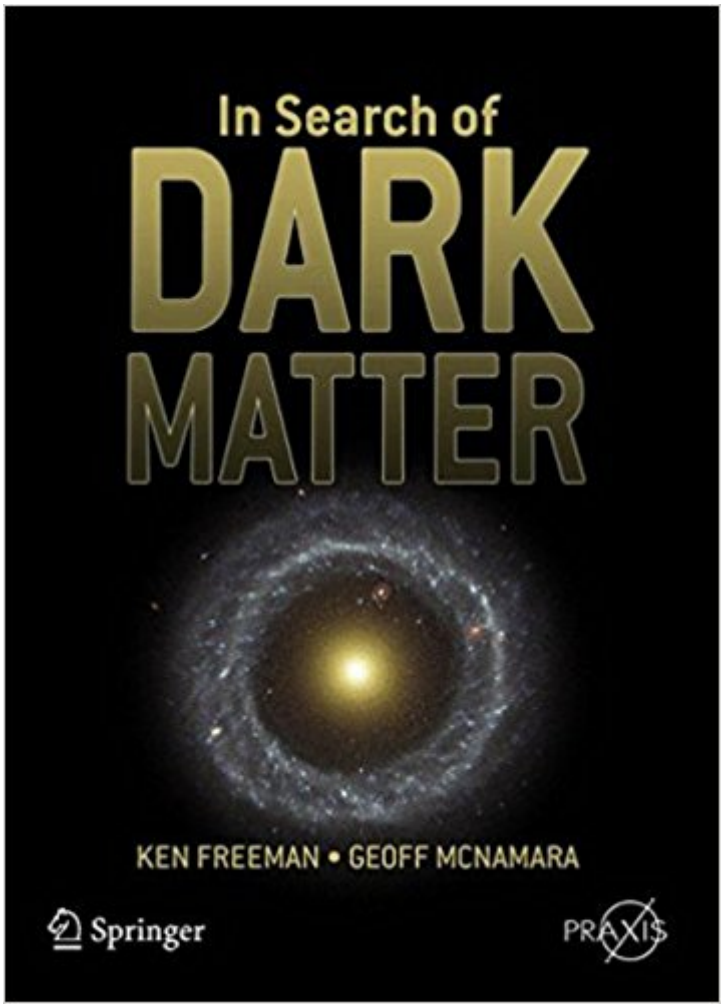
In Search Of Dark Matter (Springer Praxis Books)



Synopsis

Written for the educatedÂ non-scientist and scientist alike, it spans a variety of scientific disciplines, from observational astronomy to particle physics. Concepts that the reader will encounter along the way are at the cutting edge of scientific research. However the themes are explained in such a way that no prior understanding of science beyond a high school education is necessary.

Book Information

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Customer Reviews

From the reviews: "Foremost amongst our talents is deduction. Using logic and reasoning, a truth can be determined without direct evidence. Ken Freeman ands Geoff McNamara in their book â | showcase this talent. â | Given the state of unknown portrayed, this book would be a great tool to lure undergraduate students into the field of astronomy. â | Throughout, there are well appointed photographs to entice the reader â | . the book will bring fundamental answers about our existence and likely a lot of fame to the finder." (www.universetoday.com, December, 2006) "Pinning down exactly how much dark matter there is in the Universe, and discovering what this enigmatic stuff is made of, has to be among the most important issues in modern astronomy. â | Arguments are presented simply â | so this is a read that is suitable for a beginner without patronizing those already familiar with many of the ideas. â | In Search of Dark Matter really is an excellent little book." (Alan Longstaff, Astronomy Now, September, 2006) "â ˆIn Search of Dark Matterâ ™ has a textbook feel â | . It is a concise chronicle of the discovery of dark matter and the efforts to find out what it is and what part it plays in the Universe, from the Big Bang to the present." (Helen Close, Astronomy and

Space, January, 2007) "This little book (158 p.) is an excellent introduction for non-specialists to the search of dark matter, and more generally to modern observational cosmology. â | More than 30 illustrations, photographs and sketches, accompany the text, in a pleasant and effective way. â | The book is thus both accessible to readers with little academic training in physics, and useful to physicists to whom it provides a lot of information on this fascinating and rapidly expanding field. â | I warmly recommend it." (Pierre Marage, Physicalia Magazine, Vol. 29 (2), 2007)

