

OBITUARIES

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Nicolaas Bloembergen

Nicolaas Bloembergen, a Dutch-born US physicist and Nobel laureate, died from cardiorespiratory failure on 5 September 2017 in Tucson, Arizona. Generally regarded as the father of nonlinear optics, Nico will be remembered not only for his groundbreaking scientific achievements but for his great perseverance and genuine concern for others.

Born in Dordrecht, the Netherlands, on 11 March 1920, Nico grew up in Bilthoven, a residential suburb of Utrecht. His innate curiosity about the correspondence between mathematics and physical facts led him to study physics at the University of Utrecht. He received his bachelor's degree in 1941 and completed the equivalent of a master's degree in science in 1943; he passed his doctoral qualifying exam just three months before the university was closed later that year by German forces occupying the country. For the remaining two years of World War II, everyday liberties were greatly restricted, forcing Nico to hide indoors most days. During the winter of 1944–45, known as the Dutch Hunger Winter, Nico's family ate tulip bulbs to survive, and at night, using a storm lamp, Nico read Hendrik Kramers's book on the basics of quantum theory.

Nico always thought he would start work on his PhD thesis outside the Netherlands. Because of Europe's devastation, in 1945 the US seemed to be the most promising place to conduct research. At the suggestion of his older brother, Nico applied to the University of Chicago, which never replied; to the University of California, Berkeley, which wrote that it was not admitting foreign students at the time; and to Harvard University, which accepted him after receiving additional recommendations.

Luckily for Nico, he arrived at Harvard six weeks after Edward Purcell, Robert Pound, and Henry Torrey had detected an NMR signal in condensed matter. He was hired as a graduate assistant to develop the early NMR device. "The hitherto unexplored field of nuclear magnetic resonance in solids, liquids



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and gases yielded a rich harvest," Nico wrote in his biographical Nobel sketch. That research resulted in his 1948 *Physical Review* paper with Purcell and Pound, now commonly referred to as BPP, which became one of the most-referenced physics papers ever.

Nico returned to the Netherlands in 1947 to submit his PhD thesis, "Nuclear magnetic relaxation," at the University of Leiden. After receiving his degree in 1948, Nico worked as a postdoc for Cornelius Gorter at the Kamerlingh Onnes Laboratory for a year, and then he returned to Harvard to join the Society of Fellows. Although Nico also studied nuclear physics and microwave spectroscopy at the Harvard cyclotron, he ultimately chose to work on smaller-scale spectroscopy experiments.

In 1956 Nico created the crystal maser, which grew out of his work in microwave spectroscopy. In the early 1960s, soon after Theodore Maiman unveiled the laser, Nico extended his spectroscopy work into tunable lasers and developed a high-precision technique to observe atomic structure. His work on laser spectroscopy in turn led to his conception of nonlinear optics, in which he created a new theoretical way to analyze how electromagnetic radiation interacts with matter. "In fact, what we did was

quite simple," Nico told the Dutch newspaper *de Volkskrant* in 1990. "We took a standard textbook on optics and for each section we asked ourselves what would happen if the intensity was to become very high. We were almost certain that we were bound to encounter an entirely new type of physics within that domain."

Nico became an intellectual force at Harvard and rose quickly through the academic ranks. He became an associate professor in 1951 and received named professorships in 1957, 1974, and 1980. Nico retired from Harvard in 1990 as Gerhard Gade University Professor Emeritus.

Among the many honors Nico received for his work were the American Physical Society's 1958 Oliver E. Buckley Prize for Solid State Physics and the 1974 National Medal of Science. In 1981 the Nobel Prize in Physics was awarded to Nico and Arthur Schawlow for developing laser spectroscopy and to Kai Siegbahn for developing high-resolution electron spectroscopy.

Despite receiving such impressive honors, Nico continued to dedicate himself to teaching and mentoring. Throughout his life, he retained an attitude of sincere modesty. Harvard professor Eric Mazur, a postdoc of Nico's, recently said of his mentor, "Even though he received the Nobel Prize . . . he always remained one of the humblest people I have ever known. . . . He considered the success of the people around him his biggest accomplishment."

John Armstrong, a retired IBM vice president of science and technology, also worked in Nico's lab. He recalled the profound influence Nico had on his career: "It was the formative experience in my life as a scientist to have worked with him in [nonlinear optics] as a postdoc. He provided crucial support at an early stage in my career, and I believe this was true for many of his former students and postdocs."

Nico remained active at Harvard until he and his wife moved to Tucson in 2001. He was appointed as a professor of optical sciences at the University of Arizona. Refusing a salary, Nico was given an office, a computer, and a parking spot next to the optical sciences building. As only an academic could appreciate, the nearness of the parking space was the

most important part of the arrangement.

