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tortion with only three parameters and to trace a number of rays reduced by a factor of 10. His spot-diagram method (1937) gives a clear intuitive picture of the light distribution in an optical image by tracing a relatively few well-defined rays through the system.

The author of over 200 papers in mathematics and physics, he also wrote two very important books in optics, *Strahlenoptik* (1931) and *Modern Geometrical Optics* (1958). In these he showed how to solve both classical and more recent problems using the methods of Hamilton with, of course, his own innovations and insights.

His later years he devoted particularly to extending the ideas of Hamilton and Grassmann to the task of formulating a unified approach to the various branches of physics. He was also frequently in demand as a speaker before various student, scientific, and lay groups, discussing his ideas in science, philosophy, and education, and sharing his knowledge, much of it first hand, of the history of mathematics and physics.

LIONEL D. DUREAU
University of New Orleans

Helmut Schwarz

Helmut Schwarz, professor of physics at the Rensselaer Polytechnic Institute, died at the age of 66 in December 1981 after a long illness. Born in Wuppertal, West Germany, he obtained his PhD in physics from the University of Bonn in 1940. After World War II he emigrated to Brazil, where he served as professor of applied physics at the University of Brazil, Rio de Janeiro, and as professor of physics at the Technical Center of Aeronautics, São Paulo. In the late 1950s he moved to the US. At first he worked at several industrial laboratories, among them RCA and Hamilton Standard. In 1963 he was appointed professor of physics at Rensselaer Polytechnic Institute. He taught first at its Graduate Center in Hartford, Connecticut, and then, from 1977, at its Main Campus in Troy, New York, until he fell ill in 1980.

Schwarz's work was mainly in three areas of physics and technology: vacuum physics, electron beams, and lasers. He published many papers and received several awards for the invention of a quadrupole ionization gauge and for his work on the modulation of electron beams by laser light.

During the last fifteen years, Schwarz devoted his efforts to the interaction between laser and electron beams. He performed the first exploratory experiments, some of which were designed to produce quantum-mechanical beat phenomena in electron beams. During the 1970s Schwarz together

with Heinrich Hora organized a biennial workshop on Laser Interaction and Related Plasma Phenomena, which served to develop directions for laser fusion and other fundamental interaction processes.

ROLAND M. LICHTENSTEIN

GERHARD L. SALINGER

Rensselaer Polytechnic Institute

George Whitfield

George Whitfield, associate professor of physics at The Pennsylvania State University, died on 21 August 1981.

Whitfield was born in New York City on 12 December 1930. He graduated with a BS degree from City College of New York in 1954 and received a PhD in physics from Columbia University in 1959. After a postdoctoral appointment at the University of Illinois, he was assistant professor of electrical engineering at Princeton University from 1962 to 1965. He went to Penn State in 1965.

Whitfield was internationally known for his work on polaron theory; in the 1970s, at the Middle East Technical University in Ankara, he collaborated on research in solid-state physics. He was co-author with Charles Kuper of *Polarons and Excitons*. At the time of his death he was working on a book on polaron theory. His other research interests included the theory of superfluidity and, in recent years, the foundations of the theory of superconductivity.

GORDON FLEMING

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PETER SHAW

The Pennsylvania State University

Correction



The June issue of PHYSICS TODAY illustrated the obituary of Jan Schilt with a picture of someone else. Schilt appears above in a photograph courtesy Columbia University. □

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