

Contents

Preface	vii
Acknowledgments	ix
1. Introduction	1
2. Quantum Chromodynamics and the Phase Transition in Strongly Interacting Matter	7
3. Basic Properties of Atomic Nuclei	17
3.1 Static properties	17
3.2 The nuclear Fermi momentum	22
4. Sources of Relativistic and Ultrarelativistic Nuclei	25
4.1 Cosmic rays	25
4.2 Accelerators	26
5. Detection Techniques	33
5.1 Fixed-target experiments	33
5.2 Experiments at colliders	43
6. Cross Sections and Collision Geometry	51
6.1 Interaction cross sections	51
6.2 Geometrical picture of the collision	54
7. Fragmentation Processes	59
7.1 Electromagnetic dissociation	59
7.2 Nuclear fragmentation	66
7.3 Fragmentation in its extended meaning	71

8.	Multiplicities and Relative Abundances of Secondary Particles	75
8.1	Mean multiplicities	75
8.2	Multiplicity distributions	80
8.3	Particle abundances	84
9.	Longitudinal Distributions of Secondary Particles	93
10.	Transverse Spectra of Secondary Particles	99
11.	Electromagnetic Effects on Charged Meson Spectra	105
12.	Production of Strangeness and Heavy Flavours	111
12.1	Strangeness	111
12.2	Heavy flavours	117
13.	Emission of Light Nuclei, Antinuclei, and Hypernuclei	121
13.1	Light nuclei and antinuclei	121
13.2	Hypernuclei	125
14.	Hadronic Femtoscopy	131
14.1	Correlations of identical bosons	131
14.2	Correlations of identical fermions	149
14.3	Correlations of non-identical particles	153
15.	Collective Flow	157
16.	Charmonium Suppression	167
17.	Puzzle in Di-Lepton Mass Spectrum	175
18.	Direct Photons	179
19.	High Transverse Momenta	185
20.	Production and Absorption of Jets	193
21.	More About Quark-Gluon Plasma	197
21.1	Polarization of the quark-gluon plasma in the spin space	197
21.2	Disoriented chiral condensate	198
21.3	Color glass condensate	200
22.	Predictions for the Large Hadron Collider	203
22.1	Extrapolations of present-day experimental data	203
22.2	Predictions from theoretical models	207

Appendix A	Relativistic Kinematics	211
A.1	Basic definitions and formulae	211
A.2	Rapidity and pseudorapidity	212
A.3	Scaled variables	213
A.4	Invariant mass and centre-of-mass energy	213
A.5	Decay processes	214
A.6	Invariant cross sections	215
A.7	Motion of a particle in external fields	215
Appendix B	The Relevant International Conferences	217
Index		221