For his entire scientific career, Nico kept his high level of productivity and enthusiasm for science. Until his health started to decline during the last year of his life, he went to his office several days a week. He welcomed any opportunity to meet with visitors, students, and faculty. His standing in the optics community and the respect he inspired were evident at his 90th birthday party in 2010. In addition to the many former PhD students and postdocs who came to celebrate their mentor, Nobel laureates Roy Glauber, John Hall, and Charles Townes attended. Loved by many for his generosity, playfulness, and kindness, Nico will be greatly missed.

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Cécile DeWitt-Morette

Cécile DeWitt-Morette passed away on 8 May 2017 in Austin, Texas. She is perhaps best known for establishing the Les Houches School of Physics, located in the French Alps, and for having thus contributed greatly to the development of physics during the second half of the 20th century. Over the years the school attracted prominent teachers, and many students later became prominent scientists in their own right. Recent Nobel laureate Kip Thorne attended Les Houches first as a student and then as a lecturer;

he is one of 50 participants who have earned a Nobel Prize or Fields Medal.

Born in Paris on 21 December 1922, Cécile grew up in Caen, and she obtained her bachelor's degree in science from the university there. On 6 June 1944, the day of the Normandy landing, while Cécile was taking her master's exam at the University of Paris, bombs destroyed her home in Caen and killed most of her family.

Soon after, Cécile was hired by Frédéric Joliot-Curie to assist with tasks requiring theoretical knowledge. However, France lagged significantly in theoretical physics: No structured course on quantum mechanics had yet been offered. A conversation she had with Paul Dirac while visiting the UK led Cécile to realize her ignorance. Like other graduate students, she was expected to be trained abroad, and thus she prepared her doctoral thesis in Dublin under the direction of Walter Heitler. After she defended her thesis on the production of mesons, she left Paris for Copenhagen; in 1948 she went to the Institute for Advanced Study in Princeton, New Jersey. There she met a young physicist, Bryce DeWitt, who was as tall as she was short.

In the spring of 1951, Cécile married Bryce, which meant she would live outside of France, and she imposed on herself a condition to contribute to the redevelopment of physics in her motherland. Having experienced firsthand the deficiency of modern-physics instruction in France, she set out to remedy that. Through her energy, courage, and vision, she invented the concept of an autonomous international summer school with specific features: gathering a small group of carefully selected, promising students and eminent professors engaged in cutting-edge research; letting them work, live, and eat together for two-month sessions in a secluded and beautiful location; delivering extensive courses that progress from basic physics to recent advances; and publishing the lecture notes.

By the summer of 1951, Cécile was already able to launch the first session. Using her unique power of persuasion—Pierre-Gilles de Gennes said that no one could resist her “blue-eyed stare”—she garnered support for the project from influential physicists such as Louis Néel and Yves Rocard, obtained funds from the French government, found assistants, recruited outstanding lecturers, and advertised the school. Through a Girl Guide

friend whose father had bought them in the 1920s, she borrowed several ancient alpine chalets overlooking the village of Les Houches and facing the Mont Blanc chain. She installed rudimentary housing and a classroom in a hayloft.

For two summer months that year, about 30 students—half French, half foreign—who paid only for their meals, were introduced to modern physics by an impressive list of teachers, including Léon van Hove, Walter Kohn, Wolfgang Pauli, Emilio Segrè, and Victor Weisskopf (shown in the photo with Cécile at Les Houches). Some students slept on straw, but the lack of comfort and the intensive work were balanced by a congenial atmosphere and mountain hiking or climbing during free time. Lasting relationships were created.

From 1951 to 1972, Cécile directed and developed her school with tireless energy; she spent every summer at Les Houches with her four daughters and often with Bryce. She transformed the school into an official institution, installed a scientific and administrative board, and obtained funding from various sources, including the NATO Science Committee after 1958. Over time, she organized the purchase of the school property, the remodel of old farms, and the construction of modern chalets for housing and a building with a classroom, a library, and working spaces.

As graduate-level instruction in Europe improved, the yearly sessions increasingly focused on specific themes and were organized by a scientific director, but Cécile resisted overspecialization. In 1958 she entrusted Philippe Nozières with an eight-week session on the many-body problem, at which I had the marvelous experience of discovering living physics. Other institutes created throughout the world since 1953 have used Les Houches as a model.

In parallel with the development of the Les Houches School, Cécile pursued her physics career in the US and eventually became the Jane and Roland Blumberg Centennial Professor at the University of Texas at Austin. She produced foundational work on path integrals, their classical limit, and their interplay with topology. She published articles on wave propagation and on general relativity, measured the deviation of the light of stars by the Sun during the 1972 eclipse, and directed the work of many students. She edited numerous volumes

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Cécile DeWitt-Morette