teaching standards, but he was told to expect a cut in the university's budget and was compelled to stop hiring any more faculty or staff. Despite such limitations, Bath fared considerably better during the period of Matthews's leadership than many other academic institutions. While undergraduate intake remained static, the number of doctorates awarded by Bath increased considerably.

On his retirement in 1983, Matthews returned to Cambridge to teach. His advice on policy matters was eagerly sought after. That year he was appointed chairman of the government's select advisory committee on radioactive waste management.

Matthews never lost touch with students, to whom he was always approachable and stimulating. I met him for the first time in 1950 at the Cavendish Laboratory in Cambridge. I had gone there to request Nick Kemmer to take me on as a research student. In my first interview with Kemmer, he said: "All theoretical problems in quantum electrodynamics have already been solved by Tomonaga, Schwinger, Feynman and Dyson. Paul Matthews has done nearly the same for meson theories. He is finishing his PhD this year. Ask him if he has any problems left."

With characteristic generosity Matthews suggested the problem of renormalizing spin-zero mesons to all orders. He told me to work on it "till I get to work in the fall. If you don't solve it by then, I'll take it back."

During the few months that Matthews was still in Cambridge before his holiday I had daily contact with him. He provided me with intellectual as well as physical sustenance. This was just after the war, when Britain was in the throes of severe austerity, and to find a table at which Paul and his wife, Manzi, offered kosher sausages and other delights that defied the rationing allocations was for me the epitome of bliss.

I joined Matthews as a colleague in early 1951 at the Institute for Advanced Study, where we began a collaboration that continued over the next 14 years. He returned to Cambridge and acted as examiner for my PhD. We subsequently worked together on a field-theoretic formulation of Richard Feynman's path integrals. After I joined Imperial College in 1957, Matthews followed. We worked together on dispersion relations and on unitary symmetries.

I came to admire him more and more for his physics and his humanity. His clarity of thought and exposition were legendary among physicists and students. Imperial's undergraduates voted him best lecturer in physics year after year. His own insistence on excellence continued unblemished when, later, as vice chancellor at Bath, he was recognized by Britain's University Grants Commission for transforming the place into one of the country's model universities. With his untimely death, Britain and the physics world have lost a collegial giant and a prince among men, and I, one of the dearest of personal friends.

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Imperial College of Science and Technology
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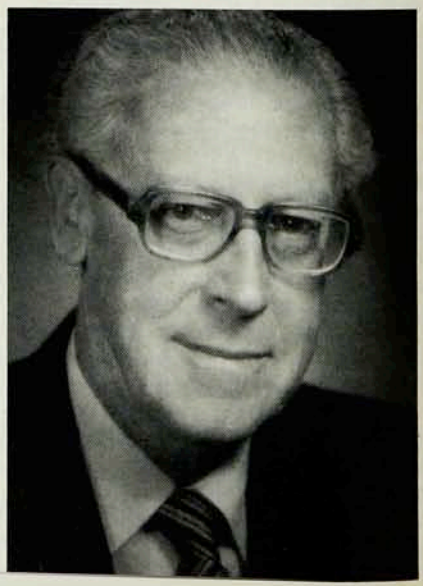
George H. Vineyard

George H. Vineyard, director of Brookhaven National Laboratory from 1973 through 1981 and president-elect of The American Physical Society, died of cancer on 21 February 1987. He was 66 years old.

Vineyard's distinguished career centered on basic research in theoretical solid-state physics. In addition, he held many administrative positions at Brookhaven, culminating in his appointment as the laboratory's fourth director. He resigned to return to full-time research, remaining active even during his illness.

Born in St. Joseph, Missouri, in 1920, Vineyard studied physics at MIT, receiving his BS degree in 1941, and his PhD in 1943 with a thesis on the behavior of space charge in the cavity magnetron. From 1943 to 1946 he was on the staff of the MIT Radiation Laboratory, working on microwave electronics and radar.

VINEYARD



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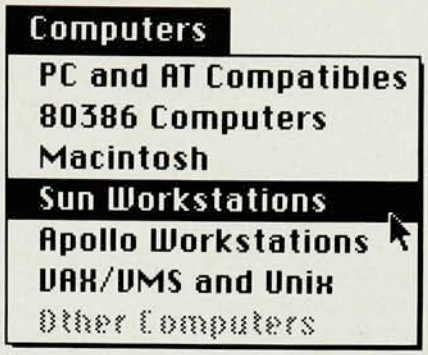

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MATLAB has tools for all your analysis needs. You get useful linear algebra functions like eigenvalues, linear-equation solution, least-squares, inverse, pseudoinverse, matrix exponential, singular value decomposition, and almost anything else you can think of to do with matrices. MATLAB is also chock full of other analytical capabilities including complex and polynomial arithmetic, curve fitting, cubic splines, nonlinear optimization, quadrature, ordinary differential equations, and multivariate statistics. Altogether, there are over 200 functions available.

