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Book Review

ITER: The Giant Fusion Reactor. Bringing a Sun to Earth. By Michel Claessens. Springer (2019). ISBN 978-3-030-27581-5.

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This 216-page book tackles a difficult task: explain the essence of the ITER project and the problematics of controlled nuclear fusion to the general public. In order to do so, the author approaches the problem from many sides, each contained within one of the 16 chapters. As such, the book provides not only basic information on the physics behind nuclear fusion and magnetic confinement but also the history of this scientific discipline and the ITER project itself (including personal testimonies of senior scientists and diplomats that go beyond the information included in official press releases). This part of the book also can be valuable to readers from within the fusion community as such information is usually omitted from the scientific publications but can be important in order to understand the present status of ITER.

The book also describes the construction works at the Cadarache site in detail, the distribution of the manufacturing of the main ITER components among the respective partners, and the logistic and communication issues related to this scheme. It attempts to depict the incredible complexity of the project on the technological, political, and human levels.

The author does not avoid discussion of the criticism of the ITER project, which is quite brave given the fact that he himself works for the ITER Organization. He is trying to debunk the most obvious misunderstandings and false claims that circulate in the media and scientific community. Some points of (scientific) criticism of ITER could benefit from more detailed explanations; however, I understand that this would be difficult to present in a way that would still be understandable for nonspecialists. I really appreciate the discussion about the meaning of fusion energy gain Q, which has recently garnered a lot of media attention. What I was missing a bit was the discussion of the criticism of ITER stemming from the bold claims of the various fusion startup companies that promise production of fusion power plant prototypes sometime well before ITER will enter deuterium-tritium operation. It is not surprising that under the influence of such exaggerated promises some journalists and members of general public may picture ITER as some kind of an obsolete dinosaur. I believe that dealing with this of criticism will be of increasing importance for the ITER Organization. Note that over-optimistic claims about the commercial availability of nuclear fusion in the past were what laid the foundation for the infamous "fusion constant" (stating that fusion will be available in 30 years), which is negatively impacting the public view of fusion research today.

Regarding the scientific side of the book, there are of course many simplifications, which are necessary in such types of publications. I found only two occasions where scientific explanations were in my opinion misleading. The first is the description of the divertor in chapter 5 (where poloidal magnetic field is mistaken for total magnetic field), and the second is the apparent confusion of discharge time and energy confinement time in chapter 12. However, these should not cause too much harm to a nonspecialist reader.

With respect to the description of the political and economic sides of the project, I could not help but get the feeling that the author was adopting a rather Franco-centric point of view. This is an unfitting choice for a publication written in English, which I assume is targeted to an international audience. I suppose that this is a result of the availability of information sources that the author had at hand. It would be interesting (and perhaps amusing) to confront, for example, the victorious narrative of how ITER ended up being hosted in Cadarache with information from other parties of the negotiations. Also, the detailed description of how much France is economically benefiting from ITER could potentially induce some bitter feelings among readers from other countries. This bias is partially compensated by almost anecdotal descriptions of (southern) French stereotypes in chapter 13.

Overall, I believe that the strongest trait of this book is that it can be helpful and attractive for a wide range of audiences. It can serve as an introduction to the topic for the general public. It can motivate young scientists to devote their careers to the research of nuclear fusion. It can teach the business partners to appreciate their collaboration with

the ITER project. It can also help people from the fusion community learn how to talk about their work with non-specialists. In this respect, the book is truly unique, and I really recommend it for reading.

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