Scientia Canadensis
Canadian Journal of the History of Science, Technology and Medicine
Revue canadienne d'histoire des sciences, des techniques et de la médecine

Michael Riordan, Lillian Hoddeson, and Adrienne W. Kolb. *Tunnel Visions: The Rise and Fall of the Superconducting Super Collider*. Chicago: The University of Chicago Press, 2015. 448 pp. $40. ISBN 978-0-226-29479-7

Leib Celnik

Volume 40, numéro 1, 2018

URI : https://id.erudit.org/iderudit/1048931ar
DOI : https://doi.org/10.7202/1048931ar

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Éditeur(s)

CSTHA/AHSTC

ISSN

1918-7750 (numérique)

Découvrir la revue

Citer ce compte rendu

Celnik, L. (2018). Compte rendu de [Michael Riordan, Lillian Hoddeson, and Adrienne W. Kolb. *Tunnel Visions: The Rise and Fall of the Superconducting Super Collider*. Chicago: The University of Chicago Press, 2015. 448 pp. $40. ISBN 978-0-226-29479-7]. *Scientia Canadensis*, *40*(1), 111–112. https://doi.org/10.7202/1048931ar

Michael Riordan, Lillian Hoddeson, and Adrienne W. Kolb. ***Tunnel Visions: The Rise and Fall of the Superconducting Super Collider.*** Chicago: The University of Chicago Press, 2015. 448 pp. $40. ISBN 978-0-226-29479-7.

No discussion of the Superconducting Super Collider (SSC) is free from the inevitable question of why it failed. In their introduction, the authors distinguish their history of the collider from those of Daniel Kevles and Stanley Wojcicki with their focus on laboratory culture, and particularly the examination of a failed project. It is an account of the attempt to build a particle accelerator that planned to achieve energies almost three times higher than CERN's Large Hadron Collider (LHC) today. In fact, the tacit comparison to CERN's success underlies the narrative – CERN's project was considered its main competitor throughout construction and up until the discovery of the Higgs boson. The authors argue that the SSC failed because American physicists and the Department of Energy (DOE) attempted to use outdated Cold-War era models of physics funding to push through a project of unparalleled scale that would have required greater international collaboration.

These threads of competition and tensions over international collaboration persist throughout the nearly two decades of political, economic, and scientific positioning to control the SSC. The history begins with the origins of the collider in the late 1970s, detailing the need to achieve higher energy interactions between particles in order to discover the last key pieces of the Standard Model. Crucially, they needed to break into the TeV scale to discover the most massive particles, such as the top quark, the W and Z bosons, and of course, the Higgs boson that gives matter mass. The authors helpfully provide an appendix explaining the physics of these high energies particle interactions and the types of questions that can be answered by observing them.

The expected creation of the SSC grew out of the inexorable upscaling of physics beginning in World War II and continuing through the Cold War. New discoveries required ever-larger accelerators that to achieve higher energies, and the question was who would build it. When the early discussions amongst Americans for the next generation of accelerators developed in the late 1970s, they quickly developed definitive plans to build the bigger, more powerful devices. The same early designers knew the costs would be high. Even in the Cold War era of nearly unlimited federal support for fundamental physics research–virtually immune from public reactions on the pretext of national security–physicists recognized that the ballooning costs of the next big accelerator could be more than one country could shoulder. This unprecedented scale of the project in costs, management, and publicity fundamentally characterize what became the SSC and its ultimate failure.

As the SSC planning began in earnest in late 1983 under the Central Design Group, the earliest cost estimates placed the SSC at $3 billion, using a cutting-edge design to reduce materials. This number was an order of magnitude greater than the largest accelerators in the US such as Fermilab

in Chicago, the Stanford Linear Accelerator Center (SLAC), or the Isabelle collider at Brookhaven. As the cost estimates rapidly grew to account for delays in developing the crucial superconducting magnets, funding the emerging bureaucratic structure, and the eventual adoption of a more conservative and thus more expensive design, the question of funding became of central importance. President Reagan eventually threw in his support of project in 1987 as a way to preserve American scientific prestige.

Beyond these initial challenges, the SSC project began to face increasing tensions with forces outside of the physics community. The site selection process was contentious; rather than choose an existing lab to expand, a bidding system was enacted to ensure fairness when creating a multibillion dollar boon for the state hosting the lab. Texas in the end won the process for its cost saving measures and promised financial support, beating out the existing lab structure at Fermilab. The highly publicized, and politicized, site selection began the most serious public scrutiny of the project, especially its rapidly growing costs. Additionally, the managerial structure of the project faced three key challenges: the lack of continuity with the original Central Design Group, physicists' lack of familiarity with managing multibillion projects, and the close oversight and control exerted by the DOE for much of the project's lifespan. Lastly, the lack of international support for the project stemmed from increasing financial commitments, especially to CERN's projects directly competing for high energy physics funding, and the nationalistic rhetoric that presented the SSC as an American endeavor. As the total estimated budget approached $10 billion, congressional support reversed, and the project became the target of cost-cutting measures. The SSC was officially terminated in 1993.

The authors have contributed significantly in a book containing nearly three decades of work. The project encompasses the dizzyingly bureaucratic array of institutions and individuals vying for collaboration and primacy. Their individual efforts to document the SSC, beginning at the time of the project's inception, combines their accounts with those of over one hundred scientists, politicians, government officials, industrialists, reporters, and others to provide an expansive view of the project. Kolb and Hoddeson both worked on documenting the SSC from the beginning, as Fermilab's archivist and historian respectively, and Riordan had independently studied the project before the three began collaborating in 1994. Amongst the greatest strength of this study is the clear identification and characterization of these competing forces and institutions at the heart of the project. As other reviews have mentioned, though, the conclusions of the authors are at times repetitive. This book offers a specifically science historical view of the SSC that is accessible to a broad audience, adding to Kevles' politically-oriented history and Wojcicki's account as a physicist on the project. *Tunnel Visions* captures the immense scale, planning, and tensions of modern physics laboratories as it traces the downfall of one of the largest scientific enterprise in history.

Leib Celnik, Harvard University