Physics: Astrophysics and Astroparticles

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Probes of Multimessenger Astrophysics

Charged cosmic rays, neutrinos, -rays and gravitational waves

- The new edition includes a comprehensive description of gravitational-wave physics written for a student audience
- Provides a modern introduction to astroparticle physics
- Presents the different probes used to study astrophysical phenomena in the multi-messenger strategy
- Offers substantial coverage of the latest experimental techniques and instrumentation, including a comprehensive description of gravitational waves
- Based on materials tested in University lectures over many years

"I have taught from and enjoyed the first edition of the book. The selection of topics is the best I've seen. Maurizio Spurio gives very clear presentations using a generous amount of observational data." James Matthews (Louisiana State University) This is the second edition of an Introduction to "multi-messenger" astrophysics. It covers the many different aspects connecting particle physics with astrophysics and cosmology and introduces high-energy astrophysics using different probes: the electromagnetic radiation, with techniques developed by traditional astronomy; charged cosmic rays, gamma-rays and neutrinos, with methods developed in high-energy laboratories; and gravitational waves, recently observed using laser interferometers. The book offers a comprehensive and systematic approach to the theoretical background and the experimental aspects of the study of the high-energy universe. The breakthrough discovery of gravitational waves motivated this new edition of the book, to offer a more global and multimessenger vision of high-energy astrophysics. This second edition is updated and enriched with substantial new materials also deriving from the results obtained at the LIGO/Virgo observatories. For the first time it is now possible to draw the connection between gravitational waves, traditional astronomical observations and other probes (in particular, gamma-rays and neutrinos). The book draws on the extensive courses of Professor Maurizio Spurio at the University of Bologna and it is aimed at graduate students and postgraduate researchers with a basic understanding of particle and nuclear physics.

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