

Tuxedo Park: A Wall Street Tycoon and the Secret Palace of Science That Changed the Course of World War II

Jennet Conant
Simon & Schuster, New York,
 2002. \$26.00 (330 pp.).
 ISBN 0-684-87287-0

Alfred Loomis was an entrepreneur, lawyer, and amateur scientist whose influence before and during World War II helped establish radar and other technologies. Central to his influence was his private laboratory in Tuxedo Park, New York, to which he attracted many important scientists—mostly as visitors. After his laboratory closed in 1940 for reasons unclear to the surviving principals, he persevered in his personal influence on radar. A good biography of Loomis would be a primer on how to organize scientists and science in a national emergency.

Jennet Conant's *Tuxedo Park* is such a biography. Its author is an accomplished journalist, who had the additional incentive to delve into the connection between her family and Loomis's laboratory. The book "tells all" about Loomis's professional and family life. It is fascinating reading for physicists who lived through World War II and for those who face today's emergencies. The book emphasizes Loomis's intuitive expertise in finance, science, and human relations. No one but Alfred Loomis could have survived being promoted "upstream" in the radar effort; funding a dismal America's Cup yachting adventure; watching his family dissolve; tragically losing a son and a granddaughter to suicide; and terminating in 1940 his investigative life and his special "Camelot"—the Loomis Lab at Tuxedo Park. But survive he did, and helped greatly the initial phases of the MIT Radiation Laboratory (Rad Lab) and, to a lesser extent, atom bomb startups. With affluence and grace, he charmed outstanding university chemists and physicists such as Karl Compton, James Conant, Vannevar Bush, Robert Wood, Ernest Lawrence, George Kistiakowski, and recent immigrants Albert Einstein, Leo Szilard, and Enrico Fermi. He made them his cronies in the radar and atom bomb ventures, and in return they elected him to the National Academy of Sciences and to the American Philosophical Society.

Conant describes Loomis's role as head of section D-1 (radar) of the National Defense Research Committee (NDRC) during World War II, and of the radar investigations at his private laboratory at Tuxedo Park. Among the many projects he sponsored were very accurate time measurement, super-sonics, and electroencephalography. He announced the invention of Loran, a navigation system based on time difference of arrival from synchronous land-based transmitters, within a week after the British made him aware of their short-range navigation system, GEE, based on the same principle. The concept of synchronous transmitters in satellites was later used in the global positioning system.

Conant's book is the only extant biography of Loomis, and it is a good one. It reveals the development of radar through Loomis's activities in Tuxedo Park and in connection with the Rad Lab. However, for a complete history of radar, I would steer readers to *Five Years*, by Charles Newton, Thelma Peterson, and Nancy Perkins (Andover Press, 1946).

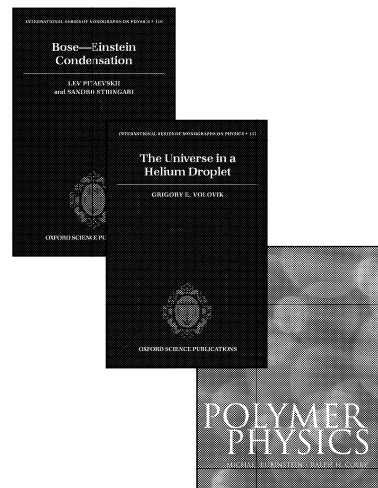
Here is my personal view, as a member of the Rad Lab for more than five years, of some of the historical context.

The radar system that Loomis championed at Tuxedo Park was a Doppler radar, in contrast to the pulsed radar of Gregory Breit and Merle Tuve (see the *Journal of the Washington Academy of Sciences* 16, 98, 1926). Even before 1940, the pulse technology appeared in US military radars. The technology provided long-distance early warning of high-flying aircraft, notably at Pearl Harbor.

Conant beautifully conveys the secret excitement of the British mission, led by Henry Tizard, to Tuxedo Park. The lack of 10-cm airborne equipment had resulted in a crisis in Great Britain's war against Nazi bombers. Winston Churchill asked Franklin Roosevelt for help. To start the effort, Tizard offered as a novelty an improvement on the forgotten split-anode cavity magnetron (Claud Cleeton and Neil Williams, *Physical Review* 45, 234, 1934). That magnetron, made by Marcus Oliphant and Henry Boot, won the enthusiasm of somewhat naive US physicists, who started the heroic effort on radar. Within a week, section D-1 was established with Loomis as its head, and the Rad Lab was established, with Lee DuBridge of the University of Rochester as its director.

Certain consequences of the Rad Lab's activities in the war could have emerged more clearly in Conant's book. The Rad Lab-designed SCR-584 radar was essential on the Anzio and

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Normandy beachheads and in the successful defense of London against buzz bombs. In 1943, the 3-cm "X band" radar "bomb sight" (using a card-programmable computer!) got the 8th Air Force back into the air and bombing through overcast skies. Wherever the war continued, Rad Lab-designed radars were sure to go, accompanied as needed by Rad Lab personnel.

Quite properly, Conant emphasizes the key work of Loomis and Luis Alvarez—whom he appeared to consider a surrogate son—to develop ground control of approach in blind landing. However, she emphasizes pilot-con-

trolled landing with a beam. Loomis and Alvarez's dream was to achieve true control of landing from the ground without pilot intervention. The dream was unrealized despite David Griggs's prior riding of the SCR-584 beam in blind landing. Exocet missiles later rode the same beam. Nonetheless, the elegant ground-control system initiated by Loomis did much for military science but is not seen in commercial airports, where pilot-controlled instrument landing systems (ILS) took over. Ironically, ILS uses the phase system as in Loomis's radar!

With some exceptions, Loomis could spot a winner in finance, in science, and among people. Conant correctly portrays this brilliant and interactive financier and scientist, who had a decisive impact on radar. You will not set the book down until you complete it.

Britton Chance
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At the Frontier of Particle Physics: Handbook of QCD

Edited by M. Shifman

Volumes 1-3:

World Scientific, River Edge, N.J., 2001. \$240.00 (set) (2151 pp. set). ISBN 981-02-4445-2 (set).

Volume 4:

World Scientific, River Edge, N.J., 2002. \$88.00 (384 pp.). ISBN 981-238-028-0

What constitutes frontier science? The question is implicit in the title of this unique collection of essays, *At the Frontier of Particle Physics: Handbook of QCD*. Quantum chromodynamics is the field theory that describes the strong interactions in today's standard model of elementary particles and forces. The editor of these volumes is Mikhail Shifman of the University of Minnesota, formerly of the Institute of Theoretical and Experimental Physics (ITEP) in Moscow. Shifman's many contributions to quantum field theory have deeply influenced our understanding of QCD.

Including the new fourth volume, the handbook contains 40 technical articles by well-known researchers, preceded by a section of historical reminiscences and essays, some previously published. The first few of these reminiscences are appreciations of the distinguished scientist for whom the set is a festschrift, Boris Ioffe of the ITEP. The historical section includes a memoir by Ioffe. That memoir and one by the physicist and human-rights activist Yuri Orlov offer windows to the world of Soviet physics in the early cold war period, and recall the role of strong-interaction physics at the opening of the nuclear era. Those memoirs are followed by a number of personal recollections relating to the discovery of QCD in the early 1970s. An essay in the fourth volume recalls the single-minded pursuit of science in and around the school of Lev Landau.

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