Preface

In 1988, in an article on the analysis of the measurements of the variations in the radial velocities of a number of stars, Campbell, Walker, and Yang reported an interesting phenomenon; the radial velocity variations of γ Cephei seemed to suggest the existence of a Jupiter-like planet around this star. This was a very exciting and, at the same time, very surprising discovery. It was exciting because if true, it would have marked the detection of the first planet outside of our solar system. It was surprising because the planet-hosting star is the primary of a binary system with a separation less than 19 AU, a distance comparable to the planetary distances in our solar system.

The moderately close orbit of the stellar companion of γ Cephei raised questions about the reality of its planet. The skepticism over the interpretation of the results (which was primarily based on the idea that binary star systems with small separations would not be favorable places for planet formation) became so strong that in a subsequent paper in 1992, Walker and his colleagues suggested that the planet in the γ Cephei binary might not be real, and the variations in the radial velocity of this star might have been due to its chromospheric activities.

Despite the 1992 article, the search for planets in binaries did not stop. Gamma Cephei was continuously monitored and more precise measurements of its radial velocity variations were obtained. In 2003, 15 years after the first announcement of the planet of this system, these efforts fruited, and in an article in *Astrophysical Journal*, Hatzes and his colleagues confirmed the existence of a Jupiter-like planet around the primary of γ Cephei. The planet became real, and so became many challenges that it introduced to the planetary science.

The 2003 confirmation of γ Cephei's planet, and the subsequent detection of giant planets in three other moderately close binary stars, GL 86, HD 41004 and HD 196885, marked the beginning of a new era on theoretical and observational research on planets in dual-star systems. During the past few years, much research has been carried out in this area, and a large number of excellent articles have been published on different aspects of observational and theoretical studies of planets in moderately close binaries. The depth of these articles, combined with their great diversity and the rich history of literature on the dynamical evolution of planets in dual-star systems has turned the field of planets in binaries into a well-established and an independent branch of exoplanetary science. This book is intended to intro-

duce this field to the community. In doing so, this volume presents the reader with the current state of the research on the detection and formation of planets in binary stars, written by teams of experts on these topics. The first half of the book focuses on the observational evidence for the birthplace of planets in binary systems, and techniques of detecting planets in and around dual-stars. The second half discusses the status of theoretical research on the formation of planets in binaries, from planetesimals, to planetary embryos, and eventually to giant and terrestrial planets. The last chapter presents a complete review of the dynamics of planets in binary star systems and the possibility of habitable planet formation in these environments.

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