



Relativistic Heavy Ion Physics

J. Bartke

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This book attempts to cover the fascinating field of physics of relativistic heavy ions, mainly from the experimentalist's point of view. After the introductory chapter on quantum chromodynamics, basic properties of atomic nuclei, sources of relativistic nuclei, and typical detector set-ups are described in three subsequent chapters. Experimental facts on collisions of relativistic heavy ions are systematically presented in 15 consecutive chapters, starting from the simplest features like cross sections, multiplicities, and spectra of secondary particles and going to more involved characteristics like correlations, various relatively rare processes, and newly discovered features: collective flow, high pT suppression and jet quenching. Some entirely new topics are included, such as the difference between neutron and proton radii in nuclei, heavy hypernuclei, and electromagnetic effects on secondary particle spectra.

Phenomenological approaches and related simple models are discussed in parallel with the presentation of experimental data. Near the end of the book, recent ideas about the new state of matter created in collisions of ultrarelativistic nuclei are discussed. In the final chapter, some predictions are given for nuclear collisions in the Large Hadron Collider (LHC), now in construction at the site of the European Organization for Nuclear Research (CERN), Geneva. Finally, the appendix gives us basic notions of relativistic kinematics, and lists the main international conferences related to this field. A concise reference book on physics of relativistic heavy ions, it shows the present status of this field.

Contents: Quantum Chromodynamics and the Phase Transition in Strongly Interacting Matter; Basic Properties of Atomic Nuclei; Sources of Relativistic and Ultrarelativistic Nuclei; Detection Techniques; Cross Sections and Collision Geometry; Fragmentation Processes; Multiplicities and Relative Abundances of Secondary Particles; Longitudinal Distributions of Secondary Particles; Transverse Spectra of Secondary Particles; Electromagnetic Effects on Charged Meson Spectra; Production of Strangeness and Heavy Flavours; Emission of Light Nuclei, Antinuclei, and Hypernuclei; Hadronic Femtoscopy; Collective Flow; Charmonium Suppression; Puzzle in Di-Lepton Mass Spectrum; Direct Photons; High Transverse Momenta; Production and Absorption of Jets; More About Quark-Gluon Plasma; Predictions for the Large Hadron Collider; Relativistic Kinematics.

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