

OBITUARIES

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Martin Moses Block

Particle physicist Martin Moses Block was born on 29 November 1925 in Newark, New Jersey, and died in Los Angeles on 22 July 2016 after a brief illness. His career was distinguished not only by many contributions but also by longevity: His first paper was published in September 1949, and his most recent in June 2016, 67 years later. Block really had two careers in physics: first, as an experimentalist, until he went emeritus in 1996, and second, as a theorist, carried out from home in his beloved Aspen, Colorado. He was active in the Aspen Center for Physics and was responsible for founding the center's enduring Aspen Winter Physics Conference series.

Block received his BS in 1947, MA in 1948, and PhD, under William Havens, in 1952, all from Columbia University, where he also helped design the magnets for the Nevis cyclotron. As a young professor at Duke University, he contributed the revolutionary notion that parity wasn't conserved in weak interactions. While rooming with Richard Feynman at the Rochester Conference on High Energy Physics in 1956, he'd hatched the idea as a way to resolve the so-called tau-theta paradox: two otherwise identical particles that decayed into different parity states and thus were believed to be distinct. Feynman recounted the story in his 1985 memoir, *Surely You're Joking, Mr. Feynman! Adventures of a Curious Character* (W. W. Norton, page 247):

I was sharing a room with a guy named Martin Block, an experimenter. And one evening he said to me, "Why are you guys so insistent on this parity rule? Maybe the tau and theta are the same particle. What would be the consequences if the parity rule were wrong?"

I thought a minute and said, "It would mean that nature's laws are different for the right hand and the left hand, that there's a way to define the right hand by physical phenomena. I don't know that that's so terrible, though there



Martin Moses Block

must be some bad consequences of that, but I don't know. Why don't you ask the experts tomorrow?"

He said, "No, they won't listen to me. You ask."

So the next day, at the meeting . . . I got up and said, "I'm asking this question for Martin Block: What would be the consequences if the parity rule was wrong?"

Murray Gell-Mann often teased me about this, saying I didn't have the nerve to ask the question for myself. But that's not the reason. I thought it might very well be an important idea.

Important, indeed! The 1957 Nobel Prize in Physics went to Tsung-Dao Lee and Chen-Ning Yang for their theoretical analysis of the process. But it was not shared by Chien-Shiung Wu for her 1956 experimental demonstration of parity violation in the beta decay of cobalt-60 nuclei, nor was Block's contribution acknowledged at the time. The episode was recounted in a bit of rueful doggerel by physicist Erich Harth (*PHYSICS TODAY*, August 1991, page 91).

At Duke, Block developed the first liquid-helium bubble chamber and used it to study the properties of several newly discovered particles. He left Duke

in 1961 for Northwestern University, where he served on the faculty for the remainder of his experimental career. He codiscovered the eta meson, and he probed particles at ever-higher energies by using heavy-liquid bubble chambers and, eventually, modern counter detectors. His work took him to accelerators all over the world, with extended stints at Fermilab, CERN, and Lawrence Berkeley, Brookhaven, and Argonne National Laboratories.

Block's lifelong passion for the mountains, especially for downhill skiing and fly-fishing, eventually took him to Aspen, where he joined the Aspen Center for Physics in its nascent years. He purchased a family home there in 1964, and he spent many vacations in Aspen until he left Northwestern to spend full time in Colorado. At that point he took up a second career in theoretical and computational physics.

A central focus of his later work was on the forward-scattering amplitudes of hadron collisions, particularly at the highest energies available at the most powerful modern accelerators as well as from cosmic rays. He sought to understand scattering structure and, specifically, why the proton-proton interaction cross section grows with the square of the logarithm of the energy. After toying with models inspired by quantum chromodynamics, Block realized that the experimental data had become sufficiently precise to make a model-independent prediction of the asymptotic behavior of the cross section. His work anticipated quantitatively the measurements eventually performed at the Large Hadron Collider at CERN. In one of his final papers, he showed that the data

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Ahmed H. Zewail
26 February 1946 – 2 August 2016

Bill Lee
15 June 1965 – 30 July 2016

John Madey
1943 – 5 July 2016

Stephen Gasiorowicz
10 May 1928 – 3 June 2016

Eugene M. Berstein
13 February 1931 – 20 February 2016

Philip Joel Greenberg
22 April 1942 – 26 December 2015

demonstrate convincingly that both the proton–proton and antiproton–proton scattering amplitudes asymptotically approach those of a so-called black disk, presumably as a consequence of gluon saturation.

