

The Quantum Universe

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PREFACE**The Quantum Universe**

This special issue of *Journal of Physics A: Mathematical and Theoretical* entitled ‘The Quantum Universe’ is dedicated to Professor Giancarlo Ghirardi on the occasion of his 70th birthday. Giancarlo Ghirardi has made many important contributions to the foundations of quantum mechanics including the celebrated Ghirardi–Rimini–Weber (GRW) model of spontaneous wavefunction collapse.

However, although Professor Ghirardi’s birthday is the inspiration for this issue, it has a much broader scope than the area traditionally known as Foundations of Quantum Mechanics. All invited authors are experts in areas of physics in which quantum theory is fundamental: non relativistic quantum mechanics, quantum computation and information, quantum field theory, quantum gravity, quantum cosmology and philosophy of science. The issue was conceived as an opportunity for workers in these diverse areas to share with the widest possible readership their views on quantum theory. Authors were encouraged to give their personal assessment of the role of quantum theory in their work particularly as it pertains to a vision of the global aims of their research. The articles are accessible to any physicist with a solid knowledge of quantum mechanics, and many contain an emphasis on conceptual developments, both those achieved and those hoped for.

One theme that runs throughout Giancarlo Ghirardi’s contributions to science is the unity of physics: the development of the GRW model itself was motivated by the conviction that the same physics should govern microscopic and macroscopic systems. However, readers of this special issue will clearly see that there is no unity as yet in the views of workers on fundamental quantum theories. Indeed the diversity of the articles, ranging from technical developments in well defined approaches, to new proposals for interpretations of quantum mechanics, indicates the state of fundamental physics: healthily active and yet lacking the consensus we seek in science.

Much work clearly remains and this volume has the potential to be a lasting reference recording the achievements of, and crucial further challenges for, our quantum community.

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Guest Editors