

III.9

Star-planet Interactions

A. F. Lanza¹ and S. Ferraz-Mello²

¹ INAF-Osservatorio Astrofisico di Catania, Via S. Sofia, 78 - 95123 Catania, Italy
e-mail: nuccio.lanza@oact.inaf.it

² Instituto de Astronomia, Geofísica e Ciências Atmosféricas (IAG), Universidade de São Paulo, Brasil
e-mail: sylvio@iag.usp.br

Among the numerous lessons learnt thanks to the CoRoT mission, it is now clear that stellar systems should be considered as a whole, i.e. including both the planets and their host star.

While the communities interested in exo-planetary sciences and stellar physics were bound together by the same instrument, CoRoT, it soon appeared that they share a large number of common interests and that they address similar physical problems among which the star-planet interaction is the most striking.

The first is related to the determination of stellar and planetary parameters, and is discussed partly in Chapters IV.4 and IV.5. Indeed, understanding the planet-star systems requires the determination of the age, mass, and radius of the planet(s), key parameters that are inferred relatively to those of their host star.

And, determining accurate stellar parameters for planetary systems is a mandatory step to constrain the scenarios of planet formation and to determine under which initial conditions and at what stage of their evolution planets can provide a propitious environment for life. Since the formation of planets is intricately related to the formation and evolution of their host star, the ages of planets are directly inferred from those of their parent stars.

Beyond the need for a global approach to characterise the star-planet systems, our ability to understand and model those complex physical systems depends on our capacity to consider properly the interactions between planets and their host star.

They are certainly multiple. Indeed, radiation, magnetic, and gravitational fields are important ingredients to account for.

Understanding this relation is a challenging task since all those physical processes are intimately intricate with each others.

With the CoRoT data, some steps forward have been done. Two of them are presented in this chapter.

Acknowledgements: The CoRoT space mission has been developed and operated by CNES, with the contribution of Austria, Belgium, Brazil, ESA, Germany, and Spain.