



Third Thoughts. Steven Weinberg. Belknap Press of Harvard University Press, Cambridge, Massachusetts, USA. 2018. 240 pages. Price: US\$ 25.95.

Let us face it. It is not easy to communicate modern physics for the lay readership. Theoretical physicist and Nobel Prize-winner Steven Weinberg admits this hard truth in his current anthology of essays – his third one since two earlier collections, and hence the title *Third Thoughts*. He writes in one of the essays on science writing, ‘It is mathematics above all presents an obstacle to communication between professional physical scientists and the general educated public’. Nonetheless, Weinberg strongly advocates that people like him who live in the ‘ivory tower’ of abstract and impersonal scientific research should take occasional breaks from the routine and strive at making science accessible to the public with the hope that it would become ‘a part of the culture of our times’ – a tradition probably started with Aristotle during the time when Hellenistic culture was in full bloom.

True to those noble intentions, his new book is not just a take on the scientific topics dear to his heart like standard model, dark energy and quantum mechanics, or the Higgs boson, but his choices of discussion also include current affairs, the harm done by economic inequality and the folly of manned space flights. The author himself says at the outset that his views are ‘rationalist, realist, reductionist and devoutly secularist’. Most of these essays were published in the *New York Review of Books* or in some newspapers, periodicals or dailies. Some of them are updated versions of his talks in different gatherings and meet-

ings. The essays have been categorized under different headings as: science history, physics and cosmology, public matters and personal matters.

In order to follow Weinberg’s train of thoughts at least on the topics in physics and cosmology like the Higgs boson, Hilbert space and quantum field theory, the reader needs to have some background on few of the difficult topics. Here, the reader is taken to the rarefied field of currently accepted ‘standard model’ of particle physics (how the basic building blocks of matter interact governed by four fundamental forces), quantum mechanics and relativity theory. These chapters address the question why it has become difficult to unify them, and the force of gravity (one of the four fundamental forces of the standard model) remains an elusive entity in a quantum mechanical universe.

However, unlike Stephen Hawking, an ‘anti-realist’ according to Weinberg, who can be accused of being a votary of ‘model-dependent reality’, the latter believes in an objective reality, but admits that given the current fragmented state of our knowledge, the ultimate reality out there continues to be unknowable. None of the avant-garde interpretations like string theory, despite its mathematical grace and beauty, are amenable to verification. The physics community already is in turmoil over this issue and in 2006, Lee Smolin’s *The Trouble with Physics* and Peter Woit’s *Not Even Wrong* raised objections at the current fashion of valuing mathematical elegance over empirical evidence. Although Weinberg does not directly address this question, he admits the increasing gap between theory and experiment that became more apparent since 1970. He hopes that this would be redressed with the output that we expect from the Large Hadron Collider (LHC), the most powerful particle accelerator ever built. The case in point is the theoretical prediction of the Higgs boson back in 1960s by Peter Higgs and François Englert, and its eventual experimental discovery reported from LHC in 2013. Weinberg himself has alluded to this fundamental particle in his 1967 paper.

Besides the topics in physics and cosmology, Weinberg has also included a few essays that deal with public issues and what has been titled as ‘personal matters’. In this category, among other topics he discusses about craft of science

and compares the work of theoretical physicists to that of poets, composers and painters. In one article he stresses the importance of being wrong, and how that state of mind compels us to be open to new ideas. He also shares his concern on the growing distrust of science encouraged by the current ruling establishment in the United States. You may find resonance of such an attitude in other countries as well, including India. In another piece, he repeats his trenchant criticism of manned space missions for their cost and scientific worthlessness, as opposed to sending robots. I wish those who are involved in such projects in India listen to his words. According to Weinberg such manned space flights are useful to the politicians to trumpet the glory of their nation to their constituents, but the real outcome in terms of science is minimal compared to the money invested.

All in all, this collection of essays, the third volume in the series of popular writing from Weinberg, is engagingly provocative and provides the reader an exposure to the mind of one of the greatest physicists. This book is also an attempt by the author to make sense of our existence by looking through the prism of physics. In the final analysis, the human mind has no option but to make the universe more comprehensible – ‘one of the few things that lifts the human life a little above the level of the farce, and gives it some of the grace of tragedy’. Weinberg himself has said this in one of his earlier books. This book is again a part of that unending project – an intellectual exploration to find out why this all happened in the first place.

C. P. RAJENDRAN

*Jawaharlal Nehru Centre for Advanced Scientific Research,
Bengaluru 560 065, India
e-mail: cprajendran@gmail.com*