

the percentage of ideas that were implemented was much higher. There are three levels of cognition: At the first stage, one observes a new phenomenon; at the second stage, one explains this phenomenon; and, at the third stage, one uses the obtained knowledge as a research and application instrument. Many experimentalists restrict themselves to the first stage; theoreticians, to the second; and only a few outstanding scientists reach the third stage. Basov belonged to the third group.

Basov was persistently attached to science, without which he apparently thought life was empty. Physics as science or physics as technology occupied his mind whether he was at home, in a car, on holiday, or ill. He was a scientist who devoted all his strength, knowledge, and enormous talent to the development of science in Russia.

Basov was frank and straightforward in judgment, a characteristic that was not always appreciated by his associates. Some believed that he underestimated their work and accomplishments, but in actuality, he was strongly devoted to laser physics, which, for him, left little room for other realms of knowledge. He was, though, an outstanding proponent of other people's ideas and accomplishments. He had a surprising intuition and was a generous, hard-working, and friendly person. These traits attracted and held scientists and students around him.

Basov depended on the people who surrounded him—friends with whom he had studied at the Moscow Engineering Physics Institute, and colleagues and disciples with whom he worked at the Lebedev Institute. He and his wife Ksenia were hospitable hosts for whom no holiday or family event would pass without numerous guests.

The international reputation of the Lebedev Institute and its scientists is the result of the long and distinguished activity of Basov. With his death, the physics community has lost one of its brightest and most admired members.

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James Thomas Cushing

James Thomas Cushing, professor of physics, philosophy, and the history and philosophy of science at the University of Notre Dame, died at his



JAMES THOMAS CUSHING

home in South Bend, Indiana, on 29 March 2002.

Jim was born 4 February 1937 in Long Beach, California. In 1959, he earned a BS in physics from Loyola University Chicago; a year later, he earned an MS in physics from Northwestern University. For his doctorate, he focused his research on theoretical particle physics under the guidance of adviser Max Dresden. Jim received his PhD in 1963 from the University of Iowa.

Jim's dissertation and early publications in the mid-1960s concerned the development of the S-matrix program, his specific contribution being to show that the Mandelstam representation obtained for a large class of nonlocal potentials. In the late 1960s and early 1970s, Jim turned his attention to the question of whether the Chew and Mandelstam bootstrap mechanism could yield internal symmetries such as isospin and SU(3). He made one of his most important contributions to theoretical physics in 1975 with the publication of *Applied Analytical Mathematics for Physical Scientists* (Wiley, 1975), which quickly became a standard textbook.

As the fortunes of the S-matrix program waned, Jim's interests shifted to the history and philosophy of physics, areas in which he was to become a leading figure. During this phase of his career, he masterfully studied the history of the S-matrix program, which he wrote about in *Theory Construction and Selection in Modern Physics: The S-Matrix* (Cambridge U. Press, 1990). But surely one of the most cited books on the history and philosophy of physics during the past decade is Jim's *Quantum Mechanics: Historical Contingency*

and the Copenhagen Hegemony (U. of Chicago Press, 1994). Another important work is the collection Jim coedited with Ernan McMullin, *Philosophical Consequences of Quantum Theory: Reflections on Bell's Theorem* (U. of Notre Dame Press, 1989).

Jim's reputation among physicists was based mainly on his well-known insistence on a fair hearing for Bohmian mechanics as an alternative in debates about the interpretation of quantum mechanics. What most interested Jim, however, was not advocating David Bohm's program over orthodox Copenhagen quantum mechanics, but rather achieving a deeper understanding of how the sociology of scientific communities plays a role in the acceptance and rejection of scientific theories. In the undergraduate textbook *Philosophical Concepts in Physics: The Historical Relation between Philosophy and Scientific Theories* (Cambridge U. Press, 1998), he expressed his concerns with the way science lives in a social and historical context.

Jim's graduate students remember him as an extraordinarily conscientious and supportive dissertation director. Many of the same moral traits that made Jim a much-loved teacher were also in play in his lifelong dedication to social justice, as evidenced especially by his involvement in the civil rights movement of the 1960s. Jim's Notre Dame physics colleagues recalled one typical episode in the late 1960s when, on the verge of tenure, Jim suddenly announced his resignation. Pressed by the chairperson for the reason, Jim explained that he was accepting a fellowship from the Woodrow Wilson Foundation to spend a year teaching physics at the Hampton Institute. He added that he did not want to put his own department in the awkward position of having to grant leave to a junior faculty member for a purpose having nothing to do with his own professional advancement or enhancing the academic reputation of Notre Dame. His Notre Dame colleagues warmly supported him for doing what his conscience demanded.

To honor Jim's memory, his family, friends, and colleagues have established the Cushing Memorial Prize, an award given annually by the University of Notre Dame for young scholars' work in the history and philosophy of physics.

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