

*“Quite a lot has changed at the Institute over the 30 years since Helen and I first came here, in the fall of 1974. The opportunity that the Institute afforded me then and on my second visit, fourteen years later—a period of being able to think about theoretical physics uninterrupted in the middle of an academic life that had then become full of other distractions—has been of inestimable value to me.*

*The significant changes since my second visit, in 1988, reflect in very large measure the enormous achievements of my predecessor, Phillip A. Griffiths. Phillip leaves the Institute in an excellent position to face the strong challenges ahead.*

*One important thing remains constant, however. Because of all of those from the founders on who have supported the Institute from their own resources—Faculty, Trustees, Friends and Members—the Institute remains true to its mission: the disinterested pursuit of knowledge. For both young postdoctoral and established senior scholars from a broad range of fields in the sciences and the humanities, the Institute provides the freedom to pursue fundamental research that produces significant advances in knowledge.*

*Helen and I are grateful for the warm welcome we have received and we look forward to getting to know all of the Institute community.*

—Peter Goddard, Director

## Richard B. Black: Insightful Leadership

As the Institute for Advanced Study approaches the 75th anniversary of its founding next year, Richard Black, Vice-Chairman of the Board of Trustees, is looking even further ahead. “In business one must anticipate where the world is headed and where one wants to be when the world gets there,” he says. As Chairman and CEO of ECRM Imaging Systems, he has a knack for pinpointing future trends, and has successfully applied innovations in a broad range of optical, imaging, laser, mechanical, and electronic technologies to produce cost-effective quality imaging equipment for commercial graphic arts and newspaper publishing businesses.

Generating new ideas and organizing people to execute those ideas is something that Rick Black relishes. “Business is also about leadership, getting a group of people to accomplish something they’d never be able to achieve individually,” he observes.

In 1990, when invited by James D. Wolfensohn and the late Leon Levy to join them on the Board of Trustees, Rick Black was immediately enlisted in support of the earliest stages of what was to become the Sloan Digital Sky Survey (SDSS). While the project initially appeared to be a low-profile one, Rick Black realized that it represented a key development for astronomy and an unprecedented opportunity for the Institute. “Rick Black’s contribution to the founding of the Sloan Digital Sky Survey in the very earliest days made possible the initial collaboration between the Institute, Princeton University, and the University of Chicago,” says John N. Bahcall, Richard Black Professor in the School of Natural Sciences. “The collaboration has grown enormously, with many institutions and groups now joined to carry out one of the most ambitious and successful projects in modern astronomy.”

Without Rick Black’s start-up support, the Sloan Digital Sky Survey might not have happened at all. His timely contribution and the Institute’s commitment enabled the project’s other founders to provide their backing. With outstanding lead support [totaling \$20 million] from the Alfred P. Sloan Foundation, the SDSS has been providing astronomers with information and stunning images since 2003 (see sidebar on page 2).

A keen amateur sky-gazer since childhood—he built his own telescope at the age of seven



LINDA ARNTZENIUS

Richard B. Black

from catalog-bought lenses and cardboard tubing that he painted black on the inside—Rick Black was somewhat overwhelmed to be congratulated as the “father” of the 2.5 meter Sloan Telescope when he attended the dedication ceremony for the SDSS in October 2000 in the mountains of New Mexico.

“Rick Black has three roles for Institute Faculty and Members: friend, colleague, and supporter,” comments John Bahcall. “He is exceptional in all three roles. I am proud to be the Richard Black Professor of Natural Sciences. All of us who have come to know Rick regard him as a friend. He is interested in everyone and everything at the Institute, but especially in astronomy, for which he has both a love and an informed understanding. Young Members and senior Faculty equally enjoy his company and are stimulated by his questions and suggestions. We look forward to his visits. Moreover, he has contributed generously to the Institute by his insightful leadership, as well as in a number of crucial material ways (some of which have been acknowledged publicly and some of which were made discreetly without public announcement).”

In addition to the SDSS, Rick Black’s material contributions to the Institute include an endowed professorship, funds quietly contributed to match a Kresge Challenge Grant, and a recent generous gift to the School of Natural Sciences.

Although now based in Chicago and Wyoming, with business interests in Massachusetts, Richard Bruce Black grew up in Houston, Texas. As a child,

(Continued on page 2)



An example of a "Grand Design Spiral," Messier 81 (M81) in the constellation Ursa Major is a classic 2-armed spiral galaxy. The image is part of the Sloan Digital Sky Survey's project of mapping the universe.

