

in Serbia, Salonika and other wartime hot spots, tending soldiers and civilians under dangerous conditions. She describes how locals still revere these British women, but pointedly uses their cases to underline the historical obstacles of gender. By 1921, Hutton

was now an expert surgeon who had coped with complicated chronic cases as well as urgent battle injuries, but she faced up to reality: as a woman, there was no chance of practising surgery in Britain. Moreover, although she ... had run entire hospitals on her own, as a married woman she was obliged to ... become her husband's financial dependent. (p. 255)

British officials eventually accepted female physicians' service, though often only on temporary hire, at lower pay and status than male doctors. Yet Fara indicates that war set the stage for female doctors to organize, demanding long-term goals of equal pay for equal work. She similarly argues that despite postwar setbacks, female scientists had established clear success. Women 'had proved themselves capable of carrying out work traditionally reserved for men, and – try as reactionaries might – that unprecedented sense of achievement and power and possibility could not be obliterated' (p. 12). Fara expresses concern about the modern persistence of gender imbalances in science and engineering, concluding, 'Blatant mockery and explicit segregation may now have disappeared, but concealed prejudice can be both harder to fight and more keenly felt ... Before the First World War, suffragists could see what they were fighting against but modern discrimination is elusive, insidious, and stubbornly hard to eradicate' (p. 283).

*A Lab of One's Own* represents superlative research and reads beautifully, making it an excellent resource for researchers and students alike. The book focuses exclusively on Britain, leaving readers to determine how much of this story is unique or reveals parallels in other countries. Fara's work shows just how challenging it is to uncover women's work that was eclipsed or left silent, raising tantalizing questions about how many stories yet remain to be dug out of dusty First World War accounts.

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JAUME NAVARRO (ed.), *Ether and Modernity: The Recalcitrance of an Epistemic Object in the Early Twentieth Century*. Oxford: Oxford University Press, 2018. Pp. 272. ISBN 978-0-1987-9725-8. £65.00 (hardcover).  
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I occasionally receive unsolicited emails from unknown correspondents extolling the virtues of the ether and arguing for its reinstatement at the centre of modern physics. While ethers are now generally considered beyond the margins of science, they have a rich and honourable history, beginning with Aristotle and including such significant thinkers as Descartes, Newton, Maxwell, Kelvin and Lorentz. Yet there has been great diversity within the family of ether theories; for example, some have been mechanical, others have been electromagnetic and others still have been spatial manifolds. Moreover, ethers have performed a wide variety of functions, not only in physics but also across the sciences and in such fields as theology, politics, art and literature.

The early history of ether theories was addressed by *Conceptions of Ether* (1981), edited by M.J.S. Hodge and myself, and by E.T. Whittaker in his two impressive volumes *A History of the Theories of Aether and Electricity* (vol. 1, 1910, rev. 1951; vol. 2, 1953); the second volume (which is given short shrift in the book under review here) embraced the period from 1900 to 1926. The present useful collection focuses on early twentieth-century ether theories, ending with Paul Dirac's provocative essay 'Is there an aether?', published in 1951 in the journal *Nature*.

Central to this volume is the question, what happened to the ether during the early nineteenth-century transition from classical to modern physics? Several contributors show that this transition

was not the sharp discontinuity that might be inferred from Einstein's oft-quoted assertion of 1905 that special relativity proved that the luminiferous ether was 'superfluous'. Instead, the emergence of modern physics was a slow and complex process in which elements of classical physics, including the ether, were often retained in various but sometimes transmuted forms. Thus, while some physicists conceived relativity as precluding an ether – and vice versa – others viewed them as compatible. Among the former were a number of Americans who remained committed to the luminiferous ether well into the 1930s and showed little interest in relativity theory. As Roberto Lalli shows in his chapter, this orientation led Dayton C. Miller and others to carry out a series of ether drift experiments that they hoped would confirm the ether's existence. By contrast, Henri Poincaré remained neutral on the ether question in his writings on the relational nature of the geometry of space, which is explored with clarity in Connemara Doran's chapter. Even Einstein's position is shown to be more nuanced than his comment on the superfluity of the ether would suggest. Thus, as Richard Staley notes, in reflecting on Mach's writings on space and time, Einstein later courted briefly the idea of an ether that he aligned with the general theory of relativity. Staley also draws attention to the importance of aesthetics in the writings of Mach and Einstein.

Oliver Lodge emerges, not surprisingly, as a key player. Yet, for Imogen Clarke and Michael H. Whitworth, he was not the diehard reactionary as sometimes portrayed, but was instead a very effective science communicator and popularizer who used his authority to engender a critical attitude towards certain aspects of science, including relativity theory. In arguing for continuity within the physical world, Lodge conceived the necessity of a mechanical ether. The comparison with Arthur Eddington is instructive, for although Eddington strongly advocated the new physics in his popular writings, he did not conceive a sharp break with classical physics and was willing to countenance an ether. Richard Noakes also reflects on the sources that Lodge used in his work on ethers and the connection between ether physics and psychical research. Noakes interestingly also stresses Lodge's antipathy towards what he conceived as the German philosophical tradition that he portrayed as crudely materialist and as denying the existence of ether.

Philipp Lenard, principally remembered as the prime advocate of 'Aryan' physics, sought to undermine Einstein's theory of special relativity by portraying it as 'Jewish' physics and thus incompatible with an ether-based physics that accorded with ostensible Aryan values. In a fascinating chapter Arne Schirrmacher traces Lenard's scientific development and argues that he invested all his scientific activities with great emotional intensity. Thus he heaped abuse on any scientist who disagreed with him and quickly fell out with his scientific colleagues. Paradoxically, while unable to sustain human relationships, he was strongly drawn to the ideal of *Volk*, as propagated by the Nazis. Faced with the apparent inconsistencies in Lenard's philosophy of science, Schirrmacher labels him a "rational" irrationalist'. Yet Lenard's inner conflicts and inconsistent behaviour might have been further illuminated by drawing on the literature dealing with mental disorders.

As Jaume Navarro notes, an often-neglected group of ether advocates consisted of those who worked with wireless technology. Ignoring the disputes of physicists over the existence of an ether, they saw it as necessary for the propagation of radio waves. In public contexts too the ether became synonymous with radio transmissions. While new wireless technologies provide one of the few justifications for linking ether with modernity in the book's title, this slippery term is not particularly helpful as most of the essays in this volume do not portray the ether as a modernist entity. I am also left wondering why some people, including Lodge, Lenard and also probably my unknown correspondents, are so emotionally attached to the notion of ether. Perhaps the prospect of space being utterly void is for them an existential fear – a *horror vacui*?

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