" astrophysics. It covers the many different aspects connecting particle physics with astrophysics and cosmology and introduces astrophysics using numerous experimental findings recently obtained through the study of high-energy particles. Taking a systematic approach, it comprehensively presents experimental aspects from the most advanced laboratories and detectors, as well as the theoretical background. The book is aimed at graduate students and post-graduate researchers with a basic understanding of particle and nuclear physics. It will also be of interest to particle physicists working in accelerator/collider physics who are keen to understand the mechanisms of the largest accelerators in the Universe. The book draws on the extensive lecturing experience of Professor Maurizio Spurio from the University of Bologna.

Cosmic Rays and Particle Physics Sep 02 2022

High Energy Cosmic Rays Apr 04 2020 Offers an accessible text and reference (a cosmic-ray manual) for graduate students entering the field and high-energy astrophysicists will find this an accessible cosmic-ray manual Easy to read for the general astronomer, the first part describes the standard model of cosmic rays based on our understanding of modern particle physics. Presents the acceleration scenario in some detail in supernovae explosions as well as in the passage of cosmic rays through the Galaxy. Compares experimental data in the atmosphere as well as underground are compared with theoretical models

Cosmic Rays and Particle Physics Nov 04 2022 Cambridge English Worldwide offers an exciting new approach for students from ten to sixteen.

Advanced Concepts in Particle and Field Theory Jun 26 2019 An expansive and conceptually unifying textbook of fundamental and theoretical physics, describing elementary particles and their interactions.

Corpuscles and Radiation in Matter II / Korpuskeln und Strahlung in Materie II Jan 02 2020

The Particle Explosion Dec 25 2021 Describes the development of the field of particle physics, examines the nature of matter and energy, and profiles the careers of leading particle physicists

High Energy Cosmic Rays Mar 28 2022 Offers an accessible text and reference (a cosmic-ray manual) for graduate students entering the field and high-energy astrophysicists will find this an accessible cosmic-ray manual Easy to read for the general astronomer, the first part describes the standard model of cosmic rays based on our understanding of modern particle physics. Presents the acceleration scenario in some detail in supernovae explosions as well as in the passage of cosmic rays through the Galaxy. Compares experimental data in the atmosphere as well as underground are compared with theoretical models

Particle and Astroparticle Physics Feb 01 2020 This book presents more than 200 problems, with detailed guided solutions, spanning key areas of particle physics and astrophysics. The selected examples enable students to gain a deeper understanding of these fields and also offer valuable support in the preparation for written examinations. The book is an ideal companion to Introduction to Particle and Astroparticle Physics: Multimessenger Astronomy and its Particle Physics Foundations, written by Alessandro De Angelis and Mário Pimenta and published in its second edition in Springer's Undergraduate Lecture Notes in Physics series in 2018. It can, however, also be used independently. The present book is organized into 11 chapters that match exactly those in the companion textbook, and each of the exercises is given a title to facilitate identification of the subject within that book. Some new exercises have been added because they are considered helpful on the basis of the experience gained by teachers while using the textbook. Beyond students on relevant courses, exercises and solutions in particle and astroparticle physics are of value for physics teachers and to all who seek aid to self-training.

The Interpretation of the Atom Nov 11 2020