Ken Freeman is Duffield Professor of Astronomy at the Australian National University (Research School of Astronomy & Astrophysics, Mount Stromlo Observatory) in Canberra. He studied mathematics at the University of Western Australia and theoretical astrophysics at the University of Cambridge, followed by a postdoctoral year at McDonald Observatory (University of Texas) with G. de Vaucouleurs and a year as a fellow of Trinity College, Cambridge. He returned to Australia in 1967 and has been there ever since. His research interests are in the formation and dynamics of galaxies and globular clusters, and particularly in the problem of dark matter in galaxies: he was one of the first to point out (1970) that spiral galaxies contain a large fraction of dark matter. Since then, he has written many papers on dark matter in spiral and elliptical galaxies. He was a founding member of the MACHO collaboration which used microlensing techniques to search for galactic dark matter in the form of compact stellar-mass objects. For his current research, he uses the optical and radio telescopes in Australia, and also observes with the Hubble Space Telescope and large optical telescopes in Spain, Chile, and Hawaii. He has written about 500 research articles. Geoff McNamara has been writing about and teaching science and technology since the mid-1980s. He has had approximately 150 articles published in magazines ranging from Electronics Australia, Astronomy, Sky & Space, and Nature Australia. In 1997 he coauthored a popular level science book "Ripples on a Cosmic Sea - the search for gravitational waves" with Associate Professor David Blair (Allen & Unwin, 1997), and contributed a chapter to "The Universe Revealed" (Mitchell Beazley, 1998). He taught Ophthalmic Optics at Sydney Institute of Technology from 1987 to 1999, and has presented many courses and talks on astronomy for the public. He has been teaching science at Campbell High School in Canberra since 2000. In 2003 he began teaching Astronomy and the course has continued to grow in popularity. In 2005 the Astronomy courses were completed by approximately 130 students.

This book sets out the evidence for missing matter in the universe in an entertaining yet thorough way. There is virtually no math in the entire book, and yet each subject area is treated fully. I had

thought the first evidence for dark matter was star rotation rates in galaxies as set out by Vera Rubin and others. However this book traces the roots of the "something is wrong with our picture of the universe" back to the 1930s and Fritz Zwicky and Jan Oort--two astronomers who could not be more different from each other. And that is another strength of this book--we learn something about Zwicky and Oort without being seriously sidetracked."In Search of Dark Matter" strikes a perfect balance between moving the story along (and it does read like a story) and stopping here and there for brief asides about the personalities and milieu involved at the various stages of dark matter research. Finally, alternatives such as MOND theory are discussed. This book is not a deep tome--it is only roughly 150 pages. But it certainly piqued my interest and made me want to find out more. The authors succeed in bringing up most topics assuming little or no background in astronomy, yet don’t get mired explaining the basics. A great read!

answers many "simple" questions that other books don’t. v.v.good

Very interesting book

I found this book to be very informative, up to date, and could be understood by the layman

The book is very well organized and enjoyable to read. Well done!

The title of this book caught my attention because so-called Dark Matter is an important and puzzling issue in modern astronomy. In brief, the stars we see have insufficient mass to account for the gravity of galaxies and galactic clusters. The missing mass must reside in non-luminous, i.e. Dark Matter.This book starts out promisingly enough. Ken Freeman and Geoff McNamara do a good job of framing the question and explaining how astronomers found a discrepancy between the amount of visible matter and the observable gravitational effects. After the first few chapters the book loses its way. It becomes more of a survey of the ideas on the subject rather than an effort to choose between them and present a coherent point of view. It is clear that ordinary matter in the form of protons, neutrons, electrons, etc is not present in sufficient quantities to explain the gravitational effects. Something else with a specific distribution that can be inferred from astronomic observations must account for the remaining gravitational effects. This leads to somewhat vague discussions of the possible mass of neutrinos, black holes (massive and small) and of exotic particles like WIMPS (weakly interacting massive particles) and axions. At the end of it all the

authors are not inclined to share with us where their preference lies. Instead, they divide the missing mass into Hot Dark Matter (HDM) and Cold Dark Matter (CDM). The difference between them is poorly explained, but at the end the authors tentatively come down on the side of CDM, albeit with caveats. Judging by the tenor of the last few chapters they seem to feel that they have provided a satisfactory account.The last chapter is actually the best because it is co-authored by Charles Lineweaver, who himself being a contributor to constraints on the cosmological constant is willing to take a clear stand. Unfortunately, this is also the point where it is revealed that in terms of the cosmological constant (omega) baryonic matter accounts for 0.04 of the contents of the universe, (cold) dark matter for 0.27 but a huge 0.73 is Dark Energy (the total being close to the desired 1.0). Dark energy barely gets and discussion. Although this preponderance of dark energy should come as no surprise to the interested layman who has kept up to date with developments in astronomy, it does seem to beg a whole different book with another title.Notwithstanding the closing paragraph's self-congratulatory but ambiguous remarks, readers will want to go in search of dark energy.

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