COURTESY OF SDSS

## Sloan Digital Sky Survey

An early champion of the project now known as the Sloan Digital Sky Survey, astrophysicist John Bahcall helped define the project's mission of discovering the evolution and structure of the universe. The Institute for Advanced Study, together with Princeton University and the University of Chicago, was a prime mover of the survey, named for Alfred P. Sloan. The Sloan Foundation is the project's lead funder, along with the NSF, NASA and a group of universities and national laboratories that comprise the Astrophysical Research Consortium, whose Board of Governors includes John N. Bahcall and Allen I. Rowe, Associate Director and Treasurer of the Institute for Advanced Study.

To date, SDSS has recorded details of close to 400,000 galaxies and 50,000 quasars, along with basic data on over 25 million galaxies. Data from the survey has been used to confirm the existence of dark energy, the negative gravitational force that accelerates matter repulsively. New understandings of dark matter and of the structure of our own galaxy are leading to new theories on the formation of galaxies.

As Richard Black Professor in the School of Natural Sciences, John Bahcall works with some of the finest young theoretical astrophysicists in the world. The Institute's astrophysics Members are free to explore any problems in which they are interested, on their own or in collaboration with each other, with Professor Bahcall, with fellow astrophysicist in the School of Natural Sciences Peter Goldreich, with members of the physics and astronomy faculties at Princeton University, or with scientists at other institutions. The Institute programs in physics and astronomy collaborate with corresponding activities at Princeton University via joint seminars and lunches, as well as frequent informal contacts.

For more information about the SDSS, see the project's website at "<http://www.SDSS.org>". ■

he entertained the idea that he might one day be the last person on Earth and felt the urge to explore everything, to learn how everything was built and worked. His curiosity ranges over every School of the Institute. "I am fascinated to read about the subjects that new Members are working on in any given year," he says. "The Institute is loaded with interesting people and its Board is superb. Remember the Dream Team in basketball? Well, the Institute has the Dream Board. The Institute Board is the most important of my avocational activities. It's a joy to be a Trustee. I only wish I had three days a week to spend at the Institute."

A constant at every Board meeting, Rick Black looks forward to the next session in May, which he will attend as a newly-wed. He and Heather Morgan Bilandic, widow of Michael A. Bilandic, a former Mayor of Chicago and Chief Justice of the Supreme Court of Illinois, were married last December.

Mr. Black's regard for the power of education runs deep. "I was fortunate. I was given very good opportunities," he says. With the help of Uncle Sam and the GI Bill, and grants long since repaid, Rick Black graduated from the Harvard Business School in 1958, after earning a Bachelor's degree in Engineering from Texas A & M University in 1954. In 1997, he received an honorary doctorate from Beloit College.

Rick Black takes the obligations of good citizenship as a given. Philanthropy is not a choice that he has spent a lot of time examining; it is what he believes as a matter of course, as a rational response to social imbalance. Hence his involvement with the Native American College Fund and Inroads, a program launched in 1970 by a Chicago businessman inspired by Martin Luther King, Jr. Rick Black's expertise helped Frank Carr to expand the program nationwide and, most significantly, to structure it for survival after the death of its founder.

That any nonprofit organization should survive its founder with vigor is a tenet Black applies to his own business, and in his role as a Trustee of the Institute for Advanced Study, where the obligation of legacy is well understood. Rick Black has sat on, chaired, or co-chaired almost every Board committee, as well as the Decadal Review, which began in 1995 and which he co-chaired with Trustee Emerita Helene Kaplan.

Such periodic reviews are crucial to the health of any organization, he believes, and

even more so for the Institute. "Nothing is as constant as change," he comments, "more so today than ten or 15 or 20 years ago. It is necessary to assess what the Institute has achieved and what lies ahead. The Institute is somewhat like a tanker—it's not going to turn on a dime. That's good but it also means that you have to think well ahead as to what role the Institute can play to remain this place of excellence. Ten percent of such a review explores where the institution has been, ninety percent determines where it ought to be going."

The Bambergers' gift, he believes, was in creating a place for unfettered research. The Institute is—and must remain—free of private interests. When Black tried to raise money for computers for the Institute,



Trustee Richard B. Black (center) with Heather Morgan Bilandic, and Friend of the Institute Robert Johnston at the Institute last October.

ANDREA KANE

he first went to friends in business. Their response was to look for what was in it for them, an attitude Black regards as shortsighted. He dug into his own pockets because he believes in maintaining the integrity of the Institute. This means that fundraising can be a challenge.

