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Abstract

This textbook, at the advanced undergraduate/introductory graduate level, follows a unified approach to the physics of the Sun and the physics of interplanetary space, both because they are governed by the same principles and because they constitute a unified system, the heliosphere. Moreover, we have attempted a balanced presentation of observational and theoretical issues, as well as of aspects related to the radiation and the plasma, and, as far as observations are concerned, a balanced presentation of information obtained from the entire electromagnetic spectrum, from long radio wavelengths to hard X-rays, as well as information from in situ measurements. After a brief introduction, we analyze the basic tools that allow us to extract information about the physical conditions on the sun from the electromagnetic radiation

it emits. We next describe the sun and the solar wind as a system with spherical symmetry, ignoring the horizontal variation of the physical parameters. A brief discussion of the physics of the solar interior follows and, after that, we pass on to some basic aspects of plasma physics, pertinent to the sun, including the interaction of the plasma with the magnetic field. We are thus ready to proceed with the discussion of the three-dimensional structure of the heliosphere. Explosive events are next, followed by the solar cycle. The last two chapters are devoted to the effects of solar phenomena in interplanetary space and the interaction with the terrestrial and planetary magnetospheres. The book concludes with four appendices, including an extended one on solar observations, bibliography and a list of site addresses.

