Church, hoping that he would spend a month or so each year there in return for a stipend of £400. He was indeed elected (on 1931 October 21), but Lindemann had to deal both with protests about money going to foreigners and with the tax office. His life in Oxford was not dissimilar to that in Germany, spending time sailing, walking, dealing with female admirers, and discussing politics.

The final chapter discusses Einstein as a refugee from Nazi Germany, making use of his Oxford connections to spend some time there in 1933, arriving from Belgium. Although Einstein noted that his connections with Oxford had grown stronger, he returned to Belgium *via* Glasgow and never came back to Oxford. He did return to England, though, discussing politics with Churchill and later, after hearing of assassination threats in Belgium, hid out alone for a while in rural Norfolk, guarded by Commander Oliver Locker-Lampson. On 1933 October 7, joined by his wife, Einstein boarded a ship in Southampton bound for New York. He never returned to Europe.

The book contains many quotations*, the sources for which appear on seven pages of the now-default small print, followed by two pages with a wide range of suggestions for further reading, a page of acknowledgements, and a three-page index. Robinson has written several books on a wide range of topics, including two others on Einstein; this one is well written and almost free of typos and questionable matters of style. This book provides an interesting glimpse of times and places often mentioned just briefly if not at all in other accounts of Einstein's life. (For an interesting collection of better-known anecdotes, see another book[1] reviewed[2] here not long ago.) Black-and-white pictures of Einstein (and others) in Oxford as well as of his poem (and its translation into English) and of Einstein in a stained-glass window, like William Golding (who was an undergraduate in science before switching to literature and wished that he knew more German) describing his chance meeting with Einstein on a bridge, bring Einstein in Oxford to life. Recommended for those who are interested in more detail on this aspect of Einstein's life, with only a cursory discussion of his science. — Phillip Helbig.

References

(1) S. Graydon, *Einstein in Time and Space: A Life in 99 Particles* (John Murray), 2023.
(2) P. Helbig, *The Observatory*, **144**, 295, 2024.

A Crack in Everything: How Black Holes Came in from the Cold and Took Cosmic Centre Stage, by Marcus Chown (Head of Zeus), 2024. Pp. 350, 20 × 13 cm. Price £12·99 (paperback; ISBN 978 1 80454 433 4).

The late, great Leonard Cohen isn't mentioned directly (nor, as far as I can tell, indirectly) in the book, so I don't know if the title is intended as an allusion ("There is a crack in everything. That's how the light gets in") or is just an illusion. In any case, this book by former Caltech radio astronomer and prolific popular-science writer Marcus Chown is one of a large number of books on black holes, some of which I've reviewed in these pages. Although there is often little overlap between those which I had already read, I asked

*The one on p. 62 contains a sentence starting with "Then in spite of his scientific position he is a poor man", perhaps the first time I have seen 'then' used where today one would use 'for', though the usage was clear due to it being cognate with the German '*denn*', which is used only in that sense. ('Then' in the sense of 'after' is '*dann*'.)

myself whether another book is still needed. The answer is yes. While this book covers relatively standard topics, there is much more emphasis on the scientists involved, often based on interviews (some by the author himself). Many of the topics will be obvious just from the names: Schwarzschild, Chandrasekhar, and Kerr occupy the first three chapters. The fourth concerns Cygnus X-1 (the first black hole detected, by Paul Murdin and Louise Webster) while the fifth takes in several related topics: the discovery of quasars by Schmidt (not neglecting the roles played by colleagues such as Sandage, Oke, and Greenstein), the early efforts of Jansky and Reber, and AGN in general. Although most have heard of Ghez and Genzel in the context of supermassive black holes (SMBH), the corresponding chapter here, before telling their stories, goes into some detail on what came before, a story involving several people working independently or in groups. Once it was clear that supermassive black holes exist, it made sense to try to detect them, with gravitational waves and *via* the *Event Horizon Telescope* (*EHT*); in each case, such detection was possible only *via* a very large collaboration. Primarily observational so far, the ninth chapter delves into the mathematical theory of black holes and modern topics such as holography, the black-hole information paradox, and AdS/CFT correspondence*, but also the formation of the first stars, galaxies, and black holes. The final chapter is a summary of the others except 7 and 8 (gravitational waves and the *EHT*) and also asks whether the Weak Anthropic Principle could explain the relatively low mass of the SMBH in the Milky Way.

