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A Pan-Chromatic View of Clusters of Galaxies and the Large-Scale Structure

Springer

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Preface

The study of clusters of galaxies has advanced tremendously in recent years due to the advent of large or dedicated ground-based telescopes, the increasingly sensitive space observatories and the significant advances in numerical astrophysics and cosmology. The current generations of large spectroscopic and wide-field imaging surveys and ongoing multi-wavelength studies are making major breakthroughs in our understanding of galaxy aggregation and transformation processes in different environments, on the properties of the tenuous ICM gas, on the starburst activity and on revealing environmental effects on galaxy formation and evolution.

We therefore felt that it was timely to update previous reviews on the physical nature of clusters of galaxies, their evolution, their galaxy, dark-matter and gas content and the cosmological constraints that they can provide.

This book is the selection of invited reviews, presented during the 2005 Guillermo Haro Advanced School (GH2005) on *"A Panchromatic view of Clusters of Galaxies and the LSS"*, organized by the *Instituto Nacional de Astrofísica, Óptica y Electrónica* in Tonantzintla, México. As the title of the school indicates, a variety of cluster physics themes were discussed: the physics of the ICM gas, the internal cluster dynamics, the detection of clusters using different observational techniques, the great advances in analytical or numerical modeling of clusters, weak and strong lensing effects, the large-scale structure as traced by clusters, the cosmological significance of clusters as well as the formation and evolution of clusters and the cosmic-web within the new cosmological paradigm.

The GH2005 advanced summer-school provided the opportunity to disseminate the new results and methodologies of cluster research to approximately a hundred senior graduate students and post-docs from all over the world.

The organizers of the school are deeply indebted to the distinguished lecturers for their excellent presentations and contributions to this book, the students of the school for their interest and inquisitive attitude which helped deepen the discussions, the INAOE which hosted this summer school and the Mexican government which through the *Consejo Nacional de Ciencia y*

Technología dealt with the financial and logistic aspects of our endeavour. We would also like to thank the *The American Astronomical Society* and *The Harlow Shapley Visiting Lectureship Program* for supporting one of our lecturers (Christine Jones) and last but not least, the *Talavera de La Luz* for allowing us to use their artwork for our poster.

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