

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

of the Les Houches proceedings, and with Yvonne Choquet-Bruhat she wrote an excellent two-volume book, *Analysis, Manifolds and Physics*.

Cécile offered me the great honor and pleasure of succeeding her in 1973 as director of the Les Houches School, which she had always regarded as her “child.” After retiring, she remained an active member of its board. Her successors, while following the advances of science, have preserved the spirit she instilled. Her school will remain her living legacy.

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Jerry Earl Nelson

Jerry Earl Nelson, the father of the segmented-mirror telescope and a towering figure in the history of telescope building, passed away on 10 June 2017 at his home in Santa Cruz, California.

Jerry was born on 15 January 1944 in northern Los Angeles County to a father who was a machinist and a mother who ran a children's center. He was introduced to astronomical research as a high school student in 1960 at the renowned Summer Science Program in Ojai (then in its second year) and to telescope building as an undergraduate physics major at Caltech when he assisted Gerry Neugebauer with the construction of a 1.5-meter IR telescope. Jerry so impressed his Caltech lab instructor and future colleague Eric Becklin with his experimental skill and thoroughness of approach that Becklin was still marveling about it 50 years later.

After graduating from Caltech in 1965, Jerry went on to graduate school at the University of California, Berkeley, where he shifted his interest to experimental particle physics. He received his PhD in 1972 under the direction of Burton Moyer. Staying on as a postdoctoral fellow at Lawrence Berkeley National Laboratory, Jerry returned to astrophysics. In particular, he applied his expertise in particle-physics electronics to a series of ingenious timing experiments at Lick Observatory that involved the Crab and other optical pulsars.

In 1977, University of California astronomers formed a committee to inves-



Jerry Earl Nelson

tigate what telescope to build as a successor to the Lick 3-meter. Jerry, who had caught the attention of some committee members with his optical pulsar work, was appointed to provide an outsider's perspective. Astronomy would never be the same.

Jerry had an abiding love of first principles and a remarkable ability to see both their furthest reaching implications and a path to getting there; his mantra was, “It's just freshman physics!” Preventing a mirror from distorting under gravity requires that its thickness increase as the square of the diameter, a fact that led Jerry directly to the concept of segmented mirrors. However, the idea of building a 10-meter-diameter mirror out of 36 segments raised some formidable problems.

Working with Terry Mast, who would be his close collaborator for 40-plus years, Jerry proceeded to solve those problems. In particular, his development, with Jacob Lubliner, of stressed mirror polishing solved the problem of how to fabricate large nonaxisymmetric optical segments, and his and Mast's development of active electromechanical control systems allowed large numbers of such segments to remain locked together and function as a single, continuous optical surface. The first Keck telescope was such a success when it went into scientific operation in 1993 that by 1996 there was a second, virtually identical Keck. Within a few more years, Jerry was at work, again with Mast, on designing what is now the Thirty Meter Tele-

scope (TMT), which is scheduled to begin construction later this year.

Jerry recognized that the enormous collecting area of the Keck telescopes made each photon more precious, not less. He worked tirelessly to help design and develop state-of-the-art instruments and to improve the telescopes' performance. Every morning he reviewed the Keck night logs. He was a fixture as an outspoken member of the Keck Science Steering Committee.

Not only a truly great physicist, Jerry was a remarkable electrical engineer and a world-class mechanical engineer as well. He received both the 2010 Kavli Prize in Astrophysics and the 2012 Benjamin Franklin Medal for electrical engineering. His personality was as impressive as his professional accomplishments. The courage he manifested in the face of criticism and personal adversity was remarkable and inspiring. Although he had a physically debilitating stroke in late 2011, Jerry still went to work every day, including holidays, and was making essential contributions to both Keck and the TMT up until his final days. His optimism was relentless—he was undeterred by people constantly telling him he was trying to do the impossible—and his intellectual curiosity was legendary. He was a mentor of uncommon patience and generosity, and it is doubtful whether anyone, with the possible exception of his colleague Mast, got more joy out of his work.

Jerry's vision, expertise, technical knowledge, and leadership made the twin Keck telescopes the first of the 8- to 10-meter telescopes to go into operation. The two Kecks, together with Jerry's efforts as the founding director of the Center for Adaptive Optics at Santa Cruz, helped to usher in an unprecedented era of astronomical discovery that covered such diverse phenomena as exoplanets, the formation and evolution of galaxies, the acceleration of the expansion of the universe, and the black hole at the galactic center. Jerry had a profound influence on the careers of a hundred astronomers and telescope engineers. His continuing influence can be seen in the segmented-mirror design of ongoing telescope megaprojects, including the *James Webb Space Telescope*, the European Southern Observatory's Extremely Large Telescope, and the TMT.

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