

CONTENTS

Preface v

Introduction 1

Chapter 1
Gauge Invariance and Interactions; 7
Remembering Robert Mills
C. N. Yang

Quantizing Gauge Field Theories 13

Chapter 2
The Space of Gauge Fields: Its Structure and Geometry 15
Bryce DeWitt

Ghosts for Physicists 33

Chapter 3
Perturbation Theory for Gauge-Invariant Fields 39
V. N. Popov and L. D. Faddeev

Breaking the Symmetry 61

Chapter 4
Broken Symmetry and Yang–Mills Theory 65
François Englert

Towards the Standard Model 97

Chapter 5
The Making of the Standard Model 99
Steven Weinberg

Renormalization 119

<i>Chapter 6</i>	
Renormalization	121
Gerardus 't Hooft	
<i>Chapter 7</i>	
From Koszul Complexes to Gauge Fixing	137
R. Stora	
<i>Chapter 8</i>	
The Renormalization Content of Slavnov–Taylor Identities	168
Carlo Becchi	

Anomalies 183

<i>Chapter 9</i>	
Anomalies to All Orders	187
Stephen L. Adler	
<i>Chapter 10</i>	
Fifty Years of Yang–Mills Theory and Our Moments of Triumph	229
Roman Jackiw	

Asymptotic Freedom 253

<i>Chapter 11</i>	
Yang–Mills Theory In, Beyond, and Behind Observed Reality	255
Frank Wilczek	

Magnetic Monopoles 269

<i>Chapter 12</i>	
To Be Or Not to Be?	271
F. Alexander Bais	

Quark Confinement and Strings 309

<i>Chapter 13</i>	
Confinement and Liberation	311
A. M. Polyakov	

Fixing in Gauge Condition Non-Perturbatively 331

Chapter 14

- Non-Perturbative Aspects of Gauge Fixing 333
 Pierre van Baal

The Lattice 355

Chapter 15

- Yang–Mills Fields and the Lattice 357
 Michael Creutz

Fermions on the Lattice 375

Chapter 16

- Chiral Symmetry on the Lattice 377
 P. Hasenfratz

Confrontation with Experiment 399

Chapter 17

- Fifty Years of Yang–Mills Theories: A Phenomenological
 Point of View 401
 Alvaro De Rújula

Supersymmetry and Supergravity 431

Chapter 18

- Supergravity as a Yang–Mills Theory 433
 Peter van Nieuwenhuizen

Physics of the 21st Century 457

Chapter 19

- Gauge/String Duality for Weak Coupling 459
 Edward Witten