

Preface

It is a fundamental aim of all the physical sciences that its theories must be subjected to ever more rigorous tests until they fail to predict correctly the measurements that are made. The discrepancy between predictions and measurements is then a guide to improvements on such theories. Stellar evolution theory is no different. Because of the complexity of stars, well-tested fundamental physics has to be combined with (semi-)phenomenological descriptions of some processes, such as convection. Helioseismology and its younger cousin asteroseismology are new branches on the genealogical tree of stellar evolution studies. Their aim is to use the oscillation properties of stars to infer interior properties, thereby testing ideas on the internal structure of stars. By applying this technique to the Sun and to other stars over a range of masses, ages, and surface chemical composition, stellar evolution theory is tested. Without these techniques, only surface properties of single stars can be determined.

This book is intended to cover the methodologies used in helio- and asteroseismology. It should be viewed as a resource for post-graduate students and researchers already in the field, with the aim of providing background to, and examples of, the techniques that are necessary to follow the path from data to model parameters, and from model parameters to predictions for observables.

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