"It's very much like the sell in education," he says. "It's hard to sell Congress or the State Legislature on something they are going to get 20 years from now, because they don't always think that far ahead. Even the National Science Foundation has to ask, what's in it for the Government right now; what are we going to get out of it?"

Following the last Decadal Review, the Institute began new initiatives in biology, East Asian studies, and theoretical computing. According to Black, the challenge now is to "keep the engine running. New opportunities, inside and outside of the Schools, have to be nurtured. If it's worthwhile, it's worth funding." He anticipates the Institute needs to raise a nine-figure sum to continue this great work. This is an enormous challenge, especially in light of trends in the national economy during the last few years.

"The Institute is *the* place for great accomplishment. Great things happen when the mind is set free," he says. Mr. Black's hope for the Institute is that it continue to flourish. Serving any private interest, short term or otherwise, is not what this institution is about and never will be. And that, says Rick Black, is a good thing: "That's why I say that in 2020 we want the Institute to be the most accomplished institution for unfettered research, just as it is today." ■

## BEQUESTS

The Institute for Advanced Study has recently been the recipient of a generous bequest from the estate of Lowell I. Schoenfeld and Josephine M. Mitchell. The husband and wife mathematicians were former Members in the School of Mathematics (1954–55). Lowell I. Schoenfeld worked in analytic number theory, and Josephine M. Mitchell worked in complex variable analysis. “In many ways,” stated John Ewing, Executive Director of the American Mathematical Society, “these two mathematicians represented twentieth-century mathematics in America.”

Josephine Mitchell grew up in Edmonton, Canada, the eldest of three girls whose parents, Benjamin and Kate Mitchell, believed strongly in the importance of education. Josephine was interested in history and mathematics. All three of the Mitchell daughters attended university. This was not a common pursuit for women in the early 1930s. Even more uncommon was the fact that Josephine Mitchell majored in mathematics, viewed at the time as an unusual field for a woman. Nonetheless, Mitchell received strong encouragement from her undergraduate mathematics professors, and after receiving her B.A. degree in mathematics from the University of Alberta in 1934, she went on to get her master’s (1941) and Ph.D. (1942) from Bryn Mawr College, under the direction of the renowned mathematician Anna Pell Wheeler. Mitchell then taught at several small colleges in the eastern U.S., and in the early 1950s accepted a position at the University of Illinois in Champaign-Urbana.

Lowell Schoenfeld grew up in New York City. He graduated cum laude from the College of the City of New York in 1940, and earned a master’s degree from MIT. He received his Ph.D. in 1944, under the direction of Hans Rademacher, from the University of Pennsylvania. After holding teaching positions at Temple University and Harvard University, he moved to the University of Illinois, where he met his future wife, Josephine Mitchell, in the early 1950s.

When Mitchell and Schoenfeld met, Mitchell was a tenured faculty member. Schoenfeld held a junior and untenured position. In the early 1950s, anti-nepotism rules were widespread in American universities, and as soon as Mitchell and Schoenfeld were married, the University of Illinois demanded that Mitchell resign her position, while Schoenfeld was permitted to keep his. The couple protested, and asked the American Association of University

Professors and the American Association of University Women for support, but their protests were not successful. University policy prevailed. Both Mitchell and Schoenfeld resigned their positions, and began their search for an institution that would accept both of them as mathematicians.

During this peripatetic period, they spent the year of 1954–55 at the Institute for Advanced Study, where the School of Mathematics Faculty included Arne Beurling, Freeman Dyson, Kurt Gödel, Deane Montgomery, Marston Morse, Robert Oppenheimer, Abraham Pais, Atle Selberg, John von Neumann, and Hassler Whitney. (Emeriti Faculty included Albert Einstein, Oswald Veblen, and Hermann Weyl.)

Mitchell and Schoenfeld’s search for a new academic home eventually led them to Penn State University, one of the few that would hire couples at the time. They spent ten years at Penn State before moving, in 1968, to the University of Buffalo, where they were each active department members. Schoenfeld and

Mitchell retired in the 1980s, and continued to pursue their life-long interests in the outdoors, including hiking, canoeing, and identifying and photographing wildflowers. Their activities also reflected their love of music, travel, family, and of course, mathematics.

The Institute for Advanced Study gratefully acknowledges the legacy of these two dedicated mathematicians. ■

Source: Remarks by John Ewing, Executive Director of the American Mathematical Society, May 16, 2003.



