

from the Second World War through to the late twentieth century. The next three chapters provide a detailed account of post-war developments in radar technology and techniques in Italy: the post-war radar industry consisting of three annexes of memoir writing by three Italian radar engineer-practitioners: Franco Bardelli, Benito Palumbo and Sergio Sabatini; Italian developments in synthetic aperture radar including the development from ground-based to space-based radar; and finally the technical details of more recent developments in radar in Italy up to the present day. Galati concludes with a chapter on system integration, a final (dis)solution for the radar, discussing the major changes in radar from before the Second World War through to the present day, as well as potential future uses. Here he argues for a systems-based approach underpinned by radar as a socially constructed technology of a kind (leaning slightly towards technical determinism) shaped by and adapting to the changing needs of its users, and how this can help us better understand radar – past, present and future.

Galati's detailed and chronological history of a hundred years of radar presents three key arguments: first that new ideas – such as those of Hülsmeier and others – in radar only come into use when there is a clear need for them, and second, and relatedly, that most technological developments in radar arrive with the appearance of lacking prior notice. Third, Galati makes a strong argument for more criticism of the current scholarship on the history of radar, in particular the focus on Anglo-American and to a lesser degree German developments in radar during the Second World War.

In these three aspects Galati succeeds, and yet overall this book feels mis-structured – for example, primary-source annexes (appendices) appear regularly in the main text – and disjointed, reading like two books, separate and interesting in their own right. The first book is a transnational history of the development of radar up to and including the Second World War; the second book is a detailed history of radar developments in Italy throughout the twentieth and early twenty-first centuries, albeit one whose narrative and analysis are substituted for large amounts of technical detail as the history reaches the period in which the author was active. Both parts are laudable studies, yet, despite rigorous research and wide-ranging source material, this combined study does not quite deliver on its initial rhetoric and promise of an admittedly ambitious transnational history of the first hundred years of radar.

In addition, *100 Years of Radar* also contains images which have not previously appeared in literature on the history of radar and, although impressive in number, these images are printed in small, matt black-and-white format and sometimes in poor quality (the latter may be due to the quality of the originals), which does not make the best of use of these rare images. Lastly, the cover price of £109.99 (a similar price is quoted for a softcover issue released in 2017) means that this book will most likely be purchased by university libraries and only the most dedicated and deep-pocketed of readers of the history of radar. *100 Years of Radar* is intended for those working in the field of radar, in particular those new to this field of technical study, as well as those seeking a broader, deeper and more transnational history of the first century of radar with a particular focus on developments in Italy.

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RICHARD MCKAY, *Patient Zero and the Making of the AIDS Epidemic*. Chicago: The University of Chicago Press, 2017. Pp. 400. ISBN 978-0-2260-6400-0. \$35.00.
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Not long after I'd begun reading *Patient Zero and the Making of the AIDS Epidemic* I came across an interview that the fiction writer Imogen Hermes Gowar gave to *The Guardian* in which she described how her reading of Jean Rhys's *Wide Sargasso Sea* made her interrogate an existing text – Charlotte Brontë's *Jane Eyre* – of which she had been a huge fan. The interview struck an

immediate, if slightly uncomfortable, chord because it exactly captured my reading experience of *Patient Zero*, the pre-existing text in my case being *And the Band Played On* by Randy Shilts.

Even now I can remember being absolutely ‘blown away’ (to borrow a very American expression) by this book, when I, then a newly minted science writer myself, read *And the Band Played On* sometime in 1994 or 1995. It was a long-haul reading project, to be sure, and not always easy to keep track of all the people and institutions whose stories Shilts tracked through its pages. But it was an absorbing and completely immersive read, by turns exhilarating and depressing, and made me excited to have chosen the profession I was in at the time. Amid the confusing and large ensemble cast of characters there were some that stood out, but none was quite as intriguing or fascinating to me as Gaetan Dugas, the eponymous ‘Patient Zero’ of Richard McKay’s book. For those unfamiliar with *And the Band Played On*, Dugas was the homosexual French Canadian air steward who, at the beginning of the book in the summer of 1980, had just been diagnosed with Kaposi’s sarcoma, then known as the ‘gay cancer’. As portrayed by Shilts, Dugas reacted to his diagnosis with a fair degree of anger and hostility towards the medical and public-health establishment, and rather than heeding advice to limit his sexual activity, deliberately went out and infected as many other men as he could before he died in 1984. Impressed as I was by what I considered Shilts’s honesty and courage in being willing to criticize his own community, I was guilty of unquestioningly buying into his portrayal of Dugas, if not as a complete ‘sociopath’ then at least as someone who was socially irresponsible. I have emerged from my reading of Richard McKay’s carefully researched history in *Patient Zero* somewhat chastened about my blind acceptance based on admiration, as well as a renewed determination to follow my frequent edict to students to be critical readers and to carefully consider the possibility of interpretations other than those presented by the author.

