

## LARGE SCALE STRUCTURE FORMATION

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# LARGE SCALE STRUCTURE FORMATION

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## FOREWORD

The modern Persian word for cosmology is "Keyhan-shenakht", which is also the title of a Persian book written more than 800 years ago. The same term can also be found in Old Persian. In spite of this old tradition, modern cosmology is a newcomer within the scientific disciplines in Iran. The cosmology community is small and not yet well established. Given the spectacular recent advances in observational and theoretical cosmology, the large amount of new observational data which will become available in the near future, and the rapid expansion of the international cosmology community, it was realized that Iran should play a more active role in the exciting human endeavour which cosmology constitutes. This was the main motivation to establish a School on Cosmology in Iran. The plan is to hold a cosmology school every three years somewhere in Iran.

The focus of this First School on Cosmology was chosen to be *structure formation*, a rapidly evolving cornerstone of modern cosmology. The topics of the school were selected in order to give both a broad overview of the current status of cosmological structure formation, and an in-depth discussion of the key issues *theory of cosmological perturbations* and *analysis of cosmic microwave anisotropies*. The lectures by Blanchard and Sarkar give an overview of homogeneous cosmological models and standard big bang cosmology. In his contribution, Padmanabhan presents a comprehensive discussion of the growth of cosmological perturbations. Two series of lectures were devoted to theories for the origin of fluctuations: inflationary cosmology and topological defect models. The lecture course of Zaldarriaga gave an introduction to the new tools to calculate cosmic microwave anisotropies, an area in which there has been spectacular recent progress. In the lectures on topological defects, the extension of these tools to non-Gaussian models is presented (to our knowledge for the first time) in detail. In his seminar, Moniez presented the current status of the gravitational microlensing experiments. The final lecture series of the school was devoted to some new ideas in cosmology.

We are grateful to all of the lecturers for their contribution to making

the School a success, and for sending us writeups to be included in this volume. We also thank J. Barrow, J. Peebles, J. Silk, Q. Shafi, and C. Steidel for very valuable advice during the planning of the school. Thanks to the generous support of the Kish Free Zone directorate, the first School could be held on Kish Island, the so-called “Pearl of the Persian Gulf”. We also gratefully acknowledge financial support from the Abdus-Salam ICTP and from UNESCO. Without their support the School could not have succeeded in achieving its goals. We are indebted to our colleagues and to the administrative staff of IPM for the enthusiasm, time, and advice contributed during the period the School was being organized and run.

Reza Mansouri  
Robert Brandenberger