COURTESY OF MRS. ALTA BENTO

Josephine M. Mitchell and Lowell I. Schoenfeld

*Bequests play an important role in supporting the Institute. Each bequest, no matter how small, adds strength to the Institute. For some donors, such a willed gift is the most realistic way of making a substantial contribution to the Institute. Bequests associate your name or the name of your family with the Institute permanently. They may be of various types: cash, securities, property, or works of art. An unrestricted bequest enables the Institute to direct your gift where it will have the greatest impact. But if you wish to fund a specific area of interest, you may devote your bequest to a School, to Faculty salaries, to endow Memberships, for libraries, buildings, to maintain facilities, or to underwrite research.*

*Should you wish to consider the Institute in your estate plans, please call Kamala Brush: 609.734.8031 or email: [kbrush@ias.edu](mailto:kbrush@ias.edu)*

## Holiday Reception for Faculty and Friends of the Institute for Advanced Study



ANDREA KANE

*Members of the Director's Circle, John and Melanie Clarke, and Arnold Snider.*

When you join the Friends of the Institute for Advanced Study, you become a partner in the advancement of research and scholarship at the highest level. Friends of the Institute make an annual contribution of \$1,000 or more, and provide an important link between the Institute and the community. Through their support and involvement, Friends participate in the intellectual and cultural life of the Institute. Friends may attend Institute symposia and other scholarly gatherings, as well as Institute lecture, film, and concert series. Special Friends events include a series of lectures (Friends Forums) where scholars present overviews of their work and lead informational discussions, and talks (Friends Fireside Chats) featuring other members of the Friends, as well as annual festive gatherings such as the fall picnic and the holiday reception. In addition, Friends receive Institute publications, and have access to Institute libraries and to the Institute's Dining Hall.

For more information about the Friends of the Institute for Advanced Study, please contact Pamela Hughes by phone at 609.734.8204 or via e-mail: [phughes@ias.edu](mailto:phughes@ias.edu). ■



ANDREA KANE

*From left: David and Marge Smith with Jean and Larry Parsons.*

### GIORGIO PETRONIO (1934-2004)

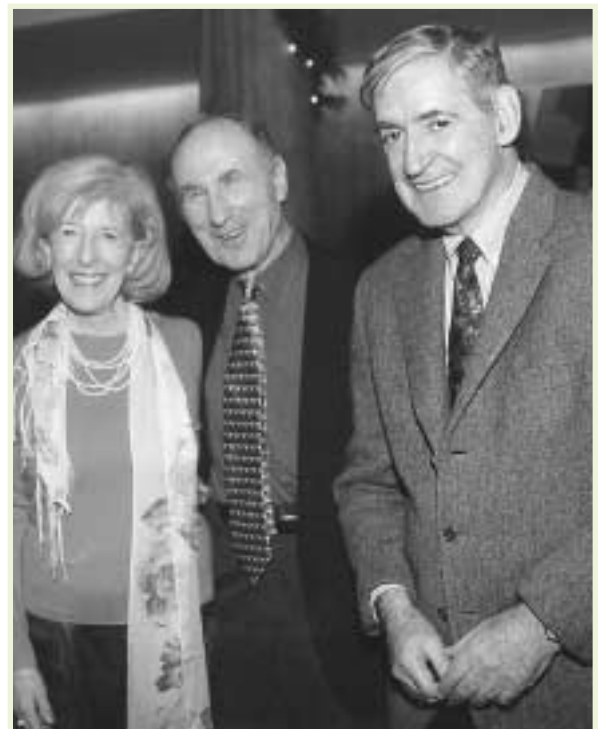
*The Institute for Advanced Study  
is deeply saddened by the passing of  
Giorgio Petronio.*

*He was a cherished Friend of the  
Institute for Advanced Study.*



ANDREA KANE

*Mayor of Princeton Township, Phyllis Marchand (second from left) with Peter J. and Marlene Lucchesi and Dr. Jerome K. Freedman (right).*



ANDREA KANE

*From left: Judith Brodsky, Michael Curtis and John J. Wise.*

## Richard Black Professor John N. Bahcall



CLIFF MOORE

John Bahcall

While almost everyone readily connects astronomy and telescopes, the connection between astronomy and mines is one that many, including John Bahcall, find amazing. In addition to data from telescopes such as Sloan, Hubble, and Spitzer, Professor Bahcall has used results of experiments conducted deep underground in a laboratory in Japan and in a Canadian mine in which the Sudbury Neutrino Observatory is located.

