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DREAMS OF A SUPER COLLIDER[1][2]

V. Pronskikh[3]

Fermi National Accelerator Laboratory

Review of Tunnel Visions: The Rise and Fall of the Superconducting Supercollider, by Michael Riordan, Lillian Hoddeson, and Adrienne W. Kolb, University of Chicago Press, 2015.

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[2] Submitted to Endeavour, May 2015.
[3] Email: vspron@fnal.gov

Dreams of a Super Collider, Review of Tunnel Visions: The Rise and Fall of the Superconducting Supercollider, by Michael Riordan, Lillian Hoddeson, and Adrienne W. Kolb, University of Chicago Press, 2015.

Vitaly Pronskikh

Fermi National Accelerator Laboratory, Batavia IL, USA

The title "Tunnel Visions" alludes to the medical term for the loss of peripheral vision (due to an eye decease, snake bite or excessive alcohol consumption). If one attempts to assign this meaning to an outlook, perspective or point of view, the phrase suggests narrowness or obscurity. That is indeed the connotation historians Riordan, Hoddeson, and Kolb want to give to the Superconducting Supercollider (SSC), a planned particle accelerator complex that originated as a conceptual design in 1988 and was terminated by the Congress in 1993. The complex was meant to be the most powerful in the world--with a still-unsurpassed energy of 40 teraelectronvolts (TeV). The book "Tunnel Visions" sequentially examines numerous possible explanations of the project failure. In the Epilogue "The Higgs Boson Discovery" the authors recount the Nobel Prize-winning discovery of the elusive particle at CERN's Large Hadron Collider in France and Switzerland to conclude that, had the SSC not been canceled, the famous boson might have been discovered on US soil. A sense of missed opportunity due to a collective lack of farsightedness is, therefore, one of the central themes of Tunnel Visions.

One of the important drivers of the project was the political context. The competition with the Soviets over accelerator energy during the Cold War fueled plans for the SSC, when the accelerator-based high-energy physics enjoyed a strong political backing in the United States (137). The main argument for the construction of such a machine presented to the 1987 Reagan administration was that it would meet "national concerns" (51) such as "scientific prestige" and "technological competitiveness". It had a motive of sustaining American leadership in the field. Following the 1991 collapse of the Soviet Union, however, the bipolar, post-World War II, world ended, and a new world order emerged (165). Science eventually became globally distributed but locally coordinated. The project to reassert American dominance in the esoteric science of high-energy physics needed significant federal funding. Plans for the SSC, explicitly national in their conception, could not gather international involvement and advisory participation. When the permanent cost overruns and budget shortages eventually prompted its leaders to seek substantial foreign financial support, the potential participants were not in a position to allocate the necessary funding. A few million-dollar contributions promised by Canada, China, India, Russia, and Taiwan could not make up the difference by the time congressional votes torpedoed the project (270). The

coordination of such essential foreign financial inputs required a continuous multinational political process, one clearly impeded by the Cold War spirit of the political bipolarity.

Significant attention is paid in the book to the discussion of what might have happened if the SSC had been built somewhere else, for example, in Illinois. The authors argue that the collider would have benefited from a location near Fermilab by making use of the existing infrastructure. They compare the SSC to CERN, with the latter building "one machine after the other as extensions of the existing facilities" and maintaining its team of accelerator physicists and engineers. The team worked smoothly together and effectively supported and enabled the efforts of the experimental scientists to succeed in their quests for the theoretical phenomena. Like CERN, Fermilab "had equally adept machine builders" (289). As the authors see it, a 20 TeV collider project that was initially proposed in 1983 (an energy level CERN still has not reached) would have required a $1 billion extension of the existing Fermilab as opposed to $10 billion needed for the 40-TeV Texas site. This would have allowed detecting the long-sought Higgs Boson at Fermilab decades earlier than CERN managed it. However, the authors underscore that the political atmosphere of the day favored a project in Texas more than one in Illinois. The proposal to construct the SSC near Fermilab *inter alia* met resistance from a local activist group concerned with the alleged problem of nuclear waste production in the high-energy physics machine (112). The book also addresses the poor management at the SSC, which, in certain aspects, was characterized as "dysfunctional agency" (127).

Although there are other published reflections about the SSC, the book "Tunnel Visions" deserves readers' attention because of the prolonged efforts of Riordan, Hoddeson, and Kolb. The historians not only witnessed the rise and fall of the gigaproject but also conducted and critically analyzed about one hundred interviews into the fate of the SSC. It seems gargantuan projects in physics are not impossible nowadays. The authors, by giving CERN as an example, argue that, in order to succeed, these gigaprojects have to be organized in a way completely different from those in the past. A Big Science project of the XXI century can no longer be the exclusive fantasy of a visionary; it must be a multifaceted global enterprise of social and political proportions. That requires society as a whole to determine the worth of knowledge. And to figure out who will pay for its pursuit.