in a random sequence, which displayed the helix–coil transition. That work remains a landmark in the theoretical understanding of DNA. In the same period and in the decades to come, he put forward new ideas about the role of topological knots in polymers, and specifically in DNA. He proposed an exceedingly elegant method of generating an equilibrium ensemble of closed polymer chains, which has been used extensively.

In statistical physics and condensed matter theory, Sasha's main achievement was what is now called the Dykhne duality relations for the conductivity tensor of a two-dimensional heterogeneous conductor. Extremely simple, general, and elegant, the duality relations can be applied to admixtures of different quantum Hall phases of 2D electron gas. For random 3D anisotropic conductors, however, the duality relations do not apply. So to address that problem, Sasha and one of us (Dreizin) introduced the notion of current bottlenecks and found the resistivity of polycrystalline systems and their magnetoresistance in a strong magnetic field.

In plasma physics, Sasha predicted and analyzed new phenomena of the ionization instability: the ionization wave and ionization turbulence. He proposed a macroscopic description of the turbulent plasma by its coarse-grained resistivity tensor. The predicted phenomena were observed in experiments performed at Sasha's suggestion.

In nuclear physics and nuclear security, Sasha studied how radioactive wastes penetrate from security storage to the environment. He found the effect of superdiffusion: In very inhomogeneous (fractal) media, rare optimal trajectories allow the propagation of radionuclides across long distances with a probability much higher than that of the common diffusion process.

For many years Sasha taught theoretical physics at the Moscow Institute of Physics and Technology. Trying to narrow the gap between fundamental science and technology, he organized a department of applied theoretical physics. His former students now work at leading science centers worldwide.

As a scientist, he felt strong obligations toward society. He performed his rather significant leadership duties with a skill unusual for many scientists. He headed not only TRINITI, but also simultaneously the Expert Committee of the Ministry of High Education and the Russian Expert Committee on Fundamental Studies (the analogue of NSF). He participated in two Russian–American committees: one on higher education and the other on the reliability of nuclear waste storage.

A brilliant and magnetic person, Sasha was also warm and open; he helped many people and had friends everywhere. He had an exceptional sense of humor, and his jokes were unexpected, funny, and to the point. He loved life. A brave man, Sasha participated in the cleanup of the Chernobyl nuclear disaster and in so doing displayed extraordinary personal courage, which was recognized in 1996 on the 10th anniversary of the disaster, when he received the Russian Federation Order "For Rescue of Victims."

For each of us, and for his numerous friends and disciples, his death is an irreplaceable loss.

Yuri A. Dreizin
Protomold Company
Maple Plain, Minnesota
Maxim D. Frank-Kamenetskii
Boston University
Boston, Massachusetts
Valery L. Pokrovsky
Texas A&M University
College Station
Boris I. Shklovskii
University of Minnesota
Minneapolis
Alexander A. Vedenov
Kurchatov Institute of Atomic Energy
Moscow

Bruce John Faraday

Bruce John Faraday, a solid-state physicist and long-time employee of the Naval Research Laboratory (NRL), died of a heart attack at his home in Annandale, Virginia, on 5 April 2005.

Bruce John Faraday

Bruce was born in New York City on 9 December 1919 and was a 1940 magna cum laude physics graduate of Fordham University in New York. He went to NRL in 1948 after serving in the US Army in World War II. In 1963, while employed in NRL's solid-state physics division, he received his PhD in physics from the Catholic University of America. His thesis, prepared under the guidance of W. Dale Compton, was titled "Color Centers in KCl and KBr by Prolonged X-Radiation at Low Temperatures."

Bruce's thesis work evolved into a career studying radiation's effects on materials. The early 1960s marked the beginning of the US Navy's interest in the effects of radiation on satellite components, and Bruce became an active researcher in solar cells and was well known at the photovoltaic specialists' conference of the Institute of Electrical and Electronics Engineers. He also was very involved in the more fundamental International Conference on Defects and Radiation Effects in Semiconductors sponsored by the IEEE. That work expanded to include radiation damage to other semiconductor devices, including the phenomenon of single-event upset. From 1974 to 1984, Bruce headed NRL's radiation effects branch.

Bruce's managerial skills at NRL were legendary; he relied on a personal touch. For example, he would spend many a day on the phone with navy sponsors, talking mostly about sports (he was passionate about the New York Giants baseball and football teams) and occasionally about new navy programs he had developed. The approach worked; Bruce and his staff enjoyed many years attacking and solving critical technical problems for the navy.

In 1981 Bruce's contacts at Naval Sea Systems Command (NAVSEA) and Naval Air Systems Command (NAVAIR) steered him toward a new hot area of materials research: radar-absorbing materials. Bruce was familiar with NRL's ferrite materials expertise, saw the possibility of radar absorption in the ferrites, and started a program called Project Newboy. Newboy rapidly evolved into the low observables materials and structures group, which Bruce headed until his retirement in 1986. He received the Navy Superior Civilian Service Award in 1981 for that project, and the program remains an important research area at NRL.

Bruce's leadership and guidance profoundly influenced many people at NRL. He nurtured his staff, got them interested in the work, and then gave them all the credit. We at NRL still point to Bruce's techniques as the way to manage scientific personnel and develop research programs. More important, he was a great friend to many of us and will remain in our memories always.

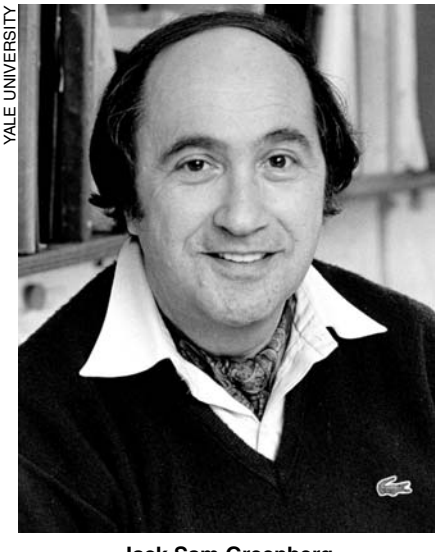
Carmine Carosella
Graham Hubler
Naval Research Laboratory
Washington, DC

Jack Sam Greenberg

Jack Sam Greenberg, professor emeritus of physics at Yale University and an experimental physicist who made exceptionally broad fundamental contributions to atomic, nuclear, and high-energy physics, died on 30 March 2005 in New Haven, Connecticut, from complications following an accidental fall at his home.

Jack was born on 23 May 1927 in Warsaw, Poland, but was fortunate in that he and his immediate family immigrated to Canada in 1934 and thus escaped the catastrophes of World War II that swallowed up virtually all other members of his family. He earned a bachelor's degree in engineering in 1950 and an MS in engineering physics a year later from McGill University. For his doctorate, Jack moved to MIT and worked on positron emission from beta decay. He received his PhD in physics in 1955 under the tutelage of Martin Deutsch, who had discovered positronium in 1951.

Jack next spent a postdoctoral year at ETH Zürich, where he attended lectures by Wolfgang Pauli. He joined Yale in 1956 as an instructor in physics. That choice was motivated partly by the arrival at Yale of Vernon


YALE UNIVERSITY

Jack Sam Greenberg