Martin Block remained productive up until the end, when he and collaborators were revising drafts of his latest manuscript. He was, his friends and colleagues agree, quite a character, and something of a force of nature.

Francis L. Halzen

University of Wisconsin–Madison



Virginia Ruth Brown

Virginia Ruth Brown died on 8 February 2016 in Chevy Chase, Maryland, after a long battle with cancer. She was a wonderful colleague, friend, and distinguished theoretical nuclear physicist. During her long career, Virginia made important contributions to our understanding of the nucleon–nucleon interaction, nuclear reaction theory, and nuclear structure, among other accomplishments. She loved physics and had a deep commitment to getting to the heart of things.

Born on 11 March 1934 in Massachusetts, Virginia received her PhD, under the supervision of Bernard Margolis, from McGill University in 1964. She was a postdoctoral fellow at Yale University and then worked at Lawrence Livermore National Laboratory (LLNL) from 1964 until 1995. She was an NSF program officer for nuclear theory from 1995 to 1998. Following that, she was a visiting professor in the physics department of the University of Maryland in College Park and a visiting scientist in the Laboratory for Nuclear Science at MIT.

During Virginia's early work on nucleon–nucleon bremsstrahlung, she explored the effects of parity nonconservation and demonstrated the importance of meson exchange in neutron–proton bremsstrahlung. Her calculations showed that meson exchange currents contributed a factor of 2 and were not dominated by one-pion exchange. Throughout her career she continued refining and extending her calculations, including for relativistic effects and noncoplanarity. She compared her results with experiment, most notably with the data on neutron–proton bremsstrahlung that



Virginia Ruth Brown

Stephen Wender, June Matthews, and their colleagues obtained at the Los Alamos Neutron Science Center. When Virginia was at MIT she interacted frequently with Matthews's group and directed the research of several of Matthews's undergraduate and graduate students.

Virginia's collaboration with experimentalists started soon after she joined LLNL; most prominently, she worked with John Anderson on charge-exchange reactions in nuclei.

Around 1973 Virginia also began her long partnership with theorist Victor Madsen. They developed the nuclear-structure and reaction theory needed to understand charge-exchange reactions; their breakthroughs included a model for mixing giant resonance states with the low-lying states that had been experimentally observed at the time. Their most important contribution was the systematic inclusion of isospin degrees of freedom that were required to understand the data. It was successfully applied to inelastic scattering processes without any additional modifications.

One of us (Bernstein) remembers how stimulating it was to work with Virginia. In the mid 1970s, he received a letter from her about how Madsen's and her isospin-dependence calculations could explain the puzzles and regularities that he had observed in inelastic alpha-particle scattering. Their collaboration started in their first meeting, and over many years it yielded a productive series of papers.

They covered electromagnetic tests of the accuracy of the observed neutron and proton transition matrix elements and their observation using different hadronic probes and electromagnetic methods such as electron scattering and Coulomb excitation. He remembers with great pleasure his annual spring-break trip to the University of California, Berkeley, and LLNL to work with Virginia and to enjoy great dinners with her in Berkeley and San Francisco. Their friendship and collaboration were reinforced while she was working as a visiting scientist at MIT from 1998 until her death.

Virginia was a deeply involved member of the American Physical Society (APS), including as secretary/treasurer of the division of nuclear physics (DNP) from 1986 to 1995. Because of her numerous contributions, her colleagues chose her in 2003 to receive the division's first Distinguished Service Award.

Another of us (Gibson) saw firsthand Virginia's remarkable contributions to APS. He first met Virginia when he was a postdoctoral fellow at LLNL in 1968. Their closest connection came through the DNP, when he succeeded her as secretary/treasurer in 1995, and she mentored him in that time-consuming position.

Virginia's efforts as part of the DNP leadership strengthened the division's fall meetings, assisted in funding APS's Hans Bethe and Herman Feshbach Prizes and the division's Nuclear Physics Dissertation Award, initiated the Department of Energy and NSF's Nuclear Science Advisory Committee Long Range Plan town meetings, and established the DNP archive and historical record.

While at NSF, Virginia suggested exploring a joint meeting with the nuclear physicists of the Physical Society of Japan. She chaired the first of the resulting series of successful international physics meetings in 2001 and remained instrumental in their success through the 2014 joint meeting. After Virginia left NSF, she was a visiting scientist at Los Alamos National Laboratory, where she conducted research and shared meals with Gibson and another of us (Seestrom). During one visit, she and Gibson drafted a history of the DNP. Virginia's imprint on the division is indelible, and the DNP owes her a great debt of gratitude.

With her contagious enthusiasm and