

both to the standard Faddeev method and to the conceptually simpler continuum discretized coupled channels method. Characteristically, Austern, in that paper, directly examined coordinate-space boundary conditions rather than resort to the more usual complete-continuity arguments.

Austern once described his main interests as physics, family, hiking in the mountains, and music. Highly intellectual, he communicated easily and comfortably with people on all levels. Always outgoing, he maintained personal contact with a worldwide circle of professional colleagues. He was a master at making theory understandable to experimental physicists, and his teaching was creative and responsible. He disdained being competitive rather than cooperative in science or in personal life, and he did not seek recognition. Apart from his scientific legacy, many of us owe him a great deal for his generous help and wise mentoring.

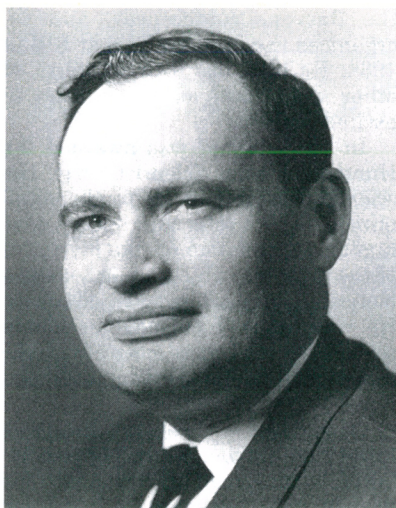
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Simon Larach

Simon "Si" Larach, a solid-state chemist and physicist who was instrumental in the development of modern color television phosphors, electroluminescent phosphors, and various radiological medical technologies, died on 20 January in Baltimore, Maryland, of complications from a stroke.

Born in Brooklyn, New York, in 1922, Larach graduated from the City College of New York in 1943 with a BS in chemistry. During World War II, he conducted medical research on anti-malarial drugs. He also served in the US Army Air Corps as a radar officer after taking military electronics courses at Harvard and Yale universities. In 1946, he joined the David Sarnoff Research Center of the Radio Corporation of America (RCA) in Princeton as a research chemist. He spent 41 years at the center, the last 20 of which he was a fellow of the technical staff.

In 1955, Larach received his PhD in chemistry from Princeton University. During the 1950s and 1960s, he led a research team at RCA that was instrumental in creating a new red-emitting, rare-earth phosphor for color television. This family of phosphors—rare-earth oxysulfides—has many applications, such as in cath-



SIMON LARACH

ode-ray tubes and x-ray intensification screens, and the red emitter europium-doped yttrium oxysulfide is still used in color television tubes worldwide. Larach also helped design the US solid-state physics exhibit for the 1958 Brussels World Fair.

During the 1960s and 1970s, Larach was a visiting professor at Princeton. A proponent of industry-academic collaboration, he worked with researchers in both arenas during those years to study electron paramagnetic resonance. From 1969 to 1970, Larach was a visiting professor of chemistry at Hebrew University in Jerusalem, where he helped to establish the graduate school of applied science. Throughout his career, he periodically returned to Jerusalem to teach; he also lectured at institutions in the US, Europe, and Asia.

In 1974, Larach began applying his knowledge of phosphors and wave propagation to medical technologies. He was appointed as an adjunct professor of radiology at MCP Hahnemann University in Philadelphia in 1975 and at Columbia University in 1979, while retaining his position at RCA.

Following his retirement from RCA in 1987, Larach formed a consulting firm that helped the US Army develop new phosphors and phosphor technologies for use in "heads-up" military displays, in which the image is projected on windshields.

A recipient of more than 50 patents, Larach served on President Lyndon B. Johnson's Commission on Laboratory Safety and, in 1966, was awarded the David Sarnoff Medal, given by the Society of Motion Picture and Television Engineers for outstanding technical and scientific achievement. From the 1960s into the

1980s, he was an editor for the *Journal of the Electrochemical Society* and a contributing editor to the Van Nostrand science encyclopedia.

Larach was a congenial person who inspired and encouraged others to create and try out new materials and synthesis techniques.

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Nimai Chad Mukhopadhyay

Nimai Chad Mukhopadhyay, a professor of physics at Rensselaer Polytechnic Institute (RPI), died at home in Loudonville, New York, on 15 May after a long and courageous battle with a deadly illness.

Nimai was born in Maharampur (near Calcutta), India, on 17 January 1942. In 1963, he earned a BSc in physics from the University of Calcutta. He began graduate school at the University of Chicago in 1968, having already received conventional training in low-energy nuclear physics and several years of research experience. He earned both an SM (in 1970) and a PhD (in 1972) in theoretical nuclear physics. He chose to enter the then-fledgling field of high-energy nuclear physics. Nimai clearly grasped the importance of his newly chosen field, so he made certain that he received a thorough grounding in particle physics and quantum field theory.

Beginning with his PhD thesis and continuing with research from about 1972 to 1981 at the University of Maryland, College Park, and the Swiss Institute of Nuclear Research (now known as the Paul Scherrer Institute) in Villigen, Nimai focused



NIMAI CHAD MUKHOPADHYAY

on nuclear aspects of the weak interactions. This phase of his career culminated in an authoritative review of nuclear muon capture in *Physics Reports* in 1977.

