

Precision Cosmology: The First Half Million Years

By Bernard J. T. Jones



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Cosmology seeks to characterise our Universe in terms of models based on well-understood and tested physics. Today we know our Universe with a precision that once would have been unthinkable. This book develops the entire mathematical, physical and statistical framework within which this has been achieved. It tells the story of how we arrive at our profound conclusions, starting from the early twentieth century and following developments up to the latest data analysis of big astronomical datasets. It provides an enlightening description of the mathematical, physical and statistical basis for understanding and interpreting the results of key space- and ground-based data. Subjects covered include general relativity, cosmological models, the inhomogeneous Universe, physics of the cosmic background radiation, and methods and results of data analysis. Extensive online supplementary notes, exercises, teaching materials, and exercises in Python make this the perfect companion for researchers, teachers and students in physics, mathematics, and astrophysics.



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Editorial Review

Review

'Jones has been contributing to cosmology since the 1970s, when it was a small data-starved science. In Precision Cosmology he traces the development to the many lines of theory and observation that now fit together so well in the established cosmology. The book progresses from conceptual to increasingly formal, making it accessible to a broad range of readers. They will find a steady supply of references on how to work out all the details, citations to literature that go beyond the standard ones, to interesting and sometimes surprising connections that better inform understanding of how cosmology grew. This is a useful book for teaching and reference.' James Peebles, Princeton University, New Jersey

This book gives a fascinating account of how observations in the last hundred years have changed the perception of our Universe. It leads the reader from a historic account of the most dramatic discoveries of the recent past to a description and interpretation of the latest experiments. This book describes the detailed knowledge of our Universe that is supported by numerous experiments including the recent discovery of gravitational waves and, most importantly, will be tested by many more in the nearby future. It is a welcome beacon that both researchers and students can use in the fast changing field of precision cosmology. A particularly attractive pedagogical feature is that most of the cosmology is first introduced in a Newtonian context thereby avoiding as much as possible the complexities of General Relativity. Many exercises and online supplements further assist the reader. I full-heartedly recommend this book to anyone who wants to understand the Universe we live in.' Eric Bergshoeff, Willem de Sitter Chair in Theoretical Physics, Rijksuniversiteit Groningen, The Netherlands

This is an extremely impressive book that manages to synthesise the theoretical background underpinning modern cosmology with the latest statistical analysis of available data into an invaluable resource for graduate students and experienced researchers alike. It is refreshing to see such a thorough exposition of this huge and complex topic starting from basic concepts through to the forefront of modern research. I also very much appreciated the attention paid to the historical development of the subject that puts more recent advances in their proper context, with copious references to important foundational papers. This book is an immense achievement, for which the cosmological community owes Bernard Jones a substantial debt of gratitude. I'm sure it will be essential reading for current and future cosmologists for many years to come.' Peter Coles, Cardiff University

About the Author

Bernard J. T. Jones is Emeritus Professor in Astronomy at the Kapteyn Astronomical Institute of the University of Groningen, The Netherlands.

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