



## Book Review

“*Physics of the Plasma Universe*”, Second Edition, by Anthony L. Peratt, Springer, 2015;  
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“Physics of the Plasma Universe Second Edition” by Anthony L. Peratt is a profound guide dedicated to plasma physics in the Solar System, the Milky Way and many objects therein other galaxies, active galactic nuclei and more. The book has 406 pages and its second edition was published by Springer in 2015. It is addressed to graduate students and researchers working in the field of cosmic plasma.

The second edition has been updated with new observations in the full energy range of the electromagnetic spectrum collected over more than the last two decades, since its first edition in 1992. The book describes a large number of theoretical and observational aspects of plasma. It presents a variety of topics including: the formation of magnetic fields, active galactic nuclei, star formation mechanisms, cosmic rays and plasma processes in the Solar System. Its content is divided into 13 chapters and 4 appendices. The last section is an index, which is very handy in case of occasional use.

The book “Physics of the Plasma Universe” begins with the cosmic plasma fundamentals. A large number of physical laws and problems presented to the reader makes the book a perfect introductory manual. The volume is full of equations which are well explained and understanding them should not be a problem even for young people starting in the field of cosmic plasma. Following chapters deeply

describe the effects of magnetic and electric fields on plasma based on theoretical considerations, which are applied to measurements in experiments in Earth laboratories and space missions. The issues related to synchrotron radiation and the transport of cosmic radiation are presented too. Many issues are also described from the point of view of numerical simulations, and even some advanced tips and difficulties regarding numerical works are discussed in separate chapters. The final chapters introduce further plasma experiments in laboratories and discuss some interesting aspects of universality of the plasma properties regardless of the measurement scale, which can range from microns up to gigaparsecs.

The text is well referenced to original works, and all of the references are listed at the end of each chapter. The author describes also the history of plasma science, which gives the reader a possibility to follow the progress and helps to grasp the further developments in the field. The content of the book is thoroughly explained not only by text and equations, but also by numerous figures. All of them are only b/w figures, which is understandable from the economical point of view. However, in some cases they are difficult to read, especially if presenting 3D plots. In several cases, captions and labels are too small or completely unreadable.

Anthony L. Peratt is a noted physicist specialized in plasma physics, which should be a sufficient recommendation to read his book entitled “Physics of the Plasma Universe”. The book is an excellent manual for young and experienced scientists interested in plasma physics. Plasma is so ubiquitous in astrophysical objects on different scales, ranging from Earth up to cosmological structures, that

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researchers who are not interested in plasma physics per se can benefit from reading this book and improve their understanding of the processes occurring in such objects. The second edition incorporates many recent results and makes the book an up-to-date guide through the science of plasma in the Universe.

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