TABLE OF CONTENTS

Preface v

The DGM — Conference Series 1971-1987 vii

I. STRUCTURE OF CLASSICAL AND QUANTIZED FIELDS

1. *Quantum Field Theory*

General Covariance and Strict Locality in Quantum Field Theory
K. Fredenhagen 3

Polysymplectic Quantum Field Theory
Ch. Günther 14

Some Recent Developments Related to the Hawking Effect
B. S. Kay and R. M. Wald 28

Symmetry in Terms of G-Numbers
Y. Ohnuki and S. Kamefuchi 41

Formulation of a Nonperturbative Quantumelectrodynamics as a Nonlinear Classical First Quantized Field Theory
A. O. Barut 51

2. *Gauge Theories and Strings*

Superstrings and Covariance in the Embedding Manifold
Y. Ne'eman 66

Some Gravitational Consequences of String Theories
S. Deser 76

Homogeneous Kähler Manifolds
H. Römer 89

Dimensional Reduction and Kaluza-Klein Theories. Some Differential Geometric Ideas
A. Jadczyk 99

On the Stability of Monopoles
P. A. Horvathy and J. H. Ramsley 108

Time-Dependent Vortices and Monopoles
J. Burzlaff 118

Faddeev-Popov Trick and Loop Expansion in the Presence of Gribov Copies. A Differential Geometric Survey
F. Nill 126

Cartan Planes and Holonomy in Gauge Field Theories
C. N. Kozameh and E. T. Newman 142

On the Role of Boundary Conditions in Conservation Laws in Field Theory
J. Śniatycki 154

Higher Conservation Laws for Ten-Dimensional Supersymmetric Yang-Mills Theories
M. Forger 162

3. General Relativity

Two and Four-Dimensional Semi-Classical Gravity and Conformal Mappings
N. Sánchez 163

On Some Global and Semi-global Existence Theorems for Solutions of Einstein's Field Equations
H. Friedrich 181

A Simple Argument for Positivity of Gravitational Energy
J. Jezierski and J. Kijowski 187

II. QUANTIZATION METHODS AND GEOMETRICAL PROPERTIES OF QUANTUM SYSTEMS

1. Quantization

Parastatistics, θ-Statistics, and Topological Quantum Mechanics from Unitary Representations of Diffeomorphism Groups
G. A. Goldin 197

Quantization and Systems of Imprimitivity for the Group of Diffeomorphisms
P. Štovíček 208

The Probability Current in Geometric Quantization
F. J. Bloore and J. Underhill 219

Dynamical Quantization
I. Saavedra 227

2. Geometrical Properties

U(1) Anomaly and Index Theorem for Compact and Euclidean Manifolds
L. O'Raifeartaigh 234

Parallel Transport and Holonomy along Density Operators
A. Uhlmann 246

Representations of the Heisenberg Algebra, Riccati Systems, and Associated Geometric Structures
P. Feinsilver and J. Kocik 255

Reconstructability Subspaces of Minimal Dimensions
A. Jamiołkowski 263

III. SUPERALGEBRAS AND SUPERSPACE

1. Lie Superalgebras, Superspace

Casimir Elements of the General Linear and the P-Type Lie Superalgebras
M. Scheunert 275

Structure of Verma Modules and Characters of Irreducible Highest Weight Modules over N = 2 Superconformal Algebras
V. K. Dobrev 289

Global Utiyama's Theorem in Curved Superspace
U. Bruzzo 308

2. Spectrum Generating Algebras

The Algebraic Method and Relativistic Superconformal Quantum Mechanics
A. Bohm 317

osp(1,4) as a Relativistic Spectrum-Generating Superalgebra: The Simplest Representation
M. Loewe 343

IV. CLIFFORD ALGEBRAS AND APPLICATIONS

High Spin Forms
I. M. Benn and R. W. Tucker 355

Electromagnetism and the Holomorphic Properties of Spacetime
N. A. Salingaros 370

A Clifford-Radon Transform in Euclidean Space
F. Sommen 377

Iterated Dirac Operators and Conformal Transformations in R^n
J. Ryan 390

V. GEOMETRICAL MODELLING OF SPECIAL SYSTEMS

Orbiting Dust under Radiation Pressure
J. C. van der Meer and R. Cushman 403

A Model of Growth of Crystalline and Amorphous Structures. Application to Penrose Tilings
R. Kerner and D. M. Santos 415

Group/Subgroup Techniques and the Structure of Quasicrystals
P. Kramer 423

A Study of the Nuclear Multiquark System
H. R. Petry 438

Geometry of Thermodynamics
R. S. Ingarden 455

Natural Hamiltonian Systems on Spaces of Embeddings
E. Binz 466

Reflection Groups, Torsion-Free Connections and Dynamical Systems
H. Hess 479

VI. DIFFERENTIAL GEOMETRIC TECHNIQUES

Moduli of Twistor Spaces
V. V. Tsanov 507

Systems of Connections and Invariant Lagrangians
M. Modugno 518

On Connections and Holonomy Algebras
R. H. Oehmke 535

The Symmetry and Exact Solutions of Some Multidimensional Nonlinear Equations of Mathematical Physics
W. Fushchich 544

LIST OF PARTICIPANTS 551