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Stephen B. Fels

Atmospheric and Oceanic Sciences), and he joined the permanent staff of the NOAA Geophysical Fluid Dynamics Laboratory in 1974.

Soon after arriving at GFDL Fels began his pivotal research on atmospheric radiative transfer and its interaction with dynamical processes. He developed a computer code that calculates with great accuracy the transmission functions for atmospheric infrared radiation. By considering each spectral line in turn, the code produces atmospheric infrared cooling rates whose accuracy is limited only by the accuracy with which the absorption rates for individual spectral lines are measured in the laboratory. This detailed code is now the fundamental standard for the worldwide "Intercomparison of Radiation Codes in Climate Models," an effort of the World Climate Research Programme to compare all the radiative-transfer codes in the world's major mathematical models of greenhouse-gas-induced climate change.

The physical insight gained from the program's detailed results enabled Fels to develop approximation methods that allowed for accurate radiative calculations which were 1000 times faster than those achieved by the traditional methods. These methods are now incorporated into weather and climate models at major research and operational centers in America and abroad. Most significantly, the radiation code is now running as part of the Medium-Range Forecasting Model at the National Meteorological Center, where it has contributed significantly to well-recognized improvements in five-day weather forecasting. The code has also been incorporated into the operational forecast model at the Australia-

lian Numerical Meteorology Research Centre.

Fels studied the interaction of radiative and dynamical processes in such phenomena as stratospheric circulation, stratospheric climate change and the Antarctic "ozone hole." He also investigated the atmospheric circulation of Venus and explored whether its thermal tides were related to the strong superrotation seen in its upper atmosphere.

In addition to doing research, Fels was a lecturer with the rank of professor at Princeton. His talent and dedication as a teacher gained him great popularity among the students. He combined an infectious enthusiasm for science with a passionate insistence on clear and quantitative thinking. His quick wit enlivened conversations with students and colleagues alike.

Those of us who were privileged to know and work with Stephen Fels are grateful for the all-too-brief time he was with us. We miss his intellectual vitality, his immense scientific and personal integrity and his widely appreciated sense of humor.

JERRY MAHLMAN  
NOAA Geophysical Fluid Dynamics  
Laboratory  
Princeton, New Jersey

## Harry J. White

Harry James White died on 14 November 1988 in Carmel, California. He was a pioneer in studying the electrical breakdown in gases, in designing radar and high-voltage equipment and, especially, in investigating electrostatic precipitation and air-pollution-control devices.

White was born on 29 July 1905 in Fremont, Nebraska. He received a BS in electrical engineering from the University of California at Berkeley in 1928, then pursued graduate work in physics at the same university. Working with his thesis adviser, Ernest O. Lawrence, White did seminal research on formative time lags of spark discharges in gases, using Kerr cells and transmission lines to measure nanosecond time intervals. He received his PhD in 1933.

In 1935 White began a productive and happy relationship with the Research Corporation. (The Research Corporation is a nonprofit, research-supporting institution whose income, until 1958, came primarily from the manufacture and sales of electrostatic precipitators.) His research there on electrostatic precipitation continued until 1960, interrupted only by White's war work at the MIT Radi-

ation Laboratory during the years 1941-45. During the war White contributed extensively to a volume in the MIT Radiation Laboratory Series: *Pulse Generators*, edited by G. Norris Glasoe and Jean V. Lebacqz and published in 1948. When he returned to the Research Corporation in 1945 White became director of research. In 1958 he became director of research and development at Research-Cottrell, the successor of the Research Corporation's manufacturing division.

In 1960 White was appointed chairman of the department of engineering and applied science at Portland State University in Oregon, which became a strong department under his stewardship. He was a founding member of the board of trustees and executive committee of the Oregon Graduate Center.

In 1972 White retired to Carmel, California, but with the passage of stringent air pollution legislation he unexpectedly found himself with a very active consulting practice on electrostatic precipitators, which he continued almost until his death.

White was the acknowledged world leader in electrostatic precipitation and received many honors for his work in the subject. In 1963 he published *Industrial Electrostatic Precipitation*, the first book on electrostatic precipitation, which became a classic in its field. In 1977 he published a second book, *Electrostatic Precipitation of Fly Ash*. In 1981 he organized the First International Conference on Electrostatic Precipitation; it was held in Monterey, California, and attracted workers from all over the world. In 1987 the conference established the Harry J. White Award, to be conferred on young scientists and engineers working on electrostatic precipitation.

Harry White was a gentle and self-effacing person deeply interested in helping others. From 1946 to 1960 I spent one day a month with him at the Research Corporation's laboratory; those visits were not only technically fruitful but left me with a deep admiration of White's character. On learning of White's passing, Senichi Masuda of the University of Tokyo, the leading expert in electrostatic precipitation in Japan—and now perhaps in the world—wrote that White was "really an unusual person of noble thought and dedication. He was a great teacher to all of us who have been working in the field of electrostatic precipitation, and a kind of spiritual father."

LEON H. FISHER  
Atherton, California ■

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