



UNIVERSAL: A Guide to the Cosmos: Brian Cox and Jeff Forshaw

Allen Lane, Penguin Random House UK. 2016. ISBN 978-1-846-14436-3. Pp 280. Abt £25 (hbk).

This is the broad outline of the story of the evolution of the universe, from before the Big Bang to the ongoing work with the Large Hadron Collider. It seems a tall order to put before the reader but the authors are expert in presenting cutting-edge physics to a popular market.

Universal is arranged in a logical way: How old are things? ; How the Earth was weighed; the distance to the stars; Einstein's theory of gravity; and the weighing of the Universe. Together with a summary of the evolution of the Universe these and other facts and figures about the Cosmos are often glibly thrown around in popular astronomy literature, but how were they determined? This is what Universal sets out to explain.

What makes this book refreshingly different is that the authors employ worked examples, often in the form of side-bars or short interludes of a few pages, to present facts, like the Periodic Table of Elements or to describe the practicalities of how scientists made the measurements. Some, like measuring the distance to Neptune, can even be done by amateur observers. Tales of exploration, like the unfortunate exploits of Frenchman, Guillaume Le Gentil, trying to observe a transit of Venus from India in the 1760s are presented with comments that are apt and often very funny.

At first sight, 'Universal' could be described as a coffee-table book, it's lavishly illustrated and even the cover design is by an award-winning art director, Peter Saville. But it's different to most other astronomy books, being based on demonstrable facts expertly presented in an easy to understand manner. The blurb on the back cover, by Buzz Aldrin, nicely sums it up...'I have a sense of wonder about what is out there, just as I did when I was young. There is still much to learn about our universe. 'Universal' will help inspire those who share a fascination with our planets, the solar system and beyond.'

Apart from an obvious typo, "doubling the distance to a star reduces its brightness by half" [it should be a quarter]; and the rather heavy-going maths in the worked example describing sound waves propagating in the primordial plasma, this reviewer has no big criticism. 'Universal' is a well-presented and very readable book.

The authors:

Brian Cox OBE FRS is a Professor of Particle Physics at the University of Manchester. He is well known for his many contributions to radio and TV. His documentaries on astronomy and physics appeal to a wide audience.

Jeff Forshaw is Professor of Theoretical Physics at the University of Manchester, specializing in the physics of elementary particles. He was awarded the Institute of Physics Maxwell Medal in 1999 for outstanding contributions to theoretical physics.

NB: The original English version of *Universal* is in the MAS library. The German edition, *Was Wiegt Das Universum?*, published 2018, is now available. ISBN 978-3-440-15802-9.