

obituaries

Jun John Sakurai

Jun John Sakurai, noted theorist in particle physics, met an untimely death at the age of 49 while he was visiting CERN in Geneva last October. Sakurai was born in 1933 in Tokyo. In 1949 he came to the United States as a high-school student. He went on to Harvard, then to Cornell, received his PhD in 1958, and was appointed assistant professor at the University of Chicago, which became the base for his activity for the next twelve years. In 1970 he moved to the University of California at Los Angeles, and he remained there until his death.

When Sakurai was still a graduate student, he proposed what is now known as the V-A theory of weak interactions, independently of (and simultaneously with) Richard Feynman, Murray Gell-Mann, Robert Marshak and E. C. G. Sudarshan. In 1960 he published in *Annals of Physics* a paper that was prophetic and probably his single most important paper. It was concerned with the first serious attempt to construct a theory of strong interactions based on Abelian and non-Abelian (Yang-Mills) gauge invariance. Essentially it was an $SU(2) \times U(1) \times U(1)$ (isospin, hypercharge and baryonic charge) gauge theory applied, alas, to the strong flavor interactions, before the time when the flavor $SU(3)$ emerged as the relevant symmetry of hadrons.

Nowadays we do not regard flavor as a gauged symmetry that governs strong interactions. But the impact of Sakurai's paper was considerable in those days. It induced theorists to attempt to understand the mechanisms of mass generation for gauge (vector) fields. It gave them the stimulus to search for a realistic unification of forces under the gauge principle. As it happened, the first fruits of these theoretical endeavors were to be realized in the realm of weak interactions.

On the phenomenological side, Sakurai vigorously advocated and pursued the vector meson dominance model of hadron dynamics. For example, he was the first to discuss the mixing of ω and ϕ states. In fact, he made numerous important contributions to particle physics phenomenology in a much more general sense, as his heart was always close to experimental activities. A lucid and popular expositor, he also benefited the physics community with his lectures, reviews and books.

It seems appropriate to include a quotation from his 1960 paper: "Why has nobody tried this kind [gauge theory] of interaction before? Perhaps our



SAKURAI

theory might have been tried a long time ago if it were not for the fact that the conventional Yukawa-type explanations of low-energy—phenomena—have been so successful."

In order to perpetuate Sakurai's contributions to science, a J. J. Sakurai Memorial Fund is now being planned at UCLA.

YOICHIRO NAMBU
Enrico Fermi Institute

William E. Krag

William E. Krag, member of the technical staff at MIT, Lincoln Laboratory, died of cancer on 26 August at the age of 54.

Krag received both a bachelor's degree and a PhD from MIT. His doctoral study on the magneto-transport properties of silicon was one of the first careful correlations of those properties with band structure.

After the completion of his PhD, he continued to work at Lincoln Lab on fundamental properties of semiconductors, mainly on infrared spectroscopy. He recognized the potential of computers for experimental research early, and some 15 years ago had designed and built an on-line computerized system for taking and reducing his spectroscopic data. Krag's low-temperature spectroscopy studies of impurities in semiconductors under calibrated stress were a model of experimental elegance. He participated in an important way in some of the earliest work on the emission characteristics of semiconductor lasers.

More recently, the focus of Krag's work shifted to applications. He pursued research and development of solid-state rf amplifiers and low-intensity

LTR SERIES 2.0K-300K OPEN-CYCLE REFRIGERATOR

... useful cooling to
below 2 kelvins

The new Heli-Tran® LTR Series open-cycle refrigerator gives added cryogenic capability to the researcher investigating phenomena from below 2 kelvins to ambient.

This proven system operates simply and reproducibly. It requires no vacuum source for transfer... only for temperature reduction at the sample.

Temperature stability $\pm 0.01K$ (liquid region); $\pm 1\%$ of absolute (gas region).

Complete system includes sample holder, transfer line, temperature controller.

Write for technical data.
Air Products and Chemicals, Inc.
1919 Vulture Street, Allentown,
PA 18103, (215) 481-3975
Telex: 84-7416

 **Air Products**
ADVANCED PRODUCTS



APS SHOW-BOOTH #3
Circle number 47 on Reader Service Card

Your Best Source FOR "Off-The-Shelf" OPTICS IN THE U.S.A.



