

Lecture Notes in Physics

Edited by H. Araki, Kyoto, J. Ehlers, München, K. Hepp, Zürich
R. Kippenhahn, München, H. A. Weidenmüller, Heidelberg
and J. Zittartz, Köln

197

Quarks and Nuclear Structure

Proceedings of the 3rd Klaus Erkelenz Symposium
Held at Bad Honnef, June 13–16, 1983

Edited by K. Bleuler



Springer-Verlag
Berlin Heidelberg New York Tokyo 1984

Editor

K. Bleuler
Institute for Theoretical Nuclear Physics
University of Bonn, Nußallee 14–16, D-5300 Bonn 1

Organized by
K. Holinde, H. R. Petry, D. Schütte, K. Bleuler
Institute for Theoretical Nuclear Physics
University of Bonn, Nußallee 14–16, D-5300 Bonn 1

This conference was sponsored by the “Stiftung Volkswagenwerk” in Hannover. This generous financial help is greatly acknowledged by the organizers.

ISBN 3-540-12922-7 Springer-Verlag Berlin Heidelberg New York Tokyo
ISBN 0-387-12922-7 Springer-Verlag New York Heidelberg Berlin Tokyo

Library of Congress Cataloging in Publication Data. Klaus Erkelenz Symposium (3rd: 1983: Bad Honnef, Germany) Quarks and nuclear structure. (Lecture notes in physics; 197) 1. Quarks—Congresses. 2. Nuclear structure—Congresses. I. Bleuler, Konrad, 1912-. II. Title. III. Series. QC793.5.Q2522K57 1983 539.7'21 84-5386
ISBN 0-387-12922-7 (U.S.)

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically those of translation, reprinting, re-use of illustrations, broadcasting, reproduction by photocopying machine or similar means, and storage in data banks. Under § 54 of the German Copyright Law where copies are made for other than private use, a fee is payable to “Verwertungsgesellschaft Wort”, Munich.

© by Springer-Verlag Berlin Heidelberg 1984
Printed in Germany

Printing and binding: Beltz Offsetdruck, Hemsbach/Bergstr.
2153/3140-543210

Chapter 4. Quark Structure of Nuclei

K. RITH - Quark Distributions in Nuclei and Deep Inelastic Scattering of Charged Leptons	214
H.R. PETRY - Nuclear Shells from a Quark-Theoretical Viewpoint	236
E.R. HILF, L. POLLEY - Effective QCD-Lagrangian for Nuclear Physics	260
H.J. PIRNER - Strange Quarks in Low Energy Hadronic Interactions ..	275

Chapter 5. The Nucleon-Nucleon Interaction from Quark Theory

A. FAESSLER - The Nucleon-Nucleon Interaction in the Quark Model ..	287
M. HARVEY - A Study of NN Phase-Shift Calculations in a Quark Potential Model	315
P.U. SAUER, U.-J. WIESE - Many-Nucleon Forces and Currents Derived from Quark Degrees of Freedom	326
A. MARTIN - Quantitative Spectroscopy with Quarks	341

Chapter 6. Boson Exchange in Comparison with Quark Theory

R. MACHLEIDT - Nuclear Forces Within a Consistent Meson-Exchange Model	352
K. HOLINDE - The Short-Range Part of the NN-Interaction Quark-Gluon Versus Meson Exchange	378
J.R. BERGERVOET, P.C. van CAMPEN, W.M. DERKS, T.A. RIJKEN, W.A. van der SANDEN, J.J. de SWART, P.H. TIMMERS - Quarks and the NN- and $\bar{N}N$ -Interaction	390
M. BOLSTERLI - Boson-Mediated Interactions Between Static Sources .	405

TABLE OF CONTENTS

Chapter 1.	<u>Hadrons from Quantum Chromodynamical Lattice Approximation</u>	
M. BANDER -	Recent Developments in Lattice Gauge Theories	1
G. SCHIERHOLZ -	The Hadron Spectrum in Lattice QCD	9
J. ENGELS -	Finite Temperature QCD	39
F. PALUMBO -	The Quark-Quark Interaction in the Nonrelativistic and in the Lattice Approximation	57
Chapter 2.	<u>General Quark-Theoretical Viewpoints in Nuclear Physics</u>	
J.M. NAMYSLOWSKI -	Quark and Gluon Condensates in Hadrons and in Quark Interactions - and - The Role of the Quark- -Antiquark Pair in the Structure of Nuclei	65
G.A. MILLER -	Quark Effects in Nuclear Physics	95
V. BERNARD, R. BROCKMANN, W. WEISE, E. WERNER -	Chiral Symmetry Breaking and the Pion	126
D. SCHÜTTE -	Application of the Cluster Expansion to QCD	140
Chapter 3.	<u>Bag and Soliton Models</u>	
G.A. MILLER -	The Cloudy Bag Model of Hadrons	150
J. WAMBACH -	Recent Developments in Chiral Bag Models	172
A. SZYMACHA -	Centre of Mass Correction to Bag Model	191
L. WILETS, R. GOLDFLAM -	Dynamics of the Soliton Bag	202