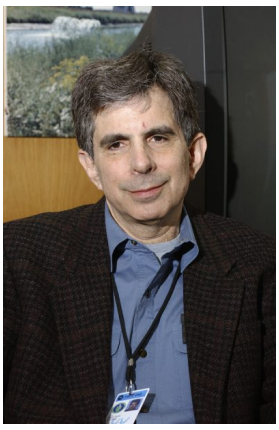
In memoriam: Sheldon Leslie Stone

November 10, 2021 | Joel Butler, Patricia McBride and Chris Quigg

Sheldon Stone (Feb. 14, 1946 – Oct. 6, 2021), distinguished professor of physics at Syracuse University, passed away in early October at the age of 75. He graduated from Brooklyn College in 1967 and earned his doctorate at the University of Rochester in 1972 under the guidance of Thomas Ferbel. He devoted most of his career to the study of particles containing charm and bottom quarks.



Sheldon Stone. Photo: Reidar Hahn, Fermilab

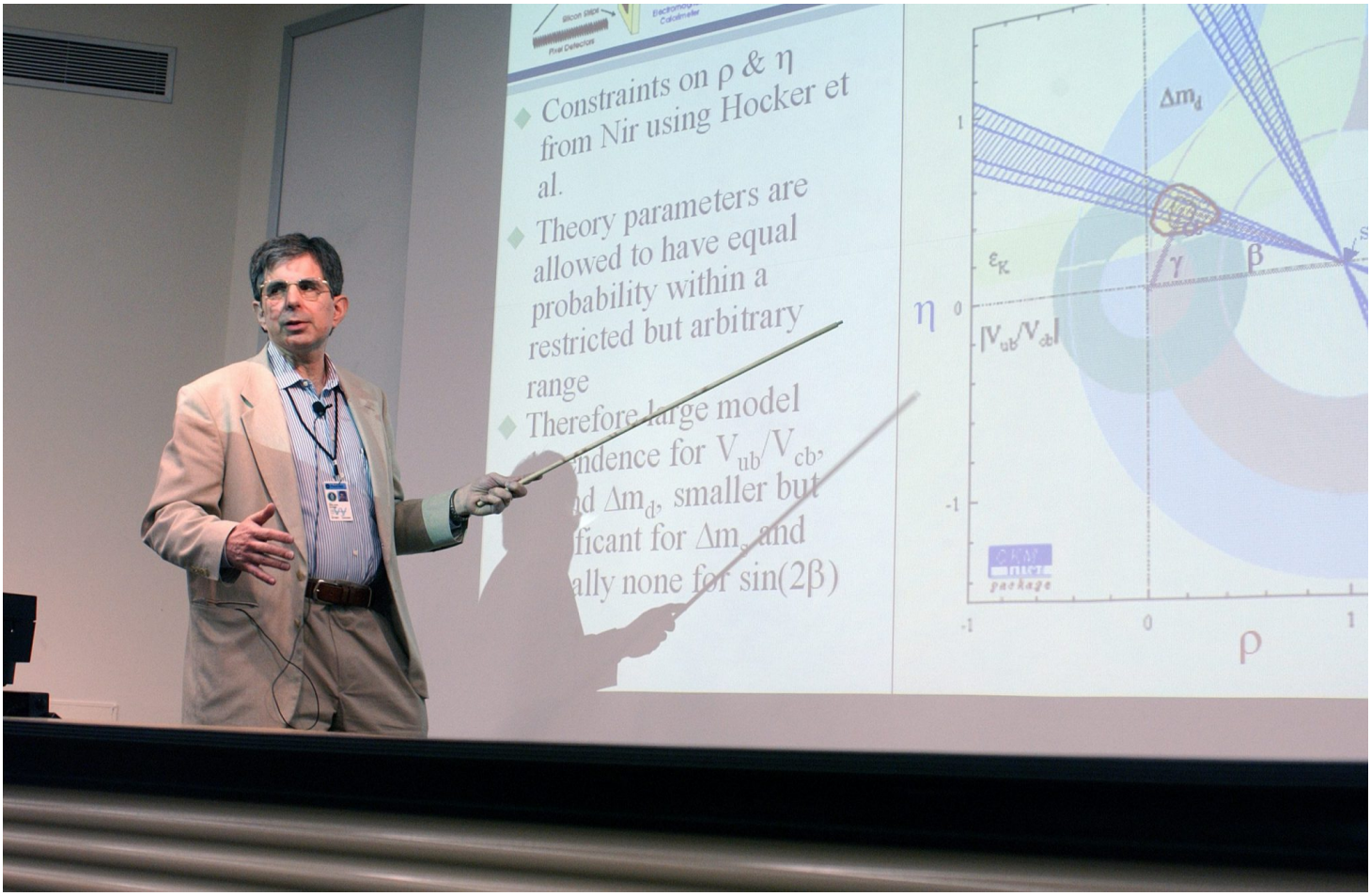
Sheldon made major discoveries, conceived and executed innovative experimental designs, contributed new ideas and methods for analysis, and wrote and edited papers and books that have informed an entire generation on the physics and techniques of heavy flavors. He formed strong connections to the theory community working on heavy-flavor physics. Sheldon was honored for his achievements with the American Physical Society's 2019 Panofsky Prize "For transformative contributions to flavor physics and hadron spectroscopy, in particular through intellectual leadership on detector construction and analysis on the CLEO and Large Hadron Collider beauty experiments, and for the long-standing, deeply influential advocacy for flavor physics at hadron colliders."

