

Moon (Kepler had similar hopes for his astrology). More realistic were uses of solar phenomena to keep track of times for planting and harvesting crops and thanking the Gods in festivals for successful agricultural years,

How do I know the book was meant for experts? Nearly every chapter uses indigenous words for concepts or phenomena without translation in a glossary. Only rarely does a map locate the site. And the asterisms (that is patterns of stars assigned names and significance different from those of our own Babylonian-to-Greek-to-Lacaille-to-IAU constellations) are mostly described rather than shown as dots on a skymap with coordinates, although the Pleiades are mentioned in several chapters.

Unquestionably there is something to be learned from every chapter, but I was particularly glad to encounter the one by editor Steven R. Gullberg on the Chankillo astronomical complex in north-central Peru. A watercolour of the site, by the editor's wife Jessica Gullberg, graces the cover of the volume. There are 13 towers (about as high as an Editor) along the crest of a ridge, separated by home-pool lengths. An observer situated at either an east or a west observation point will see the Sun rise or set in the gaps between the towers on days like the solstices and equinoxes. The Moon on this somewhat elevated horizon also peeks through from time to time. Dendrochronology and C-14 dating place use of the site around 250–200 BCE, and it is therefore clearly pre-Incan. The same site is identified as one of the most persuasive preliterate astronomical locations in a forthcoming book with very different origins*. — VIRGINIA TRIMBLE.

Einstein in Time and Space: A Life in 99 Particles, by Samuel Graydon (John Murray), 2023. Pp. 317, 20 × 13 cm. Price €14 (about £12) (paperback; ISBN 978 1 529 37250 2).

The 'Particles' in the title are anecdotes. (They are preceded by a nine-page introduction which gives a more conventional but very good overview of Einstein's work, life, and times.) We've all heard anecdotes about Einstein: why he dropped out of high school, his childhood fascination with a compass, the fate of his daughter, his stolen brain, his time at the patent office, and so on. A few of those presented here were new to me: I knew about his newspaper advert offering tutoring, and his friendship with Maurice Solovine, but didn't know (or had forgotten) that they met through his ad. There is also some interesting background information: Einstein famously explained Brownian motion, Brown having found that it applied to all small particles, whether of biological origin or not (initially having observed pollen grains, Brown had at first thought that it was some sort of vital sign), by testing all sorts of materials, including, for some reason, filings from the Great Sphinx of Giza! (Perrin was awarded a Nobel Prize for confirming Einstein's predictions involving Brownian motion.) Also new to me were details of his romance with Marie Winteler, mostly unknown to the world until the corresponding letters were published in the fifteenth volume of Einstein's *Collected Papers* in 2018. (Einstein had boarded with the family of her parents, Jost and Rosa. Einstein's sister Maja married Marie's brother Paul, and Einstein's friend Michele Besso married Marie's sister Anna.)

Similarly to the autobiographical stories of Richard Feynman written up by his friend Ralph Leighton^{1,2†}, this book consists essentially of only such anecdotes, just briefly discussing Einstein's work or more banal details of his life. However,

*Noah Brosch, *Of Stars and Stones: Diffusion versus Convergence in Archaeoastronomy*, to be submitted shortly for publication, 2024.

†Depending on the edition, for both books Leighton is sometimes referred to as co-author or editor, and for the former Edward Hutchings is sometimes referred to as editor.

twenty-six pages of references to the sources of quotations point the reader to the origin of such anecdotes. The five-page ‘Sources and Acknowledgements’ section not only lists but also gives information about several biographies of Einstein and other works, by Einstein and others, used in researching the book. The author is the science editor of the *Times Literary Supplement* and the book is very well written, both in terms of content and in terms of style. Those wanting a breezy introduction to Einstein’s life as well as those wanting to track down details of one of the many famous anecdotes will find this book very useful. And what a life it was: in 1905, Einstein “was still working six days a week at the Patent Office, he had a one-year-old son to help look after, and that year he wrote twenty-one reviews* for an academic journal. He also moved house in May. And yet he managed to produce five scientific papers in six months, three of which would eventually transform physics.” Even that is an understatement: apart from those three, the two papers on Special Relativity and the one on the photoelectric effect, there was the paper on Brownian motion mentioned above and his doctoral thesis on the determination of the Avogadro constant, two of the main papers which made it clear that atoms are real. As Pais⁴ points out, his thesis was extremely important at the time and is one of his most highly cited works. Such an output would be impressive even today, but is even more so after having visited the flat he lived in at the time, as I did in 2015. And that was all before he got his first academic job.

I noticed only one mistake: it was not “much later” after the definitive discovery of the acceleration of the Universe about a quarter of a century ago that it was realized that the cosmological constant, which Einstein had introduced for another reason in the first paper on relativistic cosmology⁵, could provide the reason for such acceleration. On the contrary, that was clear long before the acceleration had been discovered, at least as far back as the 1920s. Interestingly, the only acknowledgement regarding the scientific content of the book, rather than matters of production and so on, is for someone who checked the physics content and “explained some of the more technical issues of cosmology”. Some of the chapters start with a black-and-white photo, most of which are of people. I’ve already mentioned the ‘Sources and Acknowledgements’ and the references to quotations. In addition, ‘Credits’ gives details on both ‘Text’ and ‘Pictures’. As such, this book might be the quickest way to track down the original sources for the topics covered in the book. An eight-page index in somewhat smaller print ends the book.

All in all, a very enjoyable read, even for those who have heard most of the stories before, and a useful jumping-off point for those wanting more details. — PHILLIP HELBIG.

References

- (1) R. P. Feynman, “Surely You’re Joking, Mr. Feynman!”: *Adventures of a Curious Character* (W. W. Norton), 1985.
- (2) R. P. Feynman, “What Do You Care What Other People Think?”: *Further Adventures of a Curious Character* (W. W. Norton), 1988.
- (3) J. Renn, *Einstein’s Annalen Papers* (Wiley), 2005.
- (4) A. Pais, ‘*Subtle is the Lord...: The Science and the Life of Albert Einstein*’ (Oxford University Press), 1982.
- (5) A. Einstein, *Sitzungsb. Kön. Pr. Akad. Wiss.*, **VI**, 142–152, 1917.

*Those reviews are neither book reviews nor referee reports, but rather summaries of papers published elsewhere, mostly about thermodynamics, sometimes in languages other than German such as English, Italian, and French. They also provided additional income³. See <https://einstein-annalen.mpgw-berlin.mpg.de/home> for a summary of Einstein’s relationship with *Annalen der Physik*.