

Preface

One of the most exciting discoveries of the 20th century was that of companions of broadly planetary mass orbiting stars similar to our Sun. This was not a chance, one off, discovery. More than a hundred and fifty planetary companions are known around other solar-type stars at the present time and more are being discovered month by month. The discovery of these companions, called here exo-planets, brings to life the vision of a complete Universe in which the Earth is not a unique object but one of a class of cosmic bodies. It also raises the emotive thoughts of other living creatures elsewhere perhaps observing and describing the Universe as we do on Earth. Does this bring to reality the speculations of thinkers over many centuries some of whom have forfeited their lives for indulging in so free ranging a philosophy? This introductory notebook tries to answer such questions and aims to provide a base from which the reader can develop a personal study of these issues. Of obvious interest to astronomers, these are also of great importance to a much wider audience. This notebook consists of thirty linked introductory essays designed to explain in simple terms what has been discovered and the background to this modern work.

Although this is designed to be a generally non-mathematical account, some of the arguments are simplified and are made more precise by the limited use of elementary mathematics, including elementary calculus. We also stress the value of dimensional analysis which is simple and direct in its application. The “powers of ten” index is also used: thus 100 is written 10^2 and one million as 10^6 , and so on. There is a short non-mathematical summary at the end of each essay so the reader wishing to avoid what mathematics there is, and there isn't a great deal, need not feel disadvantaged. The continual reference elsewhere for details of parts of arguments is rather off putting in practice and tends to break the flow of the argument. To avoid this, we have tried to make each essay self contained even though this will lead to some repetition.

The account is in six Parts. The first describes the importance of gravity for planetary systems. The second considers the Solar System in a little detail as the one planetary system we know better than any others. Magnetism is an important influence in the Solar System and is included next. The general properties of stars like our Sun, which form the heart of a planetary system and provide the energy to support much of it, are considered in Part IV. Next we review the general features of the exo-planet systems discovered so far. This is followed by comments on the possibilities for life in the Universe as a whole with possible relationships between inanimate and animate matter. Finally there is a Glossary intended to be developed by the reader as a personal dictionary for the subject. We also list some of the more important space highlights over recent years. Some problems are included together with solutions. The illustrations throughout the notebook have been assembled from a collection some of whose origins has been lost by the author. I hope those sources not mentioned will be kind and understand.

I hope you find the notebook interesting and useful. Its success will be due in no small measure to the members of the Imperial College Press, and especially Kim Tan and her colleagues, for their most excellent and understanding transformation from manuscript to finished book.

G.H.A. Cole
g.h.cole@hull.ac.uk
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