

Book Review

Basics of the solar wind, by Nicole Meyer-Vernet.
Cambridge University Press, 2007, 478 p., \$141, hardback
(ISBN-13 078-0-521-81420-1)

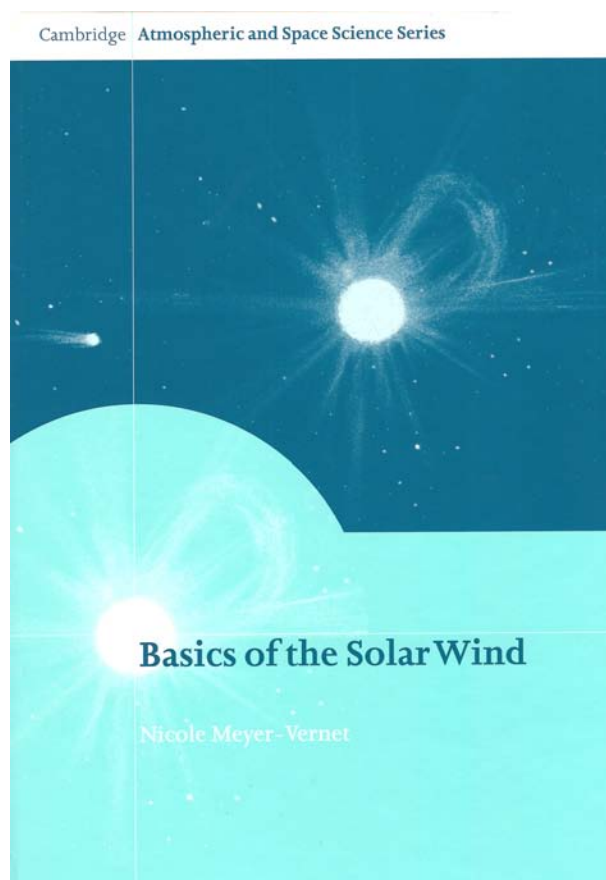
This book presents a very comprehensive account of practically everything that one has to know about the Sun that ejects the solar wind continuously, and in a temporal fashion, that itself is a signature of the dynamics of the Sun itself.

The book covers a large number of important aspects of the Sun in several chapters. To name a few, "Anatomy of the Sun," "The outer solar atmosphere," and "How does the solar wind blow," starting with a chapter on space plasma physics, which is essential for a non-specialist to follow the book. The treatment is mathematical in contrast to being descriptive. Thus the book is meant for a discerning student of science who wishes to quantitatively understand the structure and dynamics of the solar wind from first principles.

To fully realize the complexity of the solar wind, it is important to realize the stumbling blocks faced by scientists in discovering its existence. There is a long history of attempts made, initially by Kristian Birkeland who researched in the closing years of the nineteenth century, working on all the aspects: theory, laboratory experiments with a model Earth, and observations. He concluded that the Earth was permanently bombarded by "rays of electric corpuscles emitted by the Sun." His ideas, being far ahead of developments in physics, were largely ignored.

The topic of solar wind has been addressed earlier in a large number of reviews and books; yet, to a researcher, each of these leave behind a large number of questions. On the subject, the book by Meyer-Vernet is the most comprehensive that I have come across so far. Of course, the Sun is such a complex astrophysical object, not withstanding the fact that it is close to the Earth, that it is not physically possible to write down the "complete" theory of the solar wind. The author himself states: "This subject has hideously complicated aspects, and I had to make gross simplifications to avoid the fundamental ideas being lost in a morass of details." He also quotes Victor Weisskopf, who used to say at the start of a course: "I will not cover the subject; I will try to uncover part of it."

Ludwig Bierman and Sydney Chapman also theorized on solar wind, but the correct solar wind model was finally proposed by Eugene Parker in 1958 whose paper in *The Astrophysical Journal* (vol. 128, pp. 664, 1058) was originally rejected by reviewers, but then accepted for



publication by S. Chandrasekhar. Parker treated the solar atmosphere as a fluid and produced a robust model of the solar wind.

It is a pleasure to read Meyer-Vernet's book; see, for example, chapter 5 "How does the solar wind blow?" He gives back of the envelope derivation followed by simple fluid theory, and so forth and so on.

A highlight of the book is that at the end of each chapter the author poses relevant questions and gives ideas how to approach the solutions.

I highly recommend this book to anyone who wants to get a good grip on the solar corona and the solar wind.

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