Preface

We read in order to know we are not alone, I once heard, and perhaps it could also be suggested that we write in order not to be alone, to endorse, to promote continuity.

The idea for this book took about ten years to materialize, and it is the author’s hope that its content will constitute the beginning of further explorations beyond current horizons. More specifically, this book appeals to the reader to engage upon and persevere with a journey, moving through the less well explored territories in the evolution of the very early universe, and pushing towards new landscapes. Perhaps, during or after consulting this book, this attitude and this willingness will be embraced by someone, somewhere, and this person will go on to enrich our quantum cosmological description of the early universe, by means of a clearer supersymmetric perspective. It is to these creative and inquisitive ‘young minds’ that the book is addressed.

The reader will not therefore find in this book all the answers to all the problems regarding a supersymmetric and quantum description of the early universe, and this remark is substantiated in the book by a list of unresolved and challenging problems, itself incomplete.

Consequently, the idea is to provide a description of the many features present in a supersymmetric perspective of quantum cosmology. The book is split into two volumes:

- In Vol. I, entitled Fundamentals, the reader will find an accessible primer. After a contextualized introduction and guidance through possible routes of exploration, the essential content starts with a chapter presenting quantum cosmology in general terms. It is then followed by a chapter summarizing the ideas and methods of supersymmetry and supergravity. It is only afterwards that a thorough supersymmetric analysis of some relevant (quantum) cosmological models is undertaken. More precisely, the reader and fellow explorer is introduced to the main ideas, techniques, achievements, and problems, which characterize the research subject of supersymmetric quantum cosmology (SQC). Different approaches that have been employed in SQC will be discussed, bringing them together for the first time in a book publication.
- In Vol. II, entitled Advanced Topics, the scope for analyzing quantum cosmological models within a supersymmetric framework is broadened. The aim is
to provide those who have worked through Vol. I with an introduction to more topics, as well as some complementary developments. Volume II adds furthers essentials and additional (optional) frameworks to employ within SQC.

The above objectives for this book will be helped along with a detailed set of exercises, accompanied by the corresponding solutions. A display of summary boxes (outlining relevant features, concepts, and results in the form of reviewing questions) will be added at the end of each chapter.

It is hoped that this book will stimulate the interest of (a) final year undergraduates, (b) graduate students, (c) lecturers designing a course that will include aspects of superstrings and supergravity from a quantum mechanical and cosmological point of view, and (d) researchers who would like to either initiate or apply SQC methods and ideas in their work. The reader is assumed to have a good working knowledge of mathematical analysis, quantum mechanics, modern cosmology, field theory, and general relativity theory. A prior knowledge of quantum cosmology is not a condition to start using this graduate textbook. In particular, concepts related to supersymmetry/supergravity or quantum cosmology will generally be presented within the book as indicated.

Finally, before embarking upon the many technical details of this fascinating exploration, I would like to share with the reader the following words by Alberto Caeiro (Fernando Pessoa):

Aceita o Universo
Como to deram os deuses.
Se os deuses te quisessem dar outro
ter-to-iam dado.
Se há outras matérias e outros mundos –
     Haja.

London, Köln, and Covilhã

Paulo Vargas Moniz
Quantum Cosmology - The Supersymmetric Perspective
- Vol. 1
Fundamentals
Moniz, P.V.
2010, XII, 350 p., Softcover
ISBN: 978-3-642-11574-5