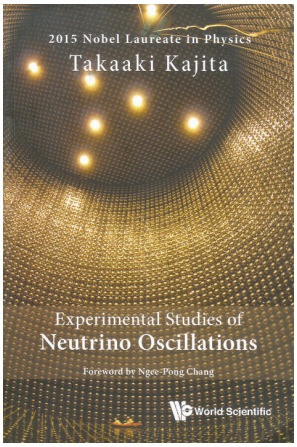

Experimental Studies of Neutrino Oscillations. Takaaki Kajita. World Scientific Publishing Co. Pte. Ltd, 5 Toh Tuck Link, Singapore 596224. 2016. vii + 98 pages. Price: US$ 18.

The book under review is a collection of articles by Takaaki Kajita, on the subject of atmospheric, solar and long-baseline neutrino oscillation physics. These articles recount the spectacular success story of solving the solar and atmospheric neutrino puzzles, as well as the considerable challenges that lie ahead. Kajita's guided tour of this exciting scientific expedition makes this a truly pleasant read.

Kajita won the 2016 Nobel Prize in Physics, for his outstanding contributions towards understanding the nature of neutrino mass and flavour mixing, through his role at the Super-Kamiokande collaboration. He shared this honour with Arthur McDonald, who played a similarly stellar role for the Sudbury Neutrino Observatory. This book is a collection of seven of his articles, previously published as stand-alone reviews or proceedings based on talks at notable conferences. As Ngee-Pong Chang remarks in a celebratory foreword, this volume is a record of and glimpse into the rise of Asian research at the frontiers of neutrino physics. It goes without saying that Kajita conveys the developments of the field from the thick of action, where he was a key player.

Chapter 1 provides a brief history of the neutrino, the physics of neutrino oscillations, the solar and atmospheric neutrino problems, and future directions. For readers unfamiliar with neutrino physics, this chapter provides a lucid self-contained introduction to the field.

Chapter 2 summarizes the state of solar and atmospheric neutrino oscillation data circa-2000, when both LMA-I and LMA-II solutions were allowed. Within a few hectic years, by 2002, the situation had changed, and chapter 4 describes the growing evidence for the LMA MSW solution, in no small part due to the data obtained at Kamiokande, leading to the solution of the solar neutrino problem.

Chapter 3 provides a circa-2002 overview of the JHF-Kamioka neutrino project. A neutrino beam with oscillation maximum at <1 GeV with a baseline of 295 km is proposed, with a 50 kton Super-K detector at the far end. Plans for the measurement of $\sin^2 2\theta_{23}$, Δm^2_{23}, and discovery of a nonzero θ_{13} are discussed.

Chapter 5 outlines the capabilities and plans for the Super-Kamiokande, K2K, and JPARC projects, while chapter 6 gives an overview of the neutrino oscillation data. Both these chapters, written in 2004, revisit some of the measurement goals in chapter 3, and a comparative reading reveals the rapid pace of progress in 2002 to 2004. This progress has continued since, and neutrino physics is now deep into the precision era.

Chapter 2 argues the case for large-water Cherenkov detectors, circa-2005, with exposure in the ballpark of a few hundred megaton years, as a promising tool to study atmospheric neutrinos in the future. With emphasis on measurement of the θ_{13} and sign of Δm^2_{23}, it is pointed out that precision of about 10–20% is achievable.

It is heartening to note that many of the goals outlined in these early proceedings were met and exceeded by several experiments, including by those where Kajita and his collaborators played a major role.

This book reveals the scientific passion of Kajita in a most unadulterated manner, displaying both the ambitious plans and the meticulous work that led to their fruition. Readers interested in the history of neutrino oscillation physics, especially the resolution of the solar neutrino problem and subsequent developments, will find this to be a revealing diary of those exciting times.

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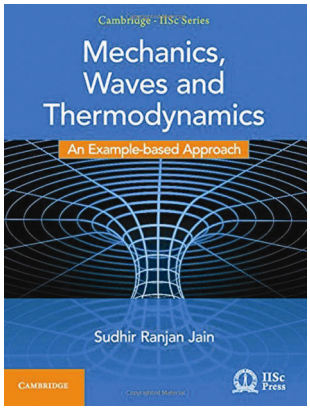

Mechanics, Waves and Thermodynamics: An Example-based Approach. Sudhir Ranjan Jain. Cambridge–IISc Series, Cambridge University Press, 4843/24, 2nd Floor, Ansari Road, Daryaganj, Delhi 110 002. IISc Press, Bengaluru 560 012. 2016. 210 pages. Price: US$ 55.99/Rs 595.

Classical mechanics is the oldest branch of physics and is the one most closely associated with our daily experiences. It is therefore not surprising that it is the subject of a large number of books written for readers at diverse levels. As a result, it is now difficult to write a book which will present classical mechanics in a new way. This is exactly what Sudhir Jain has succeeded in doing. He has used a variety of examples from real life to illustrate a number of concepts in classical mechanics. He then develops the necessary theoretical formalism which a reader can use to understand the ideas more deeply. This book differs from standard textbooks (like the well-known one by Goldstein) in that the problems from daily life provide a motivation for going deeper into the mathematical analysis. As a result, the book should be of interest to those who only want to understand some things without going into too many equations as well as to undergraduate (UG) students who want to see a more detailed treatment.

To give an idea of the wide variety of phenomena that the author has discussed, here are some examples. There are discussions of how high different animals can jump in comparison to their body sizes, why writing with a chalk on a blackboard can produce squeaking sounds, how the observed relation between velocities of stars and their distances from the centres of their galaxies led to the notion that there must be some