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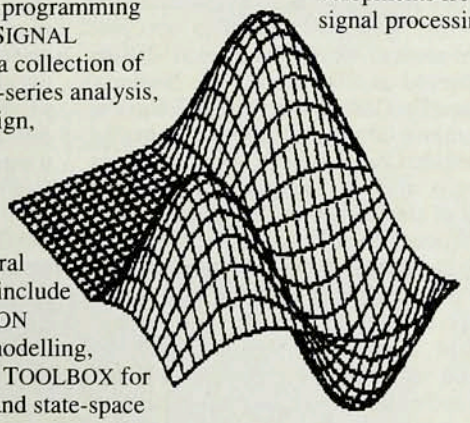

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In 1946 Vineyard joined the physics faculty of the University of Missouri, Columbia, becoming a professor of physics in 1951. His research was in the theory of liquids, the determination of structures of liquids and solids by scattering of various particles, and general solid-state physics.

Vineyard joined Brookhaven in 1954 as a physicist, becoming senior physicist in 1960. From 1961 to 1966, he served as chairman of the physics department. He became part of the laboratory's directorate in 1966, as associate director. His skills as an administrator were further recognized in 1967, when he was appointed deputy director. He was named director of the laboratory in 1973; during his tenure the National Synchrotron Light Source was started at Brookhaven.

At Brookhaven, Vineyard was involved in several areas of research: the use of neutrons to determine the structure of matter, the kinetics of order–disorder transitions, the theory of diffusion, the theory of magnetism, and radiation damage in solids. Together with George J. Dienes he wrote an advanced physics textbook on radiation damage, *Studies in Radiation Effects in Solids* (American Nuclear Society, 1957).

At Brookhaven in the late 1950s Vineyard, John Gibson, Allen Goland and Martin Milgram pioneered the use of computer simulation in realistic studies of the damage radiation can produce in the periodic arrangement of atoms in a crystal. To provide a dramatic display of what was happening in the computations, they also generated a motion picture of their results that is still viewed today. From 1965 to 1970, Vineyard, Martin Blume and Richard Watson used computers and motion pictures to study the statistical mechanics of spins in a magnet—another early application of computer simulation.

Since stepping down as Brookhaven's director, Vineyard was also occupied with several other important duties: He served as chairman of the National Allocation Committee for the John Von Neumann Center of the Consortium for Scientific Computing at Princeton University, and he was editor and chairman of the divisional associate editors of *Physical Review Letters*. He became president-elect of APS in January 1987 and would have assumed the presidency in January 1988.

Over the years, Vineyard was involved in science far beyond his own research, as a member of numerous advisory committees for the National Science Foundation, National Research Council, National Academy of Sciences, APS and several universities, as well as a consultant to various laboratories and to industry. He was a member of the President's Scientific and Educational Advisory Committee of the University of California and of the Science Policy Board of the Stanford Synchrotron Radiation Laboratory. For many years, he was a member of the Materials Research Council of the Defense Advanced Research Projects Agency. He also served on the editorial boards of many physics journals. In addition, he was involved in local activities, serving on the board of directors of the Long Island Association of Commerce and Industry, and the board of directors of the Long Island Action Committee.

Vineyard was a man of wry humor, with a Mark Twain touch, as befitted his birthplace. Also fitting was his knowledge of fine wines. His coworkers enjoyed these aspects of his personality, along with his deep intuitive knowledge of physics, which he shared easily and which will be sorely missed.

MARTIN BLUME
MAURICE GOLDHABER
NICHOLAS P. SAMIOS
Brookhaven National Laboratory
Upton, New York

James J. Burton

James Joseph Burton died of cancer in New York in February 1987 at the age of 43. During his professional career he published more than 50 scientific articles and was a coeditor of two books on catalysis and diffusion in solids. He completed his undergraduate studies at Harvard in 1964 and entered graduate school at the University of California at Berkeley, where he received his PhD in physical chemistry in 1967. During 1967–69, he worked as a postdoctoral fellow in physics at the University of Illinois at Urbana–Champaign. He then joined the faculty of the department of metallurgy and materials science at Columbia University, rising eventually to the rank of associate professor in 1972. He left Columbia to join the Exxon Research Laboratory as a senior research physicist, and worked there from 1973–77. He was awarded the Marlow Medal of the Faraday Division of the Royal Chemical Society in 1976, the second non-British scientist to win this award. In 1977, for personal reasons, Burton left physics and began studies for the rabbinate.

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