

Lecture Notes in Physics

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Supersymmetry and Supergravity Nonperturbative QCD

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PREFACE

Every few years the Tata Institute of Fundamental Research (Bombay) has been organizing a summer or winter school on some aspects of Theoretical Particle Physics. This tradition started in 1961 under the direction of the late Homi J. Bhabha. The latest in this series was held at Mahabaleshwar from the 5th to the 19th January (1984) and these proceedings contain written versions of most of the lectures delivered there.

The aim at this winter school was to focus on recent advances in the two areas of supersymmetry $\frac{1}{m}$ supergravity and nonperturbative QCD. The organizers meant to introduce research workers at various levels to developments in these current mainstreams. This is reflected in the present volume. Introductory and pedagogical lectures are followed by in-depth detailed treatments as well as technical and specialized discussions.

In the first of the two areas cited above, S. Joglekar introduces the basics of global supersymmetry. The following course by S. Ferrara covers local supersymmetry and its coupling to Yang-Mills theories including extension to the $N=2$ case. On the other hand, the lectures delivered by P. Nath stress the link with unification of the $N=1$ supergravity theory and the model-independent phenomenologically interesting features of the subject. The supplementary lectures of L. Hall, S. Raby, R.N. Mohapatra and R. Godbole are directed at specific topics of current interest.

In the area of nonperturbative QCD, the course by T. Eguchi is a pedagogical overview of the subject covering $1/N$ expansion techniques as well as lattice QCD. The lectures by S. Wadia stress the nonperturbative link between QCD and chiral symmetric models. The contributions from G. Bhanot and M. Atiyah focus on more specific topics, namely numerical simulations in QCD and the topological basis of anomalies. Finally, the last course by J. Maharana is in some sense a bridge between the two areas of our title in that it discusses the link between supersymmetry and stochastic quantization as well as issues related to non-perturbative dynamical breakdown of supersymmetry.

This school was organized by the Tata Institute of Fundamental Research. Financial aid was also received from the Department of Science and Technology of the Government of India, the Yamada Foundation of Japan and the U.S. National Science Foundation. We thank these organizations for their generosity. The authorities of The Club, Mahabaleshwar, deserve thanks for their cooperation. We also thank our lecturers and participants for their enthusiastic response. We are grateful to the

other members of the organizing committee and the superintendent for their assistance. The careful typing of S.K. Bhonslay and the proof reading by S. Mukhi deserve mention.

Probir Roy
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