

The Black Book of Quantum Chromodynamics is an in-depth introduction to the particle physics of current and future experiments at particle accelerators. The book offers the reader an overview of practically all aspects of the strong interaction necessary to understand and appreciate modern particle phenomenology at the energy frontier. It assumes a working knowledge of quantum field theory at the level of introductory textbooks used for advanced undergraduates or in standard postgraduate lectures. The book expands this knowledge with an intuitive understanding of relevant physical concepts, an introduction to modern techniques, and their application to the phenomenology of the strong interaction at the highest energies. Aimed at graduate students and researchers, it also serves as a comprehensive reference for LHC experimenters and theorists.

John Campbell is Senior Scientist at the Fermi National Accelerator Laboratory.

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“This excellent and very timely book, written by leading practitioners in the study of strong interactions at hadron colliders, is incredibly broad, covering the full range of concepts and techniques necessary to understand this rich, complex and rapidly developing subject. It captures many of the recent technological advances in perturbative QCD in a clear and concise manner, and combines it with an insightful and comprehensive study of Tevatron and Run 1 LHC data. It is pitched at exactly the right level both to imbue theorists with the necessary depth of understanding of data and to introduce experimentalists to the advantages and disadvantages of different theoretical descriptions. It is a valuable resource one could use as a basis for a graduate course in collider physics, or for more experienced practitioners to dip into.”

Nigel Glover, Professor, FRS, Institute of Particle Physics Phenomenology, Durham University

“The complexity of carrying out precise experimental measurements at high-energy colliders such as the LHC is matched by the complexity of the calculations needed to attain the same level of precision in the theoretical predictions. In recent decades there has been significant progress in understanding how to manipulate the underlying quantum field theory, Quantum Chromodynamics, to enable such calculations to be performed. This book, written by world experts in the field, provides a magnificently comprehensive and accessible user guide to the concepts and techniques for doing precision QCD calculations for LHC physics.”

W.J. Stirling, FRS, CBE, Provost, Imperial College London

Cover image: Event display of a Higgs boson candidate decaying to four electrons recorded by the ATLAS experiment on May 18, 2012. Reprinted with permission from CERN.

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