McKay himself sets an admirable example in this regard for he gives the reader more than one window into the ‘lived experience’ of Dugas, whom he felt strongly was treated unfairly by Shilts. There is his own analysis backed by a formidable amount of careful research, far too detailed to even attempt to summarize here. Instead I will exhort readers to read his book for themselves. Even more powerful, however, is the touching description of Dugas offered by Ray Redford, one of his former lovers and friends, who preferred to write his thoughts down rather than be interviewed orally. McKay offers the entirety of Redford’s written reminiscences in the Appendix, giving the reader automatic access to at least one voice other than his own (pp. 367–376).

The restitution of Gaetan Dugas is not McKay’s sole objective in this book, although it may be the one that stands out the most. Indeed, he lists it as the last of four issues that he sought to address, the other three being questions about the origins, rapid and wide dissemination and continued resonance of the idea, or rather myth, of ‘Patient Zero’, which was, as he explains, ultimately a deeply flawed epidemiological idea that was used in ways that were outright wrong (pp. 3–4). McKay works at these objectives through seven chapters and an epilogue of extensively researched and thoughtfully analysed history. Although dense with facts and analyses, the narrative flows easily, which will make *Patient Zero* accessible to a much wider audience than is usual for an academic book. Such an outcome is admirable under any circumstances, but what is more impressive in this particular case is that this book is McKay’s first.

Of course, no gem is without its flaws, and given the tone and theme of *Patient Zero*, I would be remiss if I did not at least attempt to apply the lessons learned from it to an analysis of itself. There were times while reading the book that I couldn’t help but wonder if McKay in his turn had treated Shilts in a similar vein as the journalist did the air steward, casting him as a villain posthumously, long after he could defend himself or his choices one way or another. What Redford said so poignantly of Dugas holds just as true for Shilts: he ‘was no ogre and no saint’ (p. 375). Dugas was certainly not the only, or even the most egregious, villain in *And the Band Played On*; at the time that I read the book, for instance, I can remember being far more horrified by the likes of the then US

president Ronald Reagan, and for very different reasons by the researcher Robert Gallo. Has McKay's indignation over the unfair portrayal of Dugas allowed him to ignore some of the real groundbreaking achievements of *And the Band Played On* in sounding an alarm and raising awareness about AIDS from 'within' the community, so to speak? There is a tension in *Patient Zero* that I feel comes in part from the debt it owes to *And the Band Played On* – because without the earlier book the latter could not have been written – but also, I think, from the differences between the historical and journalistic perspectives. On the whole, however, I feel that McKay richly deserves the various accolades he has received for his book, including being short-listed as a finalist – quite ironically – for the 2018 Randy Shilts Prize.

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GOVERT SCHILLING, *Ripples in Spacetime: Einstein, Gravitational Waves and the Future of Astronomy*. Cambridge, MA: Harvard University Press. Pp. 340. ISBN 978-0-6749-7166-0. £21.95 (hardcover).

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Ripples in Spacetime: Einstein, Gravitational Waves and the Future of Astronomy by journalist of astronomy Govert Schilling focuses on the historical events leading to the birth of multi-messenger astronomy, with a particular focus on the gravitational-wave field. Published shortly after the announcement of the first two black-hole merger detections (GW150914 and GW151226) and a third potential event (LVT151012) by the Laser Interferometer Gravitational-Wave Observatory (LIGO), Schilling provides a condensed history of detecting, observing and imaging cataclysmic events, such as supernovas and other binary system mergers, in our universe, including the initial direct detection of gravitational waves by LIGO alone. For those new to this field, this history is provided with simple explanations of the underlying physics needed to understand the observation methods and theories which multi-messenger astronomy seeks to explore.

Read in conjunction with Harry Collins's *Gravity's Shadow* (2004) and subsequent works, which focus on the growth of the gravitational-wave field, and Marcia's Bartusiak's *Einstein's Unfinished Symphony* (2017), which focuses on the same but also provides a history of the development of a related astronomy field, Schilling provides a deeper insight into the astronomy component of the new field of multi-messenger astronomy, or the coordinated observation of a single source through electromagnetic radiation, gravitational waves, neutrinos and cosmic rays, for example. In this regard, Schilling starts with the rise of radio astronomy, highlighting Jocelyn Bell's 1967 discovery of pulsars, which are rotating celestial objects generally maintaining a steady pulse able to keep time with the accuracy of an atomic clock. Schilling explains that her work led to the identification of numerous pulsar systems, including one identified by Russell Hulse in 1974 which was eventually classified as part of a stellar binary system. Hulse and his adviser, Joseph Tyler, realized that the period of this system was decaying, which ultimately resulted in Nobel Prizes for the first indirect detection of gravitational waves, which were causing the delay in this system.

Schilling then provides a concise history of the birth and growth of the field to directly detect gravitational waves, including the efforts made by Joseph Weber using bar detectors through the rise of laser interferometry. Although not as detailed as the account provided in Collins's work, Schilling's version provides an abridged version that will be helpful to those new to the history of gravitational-wave detection and the rise of multi-messenger astronomy and underlying science and theories. What is most beneficial in this compact history is how the interferometers in Germany (GEO600) and Italy (VIRGO) work as a collaborative network with LIGO, especially to locate sources of gravitational waves so that astronomers can turn their instruments to the correct