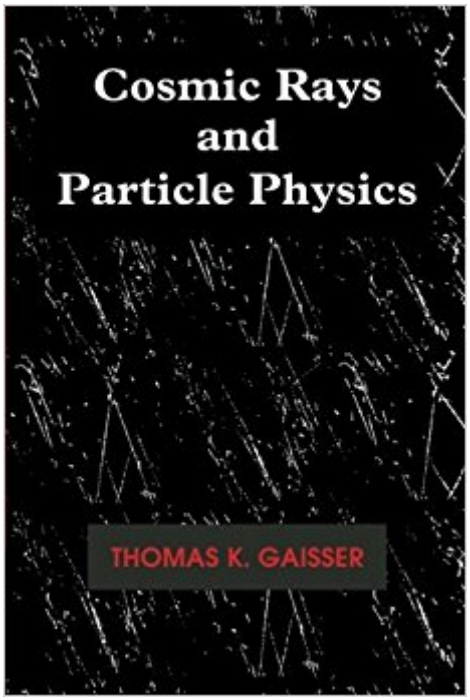
Cosmic Rays And Particle Physics



Synopsis

Over recent years there has been marked growth in interest in the study of techniques of cosmic ray physics by astrophysicists and particle physicists. Cosmic radiation is important for the astrophysicist because in the farther reaches of the universe. For particle physicists, it provides the opportunity to study neutrinos and very high energy particles of galactic origin. More importantly, cosmic rays constitue the background, and in some cases possibly the signal, for the more exotic unconfirmed hypothesized particles such as monopoles and sparticles. Concentrating on the highest energy cosmic rays, this book describes where they originate, acquire energy, and interact, in accreting neutron stars, supernova remnants, in large-scale shock waves. It also describes their interactions in the atmosphere and in the earth, how they are studied in surface and very large underground detectors, and what they tell us.

Book Information

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Customer Reviews

"...a thorough overview of the physics of cosmic-ray cascades in the atmosphere and underground as they have been shaped by the needs and developments of high-energy physics in the last decade. The treatment of all the topics is concise and based on or supplemented by sufficient physical argumentation to allow a much clearer understanding of the accompanying equations. The presentation is excellent and very useful to graduate students (to whom the book is mainly addressed) and also for researchers wishing to familiarize themselves with cosmic-ray cascades and cosmic rays in general, and there are a number of reviews and references provided that should

suffice as a first step for a more thorough study." Nature

Concentrating on the highest energy cosmic rays, this work describes where they originate, acquire energy, and interact, in accreting neutron stars, supernova remnants, and in large-scale shock waves.

The early history of particle physics is cosmic ray physics. But after the invention of the cyclotron and generations of accelerator-based particle physics, the two fields had drifted far apart. This well-written little book by Tom Gaisser rebuilt the connections. Now we have "non-accelerator particle physics" and people working in air showers who consider themselves to be doing high energy physics.It would be great for there to be a new edition of this book. Updated with Auger results, modern neutrino experiments, Askaryan pulse experiments, and the like...

With interest in cosmic rays and particle astrophysics growing, Tom Gaisser’s Cosmic Rays and Particle Physics is really the only contemporary introduction to the field suitable for undergraduates as well as beginning graduate students. There is no attempt to be fully comprehensive - the field is too broad for that - but processes relating to extensive air showers and their products (including muons and neutrinos) are covered in some detail. I regularly recommend this book to students who are considering research in particle astrophysics. There are a few gaps and a few topics covered in more detail than most people need, as is typical for a first edition. I hope Prof. Gaisser will find the time to prepare a revised and updated edition soon!

I looked at equation (3.22) for other purpose (than countingcosmic ray particle collisions) and there seems to be a sign mistake in the first equation (integrated mass

Physics) The Neutron: A Tool and an Object in Nuclear and Particle Physics Advances in Imaging and Electron Physics, Volume 157: Optics of Charged Particle Analyzers Quarks and Leptons: An Introductory Course in Modern Particle Physics Nuclear and Particle Physics: An Introduction Facts and Mysteries in Elementary Particle Physics Gauge Theories in Particle Physics, Vol. 2: Non-Abelian Gauge Theories: QCD and the Electroweak Theory (Volume 1) Gauge Theory of Elementary Particle Physics: Problems and Solutions An Introduction to Particle Physics and the Standard Model Six Stories from the End of Representation: Images in Painting, Photography, Astronomy, Microscopy, Particle Physics, and Quantum Mechanics, 1980-2000 (Writing Science) Nuclear and Particle Physics (Cambridge Advanced Sciences) Particle Physics: A Very Short Introduction Most Wanted Particle: The Inside Story of the Hunt for the Higgs, the Heart of the Future of Physics