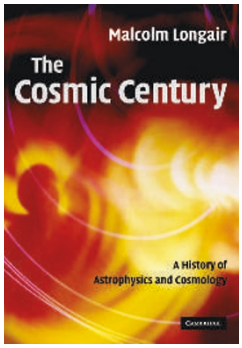
How it happened



THE COSMIC CENTURY: A HISTORY OF ASTROPHYSICS AND COSMOLOGY BY MALCOLM S. LONGAIR

Cambridge Univ. Press: 2006. 565 pp. £35/$60

The emergence from astronomy of the major new theories of astrophysics and physical cosmology over the past century represents a major triumph of physical theory. We have developed an amazing understanding of the physical nature and evolution of astronomical objects, despite their vast distance from us and the faintness of their images. The parallel development of new observational techniques, together with theoretical understandings based on much of modern physics applied in this context, have enabled such advances, and include the extension of observations from the visible to the entire electromagnetic spectrum and the introduction of photometers, spectroscopes, photomultipliers, CCDs and fibre optics. The magisterial survey in *The Cosmic Century* charts the broad sweep of how this understanding developed to the present day, giving a clear and well-balanced discussion of the major relevant observational and experimental discoveries, and the accompanying breakthroughs in theoretical understanding.

I can envisage this book being useful to physicists from other areas of specialization, who would like an overview of astrophysics and cosmology, or for workers in one of these areas who want to broaden their horizons. It could also be a text for graduate students in astronomy, astrophysics or astrophysical cosmology, who want a synoptic overview of these areas. But is a walk through history the best way to learn a subject? Might it not be better just to give the present-day understanding without having to go through the complexities of the rather tortuous way we came to comprehend them?

There is a case that the historical approach is indeed a good way to develop an understanding of the subject. First, it is interesting to learn of the historical struggles that took place, to contemplate the human face of science and to learn about the iconic heroes who made it happen: people such as Arthur Eddington, Edwin Hubble, Fritz Zwicky, George Gamow, Fred Hoyle and Yakov Zeldovich. The book does well in this way; for example, it shows clearly the path-breaking role of Eddington in systematically applying modern physics to stellar structure, and so paving the way for astrophysics to develop. Second, in order to really understand a subject you have to know not only the 'right' way — the mode of understanding that has led to the greatest progress and clearest vision — but also the plausible 'wrong' ways of doing things, the approaches that seemed good at the time but did not work out. If you do not understand them and the reasons why they do not succeed, you will be likely, sooner or later, to make the same errors, believing you have made a grand new breakthrough, when in fact you have rediscovered a failed route of endeavour. So, knowing what our predecessors tried and why it did not work is the sound foundation of a deep understanding of a subject, and that is provided by the historical approach.

A good feature of the book is that it clearly separates speculation from well-established theory. There are, of course, in a text of this magnitude, places where one will disagree with the author. In my view, these include not emphasizing the key role played by Eddington's proof of the instability of the Einstein static universe in establishing the expanding universe theory, and Beatrice Tinsley's role in demonstrating, despite strong opposition, the importance of understanding galactic evolution effects when interpreting the cosmological magnitude–redshift diagram. But these are minor defects in a sound work that will be well appreciated.

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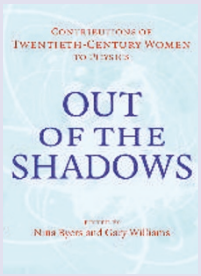
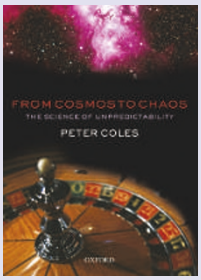
On our bookshelf



Out of the Shadows: Contributions of Twentieth-century Women to Physics Edited by Nina Byers and Gary Williams Cambridge Univ. Press: 2006. 449 pp. £30.

A celebration of 40 women who made lasting contributions to physics during the years 1876–1976. Strong role models for aspiring young physicists, both male and female.



From Cosmos to Chaos: The Science of Unpredictability by Peter Coles Oxford Univ. Press: 2006. 211 pp. £25.

Is there is link between card games, whodunit cases in the courtroom and the Big Bang? Yes: probability theory. But don't look here for tips for your next trip to the casino.