Aron M. Bernstein

Dieter Drechsel Thomas Walcher (Eds.)

Chiral Dynamics: Theory and Experiment

Proceedings of the Workshop

Held in Mainz, Germany, 1-5 September 1997

Springer

Contents

Part I Chiral Dynamics and QCD

Introduction to Chiral Dynamics: Theory and Experiment A.M. Bernstein	3
Aspects of Chiral Dynamics J. Gasser	12
Light Quark Masses and Condensates in QCD J. Stern	26
Connections Between Lattice Gauge Theory and Chiral Perturbation Theory M. Golterman	46
Nucleon–Nucleon Interaction and Isospin Violation U. van Kolck	62
Valence Quark Model from Lattice QCD K.-F. Liu	78

Part II Electromagnetic Production of Goldstone Bosons

New Developments in Threshold Pion Photoproduction and Electroproduction V. Bernard	89
Experiments on Threshold Pion Photoproduction $\gamma p \rightarrow p\pi^0$ R. Beck	106
Experiments on Threshold Pion Electroproduction H. Merkel	114

VIII

Experiments on the $N \rightarrow \Delta$ Transition

R. W. Gothe 124

The $\Delta(1232)$ as an Effective Degree of Freedom in Chiral Perturbation Theory

J. Kambor 138

Chiral Dynamics with Coupled Channels: Eta and Kaon Production

N. Kaiser 155

Status of Three-Flavor Baryon Chiral Perturbation Theory

U.-G. Meißner 173

Working Group on Electromagnetic Production of Goldstone Bosons

A.M. Bernstein and N. Kaiser (Convenors), M. Benmerrouche, J. Bergstrom, S. Goers, E. Korkmaz, M. Kovash, B. Nefkens, B. Saghai, S. Steininger, L. Tiator, U. van Kolck, H. Weller, and P. Wilhelm 189

Part III Structure of Hadrons

Chiral Perturbation Theory and Nucleon Polarizabilities

B.R. Holstein 215

Experiments on Nucleon Polarizabilities

N. d'Hose 228

Pion and Kaon Polarizabilities and Radiative Transitions

M.A. Moinester and V. Steiner 247

Working Group on Hadron Polarizabilities and Form Factors

D. Drechsel (Convenor), J. Becker, A.Z. Dubničková, S. Dubnička, L. Fil'kov, H.-W. Hammer, T. Hannah, T. Hemmert, G. Höhler, D. Hornidge, F. Klein, E. Luppi, A. L'vov, U.-G. Meißner, A. Metz, R. Miskimen, V. Olmos de León, M. Ostrick, J. Roche, and S. Scherer 264

Part IV Production and Decay of Goldstone Bosons

Goldstone Boson Production and Decay

J. Bijnens 295

Working Group on Goldstone Boson Production and Decay	
J. Bijnens (Convenor), G. Colangelo, G. D'Ambrosio, F. Gabbiani, G. Isidori, J. Kambor, A. Kupsc, M. Moinester, B. Nefkens, J. Oller, E. Pallante, J.R. Peláez, B. Renk, and P. Talavera	311

Part V Pion–Pion and Pion–Nucleon Interactions

Pion–Pion and Pion–Nucleon Interactions in Chiral Perturbation Theory	
G. Ecker	337

Low Energy Experiments on $\pi\pi$ Scattering	
D. Počanić	352

Working Group on $\pi\pi$ and πN Interactions	
U.-G. Meißner and M. Sevier (Convenors), A. Badertscher, B. Borasoy, P. Büttiker, G. Höhler, M. Knecht, O. Krehl, J. Lowe, M. Mojžiš, G. Müller, M. Pavan, O. Patarakin, A.G. Rusetsky, S. Sainio, J. Schacher, M. Sevier, G. Smith, S. Steininger, and V.V. Vereshagin	368

List of Participants	389
---------------------------------------	-----