

Einstein's Generation: The Origins of the Relativity Revolution.
By Richard Staley. (Chicago: Chicago University Press, 2008. x + 494 p., ill., bibl., notes, index. ISBN 0-2267-7057-5 \$38)

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[Aller au sommaire du numéro](#)

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venture capital. In the book's later chapters, which read more like very good journalism than history, we see how it has recently become possible for some scientists to get very rich indeed through commercialization of results. Given the tremendous uncertainties of leading edge research, especially as to its commercialization, venture capital investments often hinge on decisions about people and their virtues literal and figurative. That personal basis for dealing is for Shapin what connects the seventeenth century world he knows so well to this twenty-first century one. I would go further and argue that right from its earliest days, trying to convince a sceptical senior management to support research never rested on a dollars and cents argument but required a leap of faith. To the extent that Shapin is hammering that point home he is deeply convincing.

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***Einstein's Generation: The Origins of the Relativity Revolution.* By Richard Staley.** (Chicago: Chicago University Press, 2008. x + 494 p., ill., bibl., notes, index. ISBN 0-2267-7057-5 \$38).

The beginning of the twentieth century stands out in the disciplinary memory of today's physicists as the time of transition from classical to modern physics. But how did practitioners experience the changes in their discipline at the time? And how did that period become the scientific watershed that it is in our histories? In *Einstein's Generation*, Richard Staley revisits one of the most studied chapters of science history with the ambitious goal of inverting the traditional perspective. While most histories take for granted that Einstein's creation of the theory of relativity constituted the pivotal moment—indeed, a “revolution”—and measure the achievements of Einstein's contemporaries against it, Staley foregrounds the activities of the individuals or groups in relation to which Einstein sought to position his work, in the attempt to reach “a new understanding” of the origins of what we now call modern physics (p.3).

Einstein's Generation is a complex book that collects Staley's research into diverse facets of early twentieth-century physics, and is enriched by his command of an ample store of secondary literature. Rather than offering a single narrative or argument, it presents a spectrum of themes through a kaleidoscope of historiographic approaches. It is composed of four parts. The first part details the career of Albert Michelson, the first American Nobel laureate in physics. It follows Michelson from his engagement with the American astronomical community and the network of precision instrument makers for the measurement of the speed of light, through his creation of a new kind of instrument, the interferometer, for

the ether-drift experiments for which he is most famous, to his less-known promotion of interferometry for the determination of the standard meter. In the second part, the book shifts scale of analysis to explore the participation of physicists from different countries in the Paris World's Fair in 1900 and the annexed International Congress of Physics, an event that is now almost forgotten despite its grandness at the time. The third part turns to the experimental and theoretical activities of a group of German physicists who studied the newly discovered electron in the first decade of the century. Here, the interactions of individual scientists are scrutinized to probe the relationships between electron theory, measurements of the electron mass, and the inception of the theory of relativity. The fourth part returns to the level of collective endeavours, this time focusing on the first Solvay Council, which is now marked as an epoch-making event even though it was restricted to a small group of participants. At this elite gathering in Brussels in 1911, the author argues, Einstein and his colleagues fixed for the physics community the meaning of the culturally-loaded terms "classical" and "modern," which had been until then deployed by physicists in a variety of rhetorical ways. The categories of classical and modern physics were thus shaped together, through a process of mutual definition or, to use the author's term, of "co-creation" (p.347).

Upon this partitioned structure, Staley weaves a composite tapestry. He follows "three interrelated thematic concerns" (p.3), criss-crossing the boundaries between biography, study of scientific practices and of the material cultures of laboratories, history of ideas, and disciplinary and institutional history. The first concern is with the relationship between the material and conceptual sides of scientific research. This relationship encompasses the epistemological distinction between experiment and theory as well as the division of labour between theoreticians and experimentalists, which was being institutionalized at the time under consideration. It also includes deep connections between the making of instruments, the culture of precision measurements, and the world of industry. Staley points to high-precision metrology as a technological-scientific common ground that was at the same time material and conceptual. Interferometry enabled the degree of control of the apparatus needed by experimentalists like Walter Kaufmann in the difficult task of ascertaining the dependence of the mass of electrons on velocity. It also lay behind, Staley suggests, Einstein's theoretical use of idealized measurements by means of rigid rods, and shared a preoccupation with absolute and relative measurements. Thus the interferometer mattered to the emergence of relativity, even though the null result of the ether-drift experiments did not play a significant role. Another thematic concern regards the individual and collective dimensions of research. Staley moves beyond the tradition of what he calls "inception and reception"

accounts of the birth of relativity as a sharply individualized discovery, and targets interactions that took place soon after Einstein's first relativity paper, when the meaning of the theory was still fluid. He shows how Paul Ehrenfest and Max Born struggled to extract from Einstein's work answers to then current questions related to the electromagnetic worldview, before learning to read the new theory through mathematical analogies that were made possible by Hermann Minkowski's formulation. As Staley notes, "in the communal endeavour of science, meaning rests in the hands of later researchers" (p.271). The third concern is about the roles of disciplinary memory and disciplinary identity in knowledge production. It stems from the insight that historical argumentation, whether explicit in "participant accounts" or implicit in analogies and denominations, is integral to the practice of theory. It serves to connect fledgling ideas to more established bodies of work, results to agendas, and individuals to networks. For example, the misnomer, "Lorentz-Einstein theory" did not derive from a misunderstanding but was used by Einstein in his first "research history" to link his work to Hendrik A. Lorentz's electron theory, thereby creating the "myth" of the ether-drift experiment as the crucial experiment for relativity (p.300, p.305).

Staley pursues his themes with great subtlety throughout the book, building upon the best work in history and sociology of physics of the last decades. Hence, one cannot help sensing a little disappointment in his occasional remark that his results deepen our understanding but do not change the large picture. More than in a clear sense of direction, the strength of this book lies in its fine folds. Richness of content, sensitivity to historical details, argumentative subtlety, methodological awareness—all this makes *Einstein's Generation* rewarding, though it may set a high threshold for non-specialist readers.

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Technology / Technologie

Quand le vent faisait tourner les moulins. Trois siècles de meunerie banale et marchande au Québec. Par Gilles Deschênes, avec la collaboration de Gérard-M. Deschênes. (Québec : Septentrion, 2009. 313 p., ill., notes, bibl. ISBN 978-2-89448-580-4 39,95\$).

À prime abord, cet ouvrage abondamment illustré apparaît comme un « beau livre » qu'on laisse sur une table à café afin de le feuilleter à l'occasion. Mais il propose beaucoup plus, soit une monographie très