Faber receives Heineman prize for work in astrophysics

The American Institute of Physics and the American Astronomical Society in January presented the 1985 Dannie Heineman Prize for Astrophysics to Sandra M. Faber (University of California at Santa Cruz) at the AAS meeting in Houston. She was cited for "her spirited observational approach, [by which she] has much enriched our knowledge of the basic characteristics of galaxies. By the insight thus gained she has substantially advanced the theory of galaxy evolution."

Faber received her PhD in astronomy from Harvard University in 1972. She then joined the Lick Observatory at the University of California. For her PhD thesis Faber used intermediate-band photometric studies to demonstrate that the integrated colors of elliptical galaxies depend strongly on their luminosities; this finding has since led to detailed studies at Lick and at other observatories of old stellar populations.

Faber has worked extensively toward establishing a metallicity scale for old stellar populations that is independent of the inhomogeneous nature of such systems. In 1973 she proposed, on the basis of her studies of strong-absorption-line strengths in high-surface-brightness galaxies, that the outer, cooler regions of these galaxies had been stripped away by massive companion galaxies. In 1975, she and Robert Jackson, who was then a graduate student, developed what is known as the Faber–Jackson relation, which states that a galaxy's luminosity is proportional to the fourth power of its velocity dispersion. In a series of papers begun in 1975, Faber and colleague John Gallagher established limits on the existence of an interstellar medium in early-type galaxies; she and her co-workers further proposed a mechanism by which gas is removed from these galaxies based on calculations of the rate of expulsion of H I from stars. In 1979 she and Gallagher argued that galaxies are surrounded by huge, massive envelopes of invisible matter, a picture that has since come to dominate modern theories of galactic structure and cosmology. In 1982 Faber used properties of galaxies and galactic clusters to obtain limits on the nature of density fluctuations in the Big Bang. She concluded that the spectrum of initial density irregularities could not have consisted of white noise, as had been thought, but must have been biased toward longer wavelengths. Since 1983 Faber and her colleagues Joel Primack and George Blumenthal have been developing a theory of galaxy formation based on invisible matter. Faber and her colleague David Burstein demonstrated in 1984 that the ratio of hydrogen to metals in the M31 globular clusters is significantly different from that of Galactic globular clusters. Faber was made a full professor and astronomer at Lick Observatory in 1979.

FABER

in brief

J. A. Venables, reader in physics at the University of Sussex, England, has been appointed professor of physics at Arizona State University.

William G. Harter, formerly of the Georgia Institute of Technology, has become a professor of physics at the William Fulbright College of the University of Arkansas in Fayetteville.

Georges M. Temmer was named University Professor at Rutgers University last September; he served as director of the nuclear-physics laboratory there for 22 years. **Noemie Benczer-Koller** was named the new director of the nuclear-physics laboratory.

C. Paul Robinson, formerly principal associate director for national-security programs at Los Alamos National Laboratory, has joined Ebasco Services in New York as principal scientist and group vice president of advanced technology and special projects.

obituaries

Ernst Stueckelberg

Ernst Carl Gerlach Stueckelberg von Breidenbach died on 4 September 1984, in his 80th year, in Geneva, Switzerland, where he was emeritus professor of theoretical physics at the Universities of Geneva and Lausanne. With his death the world community of physicists loses a colleague of unique originality and depth. His long career started in Basle, Switzerland, where he was born on 1 February 1905, and covered a wide range of topics, from molecular spectra to quantum field theory, general relativity and thermodynamics.

After a stay with Arnold Sommerfeld in Munich, Stueckelberg completed his PhD in Basle in 1927 and then left Europe to become a research associate at Princeton University. There he discovered, together with J. G. Winans, the reason for the continuous spectrum of the hydrogen molecule H_2 and thus

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solved an enigma that famous physicists had failed to penetrate. This achievement even made the *New York Times*, as he used to tell his colleagues proudly in later years.

In 1930 he became assistant professor at Princeton University, but he soon returned to Switzerland, where, in 1933, he became a *Privatdozent* at the University of Zurich. In 1935 he was nominated professor at the University of Geneva, and between 1942 and 1957, he combined this appointment with a professorship at the University of Lausanne and its associated polytechnic institute (today's Federal Institute of Technology). He retired officially in 1975 but, despite an ailment that made it increasingly difficult for him to walk, he continued to give a course and to attend the seminars at the department of theoretical physics of the University of Geneva and at CERN, the European high-energy-research laboratory in Geneva.

Stueckelberg will be remembered mainly for his contributions to quantum field theory, where his name stands honorably beside those illustrious ones of Freeman Dyson, Richard Feynman, Julian Schwinger and Sinitiro Tomonaga. The classic work *Introduction to the Theory of Quantized Fields* by N. N. Bogoliubov and D. V. Shirkov explicitly underlines the importance of Stueckelberg's role. As early as 1941—long before Feynman and John A. Wheeler—he cultivated the view that positrons may be understood as electrons running backward in time.

