

Preface

A small meeting of distinguished physicists working in different fields was organized at PRL from March 14 to March 16, 1995. The broad objective was to bring together experts who would raise some fundamental questions in their field and bring their own perspective to the discussion. The choice of topics reflects to a large extent the interests of PRL scientists. Consequently, the meeting was called "Fundamentals of Physics and Astrophysics". Before the meeting, we had no intention of bringing out the proceedings. At the conclusion, however, it was felt by all the participants that it would be worthwhile to have a published record. We are therefore very thankful to all the speakers who agreed to provide a manuscript of their talk. This took some time but finally we received all of them.

The subject matter of the talks is divided into five categories: i) Quantum Mechanics, ii) Particle Physics, iii) Plasma Physics, iv) Astrophysics, v) Statistical Physics.

In the first category V Singh discusses the measurement problem in Quantum Mechanics in the context of separation of system from the measuring apparatus. This led to the development of Causal Quantum Mechanics. R K Varma presented his work on formulating a conceptually unified description of Classical and Quantum Mechanics. These two talks were in the realm of foundations of Quantum Mechanics. The remaining three contributions in this category relate to other developments in Quantum Mechanics. N Mukunda talked about a kinematic approach to describe the Berry phase. Avinash Khare discussed the development of Supersymmetry in Non-relativistic Quantum Mechanics. Some of the difficulties that arise in a merger of Quantum Mechanics and General Relativity were brought out by Partha Ghose in his talk.

In Particle Physics, the talks were addressed to two important questions. Spenta Wadia discussed the question of confinement in 2+1 dimensional Yang Mills theory. The CP symmetry and its violation were the subject of S D Rindani's talk.

There were three talks on Plasma Physics. B Buti gave a general account of chaos and its implication in Plasma Physics. N N Rao reviewed many aspects of nonlinear wave modulations in plasmas. P K Kaw talked about thermodynamics of nonlinear plasma system. (These proceedings carry a reference to the complete paper published elsewhere).

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In Astrophysics, V Sahni described Large Scale Structure of the Universe. V Krishan talked about the Rotation Curves of Galaxies and the problem of missing mass.

In the Statistical Physics section, there is one contribution by M Barma. For a model complex system in which there are many steady states he showed how to find a labelling scheme for the large number of steady states. This problem is of crucial importance in glass, spin glass and rubber.

We believe the contributions contained in this volume would be of value to the physics community particularly because the current trend is towards highly specialized meetings.

We would also like to express our thanks to Mr V T Viswanathan for very extensive help first with typing several manuscripts and making all of them computer ready.

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