



Classical Theory of Gauge Fields

By Valery Rubakov

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Based on a highly regarded lecture course at Moscow State University, this is a clear and systematic introduction to gauge field theory. It is unique in providing the means to master gauge field theory prior to the advanced study of quantum mechanics. Though gauge field theory is typically included in courses on quantum field theory, many of its ideas and results can be understood at the classical or semi-classical level. Accordingly, this book is organized so that its early chapters require no special knowledge of quantum mechanics. Aspects of gauge field theory relying on quantum mechanics are introduced only later and in a graduated fashion--making the text ideal for students studying gauge field theory and quantum mechanics simultaneously.

The book begins with the basic concepts on which gauge field theory is built. It introduces gauge-invariant Lagrangians and describes the spectra of linear perturbations, including perturbations above nontrivial ground states. The second part focuses on the construction and interpretation of classical solutions that exist entirely due to the nonlinearity of field equations: solitons, bounces, instantons, and sphalerons. The third section considers some of the interesting effects that appear due to interactions of fermions with topological scalar and gauge fields. Mathematical digressions and numerous problems are included throughout. An appendix sketches the role of instantons as saddle points of Euclidean functional integral and related topics.

Perfectly suited as an advanced undergraduate or beginning graduate text, this book is an excellent starting point for anyone seeking to understand gauge fields.

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Review

"*Classical Theory of Gauge Fields* is indeed . . . unique . . . and without alternative for all those who want to immerse themselves in this particular area of theoretical physics."--**H. Hogreve, *Mathematical Reviews***

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"This thorough, clear, and readable book is an important addition to the available literature on solitons in field theory. The inclusion of materials on semiclassical quantization of field theories and on the relevant mathematics, in addition to the sections covering classical gauge fields, broadens its appeal. The book will be very useful In advanced undergraduate as well as graduate courses on field theory. It will also serve as a modern review and reference for working theoretical physicists."--Igor Klebanov, Princeton University

"This is an excellent text on field theory. The material is well thought out, well organized, well presented, and amply supplemented with problems."--Dirk ter Haar, author of *Master of Modern Physics*

"Professor Rubakov is an outstanding researcher and an exceptionally clear lecturer, an unusual combination that shines through in this illuminating text. Students and active researchers can all learn something from this well-organized and insightful text, which is written so as to be widely accessible but authoritative."--John Bahcall, Institute for Advanced Study

From the Back Cover

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