His lectures and articles were not easy to understand. But from his discussions emerged a remarkable suggestive power, which explains why he always attracted brilliant students. Two of them must be mentioned explicitly because they are directly related to Stueckelberg's most important discoveries: Dominique Rivier, in whose thesis of 1949 the causal propagator appeared for the first time, and André Petermann, with whom Stueckelberg developed the idea of the renormalization group, the details again being contained in Petermann's thesis. This last idea was particularly fruitful: In the hands of Kenneth Wilson it has fundamentally transformed our views on critical phenomena in thermodynamics, and today it is a mathematical tool universally used both in high-energy physics and in statistical mechanics.

During the last 20 years of his life Stueckelberg devoted his time and efforts more and more to thermodynamics. At first glance it appeared surprising to see Stueckelberg turn his back on quantum mechanics, the science to which he had contributed so brilliantly. However, as with many eminent scientists, questions related to the very existence of the world gained importance with age. Indeed, it was the role of time, which had already fascinated him in his interpretation of positrons mentioned above, that he sought to elucidate—this time with the aid of phenomenological thermodynamics.

STUECKELBERG

The results of these incessant efforts are formulated in the only book that Stueckelberg wrote. And it was only thanks to the insistence of his coauthor and assistant Paul Scheurer that such a definitive form could be reached, because for Stueckelberg there was never a final form of his teachings and writings. Indeed, there exist many unpublished manuscripts of the lecture courses he gave at Geneva and Lausanne during his long teaching career, manuscripts he rejected in despair and reformulated in more truthful—as he believed—and (most of the time) more complicated versions.

It is therefore not surprising that his book on thermodynamics makes arduous reading, defying the traditions of pedagogy, language and notation. It is a logical construct without compromise, a cathedral of the spirit erected to prove with the aid of the notion of entropy that the time of physics is indeed the "biblical time" having a beginning and an end, and not the "Greek time" that flows uniformly from an infinitely distant past to an infinitely distant future.

Neither is it surprising that the honors came relatively late in Stueckelberg's life. On the international level recognition came in 1976, when the German Physical Society awarded him the prestigious Max Planck Medal. He had particular reasons beyond the scientific recognition to rejoice at this last honor. As "Freiherr von Breiden-

bach zu Breidenstein und zu Melsbach," the title mentioned on the diploma of his Max Planck award, his roots were as much in Germany as in Switzerland.

He was a tall and, in his younger days, elegant man who took pride in being an officer in the Swiss army and a baron in Germany. But he also possessed a deeply religious humility, and it was this aspect that dominated his later years.

CHARLES P. ENZ
University of Geneva

Robert Bruce Lindsay

Robert Bruce Lindsay, editor in chief of the Acoustical Society of America and Hazard Professor of Physics emeritus at Brown University, died on 2 March 1985 after a brief illness. He was 85 years old.

Over the course of his 27-year career as editor Lindsay became the father figure of the Acoustical Society. He was born on New Year's Day 1900 in New Bedford, Massachusetts, and received his BA and MS from Brown University in 1920. He did his graduate work in atomic physics at the Massachusetts Institute of Technology, with a year's interruption as a predoctoral fellow at the Bohr Institute in Copenhagen. He received his PhD from MIT in 1924, and then went to Yale as an assistant professor.

Six years later, Lindsay returned to Brown as an associate professor of theoretical physics. He became department chair in 1934 and was named Hazard Professor of Physics in 1936.

In his 20 years as department chair, Lindsay began the program of research in acoustics that was to make his department famous over the next quarter-century. At the same time, he developed his talent for writing about physics: first in *Acoustics*, written with G. W. Stewart (1930); then, on the philosophical side, in *Foundations of Physics*, with Henry Margenau (1936); and finally, in a whole stream of texts—such as *Mechanical Radiation* (1960) and his widely used undergraduate text *Physical Mechanics* (1933), which underwent several editions—monographs, edited collections and philosophical and historical commentaries.

In his research work Lindsay began with calculations of atomic wavefunctions, following the work of Douglas Hartree. In acoustics, he carried out mathematical analyses of acoustic filtration methods and gradually moved into studies of ultrasonics and underwater sound. He worked closely with US Navy scientists on underwater sound, and much of the work that he performed and directed was classified.

LINDSAY

On the historical side, he was a student of early acoustics, kinetic theory and thermodynamics, especially the work of Pierre Gassendi, Marin Mersenne and Lord Rayleigh. His interest in the concepts of energy and entropy was both historical and philosophical, and he published papers and books in both areas, being especially concerned with the philosophical implications of the second law.

On the editorial side, Lindsay was responsible for numerous reprint volumes in both acoustics and energy in the *Benchmark* series, where he practiced the policy of having all articles appear in English, translating many of them himself from French, German and Latin.

In 1954 Lindsay became dean of the graduate school at Brown, a position that he held until 1966. He retired from active service at the university in 1971.

Lindsay held many offices during his involvement with the Acoustical Society of America, including that of president of the society (1957–58), but his greatest role was as editor of the society's publications. He was appointed to the position of editor in chief in 1957, and played a vigorous role in the management of the *Journal* of the society until the week of his death.

Lindsay served for many years as a member of the Governing Board of the American Institute of Physics, and also as a member of its Executive Committee. His writing was prodigious; he was actively sought as an adviser, editor and counselor, and he was always willing to oblige.

Lindsay's monuments, like those of Christopher Wren, are to be seen by looking about, but his memory will endure even longer in the minds of those who knew him.

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