The nuclear fusion reactions that cause the Sun to shine, and make possible all life on Earth, produce elusive particles that have no electrical charge, almost no mass, and move at the speed of light. Neutrinos interact weakly with matter and are detected indirectly on the rare occasion one of them collides with an electron or an atomic nucleus. They account for some of the mysterious “dark matter” of the universe. To Professor Bahcall, neutrinos yield valuable information about the Sun (about the temperature at its center, for example), and their properties influence our understanding of the fundamental laws of physics.

In May 2001, Sudbury’s detector provided evidence for the correctness of John Bahcall’s calculation of the total number of neutrinos, as well as a solution to the mystery of some unaccounted-for neutrinos that was puzzling physicists and astrophysicists. Neutrinos, it was found, were able to change from one variety of subatomic particle to another as they traveled from the Sun to the Earth. “I am amazed that flashes of light in a mine, the temperature of the Sun, and the properties of neutrinos are linked in such a beautiful way,” comments Professor Bahcall.

While confirming the standard model of the Sun, the peculiar behavior of neutrinos calls into question the standard model of physics. The field of solar neutrino research is poised to answer some of the fundamental questions of twentieth-century physics and astronomy: How does the Sun shine? What is dark matter? Is there new physics beyond the standard model? These are some of the questions at the center of the research conducted by John Bahcall and the astrophysics Members at the Institute for Advanced Study.

For more information about solar neutrino research in the School of Natural Sciences, see [www.sns.ias.edu/~jnb](http://www.sns.ias.edu/~jnb). ■

## Support for Members at the Institute for Advanced Study



ANDREA KANE

*Institute Trustee Martin A. Chooljian with physicist Freddy Cachazo, Member in the School of Natural Sciences. Martin and Helen Chooljian have been providing support for a Member in the sciences since 1996. Dr. Cachazo’s field of research is mathematical and particle physics.*



CLIFF MOORE

*William Doyle of the University of Bristol and Member in the School of Historical Studies, greets Immanuel (Ike) and Vera Kohn at a recent Institute reception. The Hans Kohn Membership honors Mr. Kohn’s father, an educator and intellectual historian who was a Member in the School of Historical Studies in 1948 and in 1955. William Doyle’s research interest is in the history of France from the mid-17th to early 19th centuries, more generally the origins and impact of the French revolution.*



ALLISON BRIDGE

*Jane Fulcher of the Indiana University School of Music with Edward T. Cone, a founding Friend of the Institute. Dr. Fulcher is the Edward T. Cone Member in Music Studies. Dr. Fulcher’s research interest is in music in its relation to modern European cultural and intellectual history, specifically the interaction of 19th and 20th century French music with politics and ideology.*

## Institute Symposium Honors George F. Kennan

George F. Kennan made a surprise visit to the Institute this month, just two days after his 100th birthday. Professor in the School of Historical Studies since 1956 (Emeritus since 1974), Professor Kennan's arrival delighted symposium participants. Annelise Kennan, together with members of Professor Kennan's family, friends and colleagues, historians and diplomats attended the Symposium in Honor of George F. Kennan at the Institute for Advanced Study on February 18, 2004. The symposium comprised remarks from James D. Wolfensohn, José Cutileiro, and Jack F. Matlock, Jr. (the last U.S. Ambassador to the Former Soviet Union), and presentations by Former Secretary of State Lawrence S. Eagleburger, Alexander Bessmertnykh (the last Foreign Minister of the Former Soviet Union), Karl Kaiser (Otto-Wolff-Director-Emeritus of the German Council on Foreign Relations), and Strobe Talbott (President of the Brookings Institution).

The Institute for Advanced Study expresses its deep appreciation to Theodore L. Cross, Hamish Maxwell, and Stiftungfonds Deutsche Bank for their support of the symposium. ■

*A fuller account of the Kennan celebration will be included in the next issue of The Institute Letter.*



MICHAEL CICCONE



CLIFF MOORE

George F. Kennan

Mrs. George F. (Annelise) Kennan, with former George F. Kennan Professor Jack F. Matlock, Jr. (left) and present George F. Kennan Professor José Cutileiro.



CLIFF MOORE

Left to right: Professor Kennan's grandson George Kennan Pfaeffli, daughters Joan Kennan and Wendy Kennan, Renny Nancholas, and son Christopher Kennan.

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