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Foreword

This special issue contains invited papers presented at the Sixth NCTP Workshop on Nanostructures and Quantum Confinements, held at the Institute of Advanced Studies (IAS) of the Australian National University (ANU) from 30 November to 8 December 1998. The IAS is the research and graduate teaching section of the ANU. The Department of Theoretical Physics belongs to the Research School of Physical Sciences and Engineering, which is one of the research schools of the IAS. The Department of Theoretical Physics administers the National Centre for Theoretical Physics (NCTP), now renamed as the Australian National University Centre for Theoretical Physics (ANUCTP), which is a partner of the National Institute of Theoretical Physics (NITP) (see the world web sites <http://rsphysse.anu.edu.au/~grp105/CTP/About.html> and <http://www.physics.adelaide.edu.au/itp/>).

In 1994 the NCTP took the initiative to start a series of research workshops, beginning with the topic of high-temperature superconductivity for a period of 13 weeks. Due to budget constraints these workshops are now conducted for shorter periods. The present workshop on nanostructures was conducted for only 10 days by inviting over twenty active workers from overseas and within Australia. The program provided a natural meeting ground for theorists and experimentalists to establish a dialogue on the underlying physics common to both groups.

Topics at the workshop covered a wide variety of low-dimensional physical systems and nanostructures, such as low-dimensional electron gases, quantum devices (quantum dots and quantum wires), layered magnetic systems exhibiting giant and colossal magnetoresistance, nanocrystals exhibiting nonlinear optical properties, pancake vortices in high T_c superconductors, atomic clusters and cluster-assembled materials (C-60), Bose–Einstein condensation in atomic vapours, etc. Many quantum phenomena are associated with these systems that have likely implications for future nanotechnology.

Directed and intense discussions were a particular highlight of this workshop. The physics of quantum wells, tunnelling devices, single electron transistors, electron transport and noise were some of the main topics widely discussed during the workshop. For a variety of reasons we were able to collect only some of the papers presented at the workshop, but with the hope that this special issue gives an indication of our activities in this novel area.

We would like to thank Professor Erich Weigold, Director of the Research School of Physical Sciences and Engineering, Professor Robert Dewar, Head of Theoretical Physics, and members of the organising committee for their support and to all the participants for their valued contributions. Special thanks to Ms Heli Jackson, Workshop Administrator, for her help in organising the workshop.

Mukunda Das

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