While best known for his electron–positron experiments at Cornell and the LHCb experiment at CERN, Sheldon had strong connections to Fermilab. For more than a decade, he worked to develop a future heavy-flavor program as co-spokesperson for the BTeV collaboration. He served on the Fermilab Physics Advisory Committee from 1988 to 1993 and as a member of the board of directors of the Fermilab Research Alliance from 2006 to 2011.

Sheldon worked for many years on the CLEO experiment at CESR, the electron–positron B factory at Cornell University. He was at the center of many key experimental investigations, including the measurement of elements of the CKM quark-mixing matrix. He was a major contributor to the observation of the rare, one-loop (aka Penguin) decays and a leader in searching for other rare decays of B-mesons, which are sensitive to physics beyond the standard model. Sheldon contributed to the study of excited charmed mesons, which probed our understanding of the strong interaction. He served as co-spokesperson of the CLEO collaboration from 2007 to 2008.

He was a key figure in the CLEO-c proposal that repositioned the Cornell laboratory to study charm decays more thoroughly than had been done before. He and his group made the best measurements of the decay constants of the $D^+$and D_s^+ mesons through their purely leptonic decays, validating theoretical predictions based on the lattice formulation of quantum chromodynamics so that such predictions could be used with confidence for *b*-quarks.

Sheldon was an innovator in the design of heavy-flavor experiments. He pioneered the use of high-quality calorimetry based on thallium-doped cesium iodide crystals to reconstruct decays that contained photons, neutral pions and eta mesons. When first proposed for CLEO, this was considered a nearly impossible technical challenge. When Sheldon highlighted the need for charged hadron identification, he and his team developed a very novel ring-imaging Cherenkov counter for the CLEO upgrade. His group played a leading role in the construction of these detectors and in their use in data analysis.



Sheldon Stone, presenting the BTeV physics case to a HEPAP subpanel. Photo: Reidar Hahn, Fermilab

While electron–positron B factories have great strengths for the study of B_u and B_d mesons, Sheldon recognized that they are not well-suited for precision studies of CP violation and rare decays of B_s mesons, *b*-baryons, and heavier objects. These could best be studied at a TeV-energy hadron collider. Sheldon, along with an international collaboration featuring a strong Fermilab team, developed a dedicated B-physics experiment, BTeV, intended to take data at the Tevatron after 2010. BteV was a technological tour de force, containing many new ideas in particle tracking and triggering. As co-spokesperson, Sheldon took the lead in developing the physics case for the experiment, which focused on the search for new physics in the rare decays, especially of B_s mesons. Although the collaboration surmounted all scientific and technical hurdles, in 2005, the Department of Energy decided not to proceed with BTeV.

The experience and insights Sheldon and his group gained from BTeV led them to join LHCb at CERN's Large Hadron Collider. Their outstanding contributions to LHCb include the first measurement of the beauty-production cross-section at the LHC and a series of important measurements of CP-violating observables in the decays of B_s mesons. In 2015, the LHCb collaboration published the first observation of novel resonances containing four quarks and an antiquark. Pentaquark states had been predicted but had resisted discovery for more than 50 years until Sheldon and a small team of colleagues uncovered their existence in the LHCb data.

From 2008 to 2011, Sheldon served as deputy coordinator of the LHCb upgrade currently being installed, which will allow LHCb to operate at much higher luminosity, starting in 2022. He brought many ideas from the BTeV project to LHCb and was influential in shaping the experiment. The Syracuse group took major responsibilities for the hardware.

Right up to the time of his death, Sheldon was very active in physics, already working on the next upgrade of LHCb, to allow it to operate during the High Luminosity era of the LHC, running after 2027. He was completing a book, "New physics in *b* decays," in collaboration with his wife, Syracuse professor Marina Artuso—herself a star in CLEO, BTeV and LHCb, and Gino Isidori, a celebrated theorist at the University of Zürich.

Sheldon was a rigorous, energetic, passionate and creative scientist. He was equally intense about many other topics, ranging from sports to politics. We enjoyed many lively discussions on those topics, as well as physics, over lunch at the Fermilab and CERN cafeterias. His passing is a great loss both to particle physics and to his many friends and associates.

Tagged: death, people

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