Book Review

Astrophysics of Black Holes: From Fundamental Aspects to Latest Development, ed. Cosimo Bambi, Astrophysics and Space Science Library, vol. 440, Springer, 2016; ISBN: 978-3-662-52857-0, DOI:10.1007/978-3-662-52859-4

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The book entitled “Astrophysics of Black Holes. From Fundamental Aspects to Latest Development” is a textbook reporting lectures given during the Fudan Winter School on Astrophysical Black Holes that was held at Fudan University in Shanghai in February 2014.

During the winter school, six series of lectures were given by the experts, covering topics related to astrophysics of black holes and important directions in current research. The course was dedicated to master and PhD student starting their research in a science of black holes. Most of the lectures given during the school have been summarized in the book. The aim of this book is to become a reference book to researchers and students working on astrophysical black hole.

The content of the book is presented in five independent parts. First part, “Black Hole Accretion Discs” written by Jean-Pierre Lasota, presents introduction to the models of accretion discs around black holes. The introduction is very detailed and well written. The main aspects of the black hole accretion discs that are discussed in this section are the following: viscosity as a disc-driving mechanism, physics of thin Keplerian discs, disc instabilities, advection of energy, physics of accretion discs in Kerr spacetime, and slim-disc equations. There is large number of equations that are well described and really easy to understand for the reader. The most

important ones are highlighted which make understanding of the content even easier. The literature cited in this part is rich and very recent. All the figures, both black and white, and color ones, are clear.

The second part of the book, “Transient Black Hole Binaries”, by Tomaso M. Belloni and Sara E. Motta, focuses on X-ray, radio and infrared emission observed from the region of black holes including winds and outflows. The section starts with a comprehensive introduction. Further paragraphs present theoretical background of the subject and different models. A large number of figures are very helpful in understanding the text in this part.

The third part, “Black Hole Spin: Theory and Observations”, by M. Middleton, links theoretical models with observations. It mainly focuses on modeling of continuum disc spectrum and modeling of reflection spectrum. Results for binary black holes and active galactic nuclei are widely discussed. The “Useful theory” section is a very nice reminder of the theoretical aspects relevant to the topic of this part of the book. Again, detailed descriptions with large number of equations and examples can be understood effortlessly. Bibliography is rich and up-to-date and can help to find more details about the interesting topics.

The forth part “Winds from Black Accretion Flows: Formation and Their Interaction with ISM” by Feng Yuan is the shortest section of the book. Here, the reader can find well-written lecture completed with figures and recent references.

The last part “A Brief Review if Relativistic Gravitational Collapse” by Daniele Malafarina is dedicated to Einstein’s equations for the collapsing

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interior. This is a review of basic setup used to describe complete gravitational collapse of massive bodies within the general theory of relativity. Large number of complex equations presented in this section is well explained.

The intended aim of this book seems to be fulfilled. The content is rich in grounded knowledge and recent discoveries, which help students in their education and professional researchers in daily work. The material presented requires from the reader a good knowledge of thermodynamics, general relativity and calculus. It is an excellent textbook for graduate students rather than for beginning students. The diverse approaches presented by the lectures in this book allow to build a complete picture of physics of black holes and their surroundings.

Throughout the text, the authors use acronyms frequently, and unfortunately there is no list of

acronyms in the book. Additionally, adding an index will be very helpful for the intermittent readers.

To summarize, the course book “Astrophysics of Black Holes. From Fundamental Aspects to Latest Development” is a perfect volume for young scientists starting their research in a field of astrophysics of black holes. The book presents very deep and broad knowledge on the topic, in a well-written form, which can easily be understood by the reader. It is also very good position for more advanced scientists as well.

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