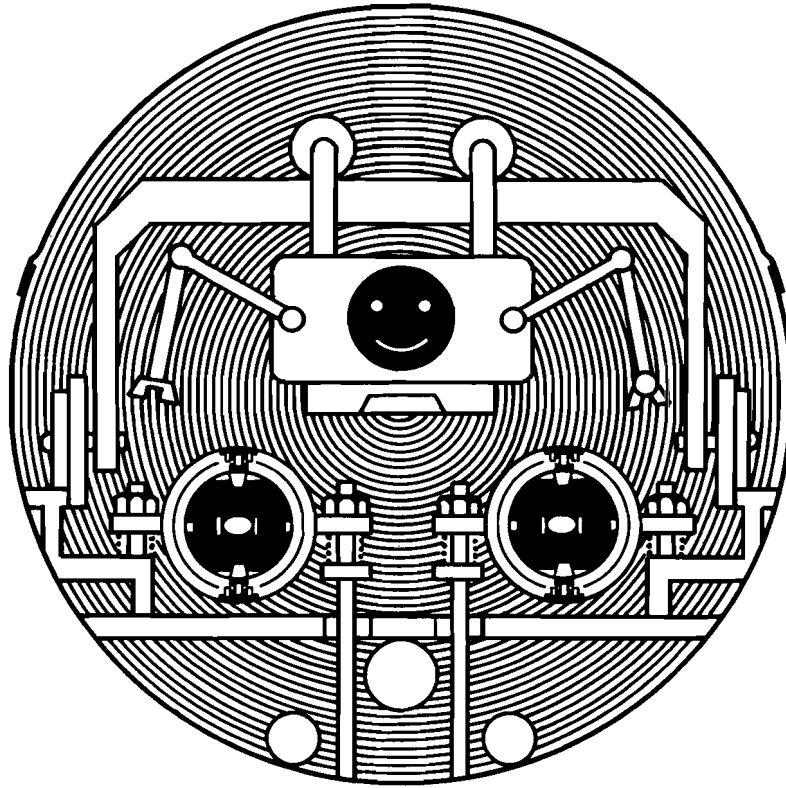


Proceedings Of The 1982 DPF Summer Study On Elementary Particle Physics And Future Facilities

June 28-July 16, 1982
Snowmass, Colorado



Editors

Rene Donaldson • Richard Gustafson • Frank Paige

Organized by the Division of Particles and Fields
of the American Physical Society

Sponsored jointly by the United States Department of Energy
and the National Science Foundation

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PREFACE

The 1982 DPF Summer Study on Elementary Particle Physics and Future Facilities was held at Snowmass, Colorado, from June 28 to July 16, 1982. The summer study was organized by the Division of Particles and Fields (DPF) of the American Physical Society. The purpose of the summer study was to assess the future of elementary particle physics, to explore the limits of our technological capabilities, and to consider the nature of future major facilities for particle physics in the U.S. The emphasis was to start an in-depth study of the above topics. The organizers felt that it was not the aim of this summer study to reach any specific decisions or to make detailed recommendations about particular future facilities. It was their hope, however, that this volume of proceedings would provide useful input information for the decision-making groups in the near future.

The organizing committee, listed on the following page, consisted of the elected executive committee of the DPF and the chairmen of the user organizations of the four accelerator laboratories, augmented by an additional physicist from each of the four labs. This group drew up a more specific list of topics to focus the work of the summer study, which was expressed in the form of a matrix.

Facilities Physics and Technology	Colliders			Fixed Target Accelerators	Non- Accelerator
	Lepton Lepton	Lepton Hadron	Hadron Hadron		
Testing the Standard Model Electroweak QCD etc.					
Beyond the Standard Model Technicolor Supersymmetry Grand Unification etc.					
Limits of Accelerator Technology and Novel Accelerator Ideas					X
Novel Detector Ideas					

The reason for expressing these topics as a matrix was to emphasize the need for comparative studies of how each possible future facility can contribute to answer the physics questions which are likely to be important. Another aim of this matrix of topics was to encourage interactions between physicists from different areas of interest and expertise. Most people attending the study felt that these aims succeeded to a considerable extent.

To carry out the work of the study the participants divided into working groups corresponding to the rows and columns of the matrix of topics, with each participant typically being active in both one of the row groups and one of the column groups. The leaders of these working groups are listed on the following page. The organizers are particularly grateful to these group leaders, who coordinated the work of the study at Snowmass, gave the summary reports, and carried the main responsibility for writing the group reports for these Proceedings.

There was an attempt to keep the formal meetings of the entire study to a minimum to allow the working groups as much time as possible to do their work. At the beginning of the first week, there was a general introductory meeting followed by organizational meetings of the working groups. In the second week, there was a series of talks presenting the programs and future possibilities of the major U.S. and European accelerator labs. At the end of the third week, there was a series of summary reports from the working groups. There was also a very lively session discussing the sociology of particle physicists in the U.S.

The attendance at the summer study was open to all active particle physics in the U.S. There were about 150 participants at the study, with approximately two-thirds from universities and one-third from the national laboratories. There was also a representation of European physicists, as well as from the main funding agencies active in this field, the Department of Energy and the National Science Foundation.

The organizers of the summer study are very grateful to a number of people whose outstanding efforts made the study possible. Bob Diebold, the Secretary-Treasurer of DPF, was responsible for the operational organization of the study. Joanne Day, assisted by Sandy Klepec, Rene Donaldson, Kathy Ayres, and Barbara Angelos, did a tremendous job in both the planning and the carrying out of the administration of the study.

In particular, Joanne's cheerful efficiency made the summer study with its pleasant social activities a happy occasion for all the participants. The editors of the Proceedings are grateful to Ellen Lederman, Marvin Goldberg, Bob Palmer, and Bob Diebold for photographs. Bud Wilson and his staff at the Snowmass Resort Association did a great job arranging the excellent living and conference facilities. The summer study would not have been possible without the financial support of the Department of Energy and the National Science Foundation. The participants were also grateful to the Argonne Universities Association for a grant to support some of the activities of the study.

In some ways, the 1982 DPF Summer Study represents a new departure in the field of particle physics. In the past, studies were typically held by the large laboratories to address problems specific to that particular laboratory. The 1982 DPF Summer Study was the first attempt in recent years to bring together physicists from the whole country to consider the future of our field from the point of view of the best overall national program. The DPF Executive Committee feels that this summer study was sufficiently useful in this last respect to hold similar summer studies at appropriate times in future years.

Charles Baltay
Chairman
Division of Particles and Fields of the
American Physical Society

DPF Summer Study on
Elementary Particle Physics and Future Facilities

Organizing Committee

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M. Beg
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E. Courant
R. Diebold
B. Gittelman
K. Gottfried
R. Gustafson
R. Lanou
A. Mann
T. O'Halloran
F. Paige
M. Pellet
M. Perl
F. Pipkin
L. Teng
G. West

Working Group Leaders

1. Testing the Standard Model
W. Marciano, H. H. Williams, H. Gordon
2. Beyond the Standard Model
M. Perl, G. Kane
3. Exploring the Limits of Accelerator Technology
M. Tigner
4. Novel Detector Ideas
S. Olsen, R. Ruchti
5. Lepton-Lepton Colliders
B. Gittelman, H. Wiedemann
6. Lepton-Hadron Colliders
T. O'Halloran, H. White
7. Hadron-Hadron Colliders
R. Palmer, J. Peoples
8. Fixed-Target Accelerators
L. Pondrom
9. Non-Accelerator Physics
A. Mann