When Nimai joined RPI in 1981, he found that RPI had well-established programs in photonuclear physics and an experimental program in pion photoproduction on few-body nuclei and p-shell nuclei. He believed strongly that, to maximize progress in physics, an intimate relationship must be established between experimental and theoretical work. Thus he built a theoretical program parallel to the existing experimental program at RPI.

One of the major projects that he and his group undertook was to put the basic mechanism for meson production on strong theoretical ground by constructing an elementary operator that is consistent with unitarity and with gauge and Lorentz invariance. The group then applied this approach to the photoproduction process in light nuclei.

The most significant feature of pion photoproduction near threshold is the delta resonance. In the late 1970s, there was an effort by Nathan Isgur, Gabriel Karl, and others to try to understand this resonance based on the constituent quark model. In that model, the resonance excitation corresponded to a spin flip of one of the quarks, and it was necessary to understand how that spin flip led to a large energy splitting from the nucleon ground state. The model that had been developed by Isgur, Karl, and others in the late 1960s and refined in the 1970s to explain this result used a simple shell-like three-quark wavefunction with a perturbing hyperfine color magnetic interaction between the quarks, which gave rise to the requisite energy splitting. This interaction also introduced a d-wave component in the wave function in addition to the dominating s-wave part, resulting in a spatial deformation. Nimai and his group made an important contribution to this physics by elucidating fundamental relationships between transverse electric quadrupole (E2) and Coulomb (S1) multipoles, which both contribute to this hyperfine process.

During the early 1980s and into the mid-1990s, Nimai broadened his research to include the photoproduction and electroproduction of baryon resonances involving pion and eta decay and, to a lesser extent, the study of the low-energy properties of baryons through the Skyrme model and lattice quantum chromodynamics.

He was instrumental in reviving

the Baryons conferences, and co-organized the first one held at RPI in 1988. He was also a co-organizer of other workshops on the subject of excited baryons.

In 1997, Nimai was awarded the Humboldt Senior Scientist Prize. His scientific research on the fundamental properties of matter and energy gave him an appreciation for the mysteries of the universe, which connected symbiotically with his deep spiritual beliefs. He was actively engaged in Hindu scholarship, and, more generally, in the commonality of its spiritual underpinnings with other religions.

Nimai was a dedicated husband, father, and teacher. He will be remembered with great affection by his friends and colleagues as a person who loved and practiced scholarship with much reverence and enthusiasm.

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Karl Strauch

Karl Strauch, an experimental high-energy physicist and professor emeritus of physics at Harvard University, died in Boston on 3 January. His death ended a 15-year struggle with Parkinson's disease.

Karl was born on 4 October 1922 in Giessen, Germany. Not long after Hitler came to power, Karl's parents were exiled from Germany for advocating democratic principles. Consequently, the Strauch family took up residence in Paris, where Karl earned his high school diploma. In 1939, the family emigrated to California. Karl attended the University of California, Berkeley, where he earned an AB in 1943. After serving in the US Navy, he returned to Berkeley to earn a PhD in physics in 1950. That same year, he was elected to Harvard's Society of Fellows; three years later, he was appointed to the university's physics faculty as an assistant professor.

Karl's early research, which made use of Harvard's Cyclotron, was on proton-nucleus scattering. Later, in 1962, he and his group discovered the decay of the η meson into two photons at Brookhaven's Cosmotron, establishing the meson's spin to be zero. In 1967, he began a seven-year term as the director of the Cambridge Electron Accelerator (CEA), a joint Harvard-MIT facility. At the CEA, he led experiments that produced tantaliz-



KARL STRAUCH

ing evidence in the early 1970s for an additional degree of freedom, suggesting the existence of quarks heavier than the up, down, and strange quarks. His most recent research was carried out with several major colliding beam experiments: Experiment I-209 at CERN (ISR) looked for muon pair production in proton-proton scattering; the Crystal Ball experiment at both SLAC and DESY (the German Electron Synchrotron) studied final states with photons in electron-positron collisions; and the L3 Collaboration at CERN (LEP) investigated high-energy electron-positron interactions.

Karl served on various national and international committees and commissions. These included the Commission on Particles and Fields of the International Union of Pure and Applied Physics and the US-USSR Joint Coordinating Committee on Fundamental Properties of Matter, which formed the chief conduit between the US and Soviet scientific communities during the height of the cold war.

Karl rose through Harvard's academic ranks to become the George Vasmer Leverett Professor of Physics in 1975. He served as chairman of the Harvard physics department from 1978 to 1982. His warm and friendly teaching style endeared him to his students, and he firmly guided more than 20 graduate students as they began their physics careers. Karl also chaired two committees that significantly affected the policies and culture of Harvard. The first successfully recommended the merger of Harvard and Radcliffe College's admissions offices and the institution of an admissions policy of equal access for women.