Although in all the chapters the scientists feature more strongly than in most books on the topic, they feature more strongly in the earlier chapters than in the later ones (the chapters are more or less in chronological order). Chown not only gets right what some authors got wrong (*e.g.*, Schwarzschild did serve (voluntarily) in World War I but, although he did think about General Relativity then, he did not die in the trenches, but rather after being discharged due to contracting *Pemphigus vulgaris*), but also provides information not easily found elsewhere (*e.g.*, Schwarzschild served not only on the eastern front (which is often mentioned), but also on the western front, and it was in Mulhouse in Alsace (modern north-eastern France) where he first became ill and also from where he corresponded with Einstein).

There are about the usual number of typos and (in my view) questionable style choices as well as a few minor careless errors, but on the whole the book is well written. All the same, Bethe is referred to as an American in the context of work done in 1938, which might be acceptable considering that he arrived there in 1935.† However, Lense, Thirring, and Boltzmann were by any sensible definition Austrian, not German. There are no figures; a few footnotes provide supplementary information; 'endnotes' are references cited in the text; there is a 16-page small-print index.

* Recycling a footnote from an earlier review: AdS/CFT correspondence refers to a popular (more than twenty thousand citations to Maldacena's original paper[1]) conjecture concerning the duality between anti-de Sitter spaces as used in some quantum-gravity theories and conformal field theories which describe elementary particles.

† Nationality is perhaps not well defined in the case of people who live in a country other than that in which they were born, whether or not that is voluntarily and whether or not there is any change in citizenship status, a point made several years ago by Simon Rattle when conducting the Berlin Philharmonic, introducing a piece by the *English* composer Handel (who did become a naturalized British subject in 1727). (In 2021, Rattle became a German citizen in order to be able to work more easily in the EU after Brexit.)

Not only does the book concentrate more on the scientists than do similar books, it also goes beyond the usual familiar narratives, giving credit where it is due and providing more background, and should be valuable to anyone interested in an accurate but non-technical history of astrophysical black holes. — Phillip Helbig.

Reference

(1) J. M. Maldacena, *Adv. Theor. Math. Phys.*, **2**, 231, 1998; *Int. J. Theor. Phys.*, **38**, 1113, 1999 (reprint).

The Beauty of Falling: A Life in Pursuit of Gravity, by Claudia de Rham (Princeton University Press), 2024. Pp. 231, 22·5 × 14·5 cm. Price £49·99/$64·99 (hardbound; ISBN 978 0 691 23749 7).

In this book, Swiss-born Claudia de Rham, now a professor at Imperial College, mixes descriptions of her work on gravitation with that of her (initially very successful but ultimately failed) quest to become an astronaut as well as those of other details of her life (*e.g.*, her childhood in several countries, learning her native language French from a Swedish mother in Peru, managing two careers in gravitational physics with her husband Andrew Tolley and their three daughters). The personal details are strewn throughout the book, which is best described as an introduction to the physics of gravitation together with a summary of modern developments, in particular those in which she has been involved (especially massive gravity). Seven chapters cover Special Relativity and the equivalence principle; curvature; tides and gravitational waves; singularities (after more details on her quest to become an astronaut, foiled by a positive test for latent tuberculosis, probably from her time in Madagascar); dark matter, dark energy, vacuum energy, and the cosmological-constant problem; massive gravity (*i.e.*, a theory in which the graviton has a non-zero rest mass); and (possible) tests of massive gravity; a short concluding chapter ends the main part of the book, followed by a two-page bibliography (mostly technical papers) and an eleven-page index, both in small print. There are a few black-and-white diagrams and photos scattered throughout the book (including one of the Einstein equation as graffiti on an abandoned locomotive in Bolivia) and fortunately footnotes rather than endnotes.

Of the many books I've read on General Relativity (GR), this is probably the best non-technical description (there are only very few equations, usually not part of the main narrative) — as simple as possible, but not simpler⋆. That is partly because she isn't attempting too much, but rather concentrating on aspects which lead up to her own work; it is also because she does a very good job describing a rather technical topic. (Qualitative analogies are always misleading at some level, but she emphasizes the weaknesses of some common qualitative descriptions of GR without finding them totally worthless.) The description of her own work on massive gravity bridges the gap between purely qualitative descriptions and the technical literature; we meet ghosts, extra dimensions, and types of gravitational-wave polarization which don't exist in unmodified GR. However, a common mistake is repeated, namely that Eratosthenes

⋆A saying attributed to Einstein, who at least said something similar.[1]