ROLYN OPTICS

738 Arrowgrand Circle
Covina, California 91724

Circle number 48 on Reader Service Card

Need a Radar ...
...Pulse Modulator
...Indicator Group
...RF Source...

NOW!

...for your R&D lab?

We have it. Off-the-shelf
from our 250,000 sq. ft. inventory.
We'll even fully test it
and trial-run it for you.

Name your specifications
and have it operating in your lab
...in 60 days!

Send for FREE 24-page
catalog and facilities guide.



**Radio
Research
Instrument
Co., Inc.**

2 Lake Avenue Extension, Danbury, CT 06810
Tel: (203) 792-6666 • Tlx: 962444 Radar Dury

Circle number 49 on Reader Service Card

imaging devices. From 1977 through 1980 he managed the Lincoln Laboratory GEODSS Experimental Test System at Socorro, New Mexico, where he was responsible for the experimental development of electro-optical sensor systems for space surveillance.

Krag was a fine solid-state experimentalist, but also pursued a wide range of interests, including wildlife, horticulture, cabinet-making and photography. Above all he is remembered for his courage in battling cancer. Even from his hospital bed he directed the installation of a new telescope he helped design; the night before he died he learned his project was successful.

H. J. ZEIGER

J. G. MAVROIDES

Lincoln Laboratory, MIT

William G. Pfann

William G. Pfann, a noted researcher in the science of materials, died October 1982, only weeks after he retired from Bell Laboratories. He had joined Bell Labs at the age of 18; when he retired, he had been there 47 years.

Pfann received a bachelor's degree in chemical engineering from Cooper Union in 1940. Early in his career he helped develop "catwhisker" crystal detectors for use in radar receivers. He is best known for his work on purification of materials by zone leveling and zone refining, and the growth of single crystals by zone melting. Indeed, his classic *Zone Melting*, published in 1958, has served to educate two generations of materials scientists. In this field, Pfann's contributions made possible the development of today's semiconductor technology by allowing the preparation of high-purity germanium and

PFANN



silicon, whose properties could be subsequently modified by impurity doping. His interest in freezing phenomena never flagged; during the last few years he was interested in their application to the preservation and storage of whole human blood.

Less well known is his work on electrical contact erosion, in which he discovered a method of eliminating the "contact bridge" erosion problem, and his conception and development of the first transistor to be manufactured (type A). He also contributed basic patents and papers on alloying and diffusion methods of transistor fabrication.

Pfann's personality and ideas have left an indelible mark on Bell Labs and on materials scientists around the world. His energy, his high standards of honesty in experimentation and his unprejudiced approach to the new, the untried, and even the heretical helped define the word "scientist" for a large number of his acquaintances.

KENNETH A. JACKSON

HARRY J. LEAMY

RICHARD S. WAGNER

Bell Laboratories, Murray Hill

Philip Shorer

Philip Shorer died on 28 September 1982 in Cambridge, Massachusetts. Well embarked on a distinguished career, he died of a painful illness at the age of 30. At the time of his death he was on leave of absence from Harvard College Observatory, working as a research associate at the Radiation Laboratory, University of Notre Dame.

Shorer was born on 9 December 1951 in New York. After undergraduate years at Stevens Institute of Technology, he joined the department of physics at Harvard University in 1974. He completed his PhD degree in 1979, with Alexander Dalgarno as his thesis adviser. Shorer spent the following year with Phillip Burke at the Daresbury Laboratory in the United Kingdom. He returned to Harvard as a research associate until August 1981, when he left for a year to work at the Radiation Laboratory.

In his short career, he had exerted a major influence on theoretical studies in atomic physics. In particular, in collaboration with Walter Johnson, Shorer carried out highly sophisticated applications of the relativistic random phase approximation to predict the energy level structures, radiative transition probabilities and photoionization cross sections of highly ionized atomic systems where relativistic effects are large.

ALEXANDER DALGARNO

Harvard College Observatory □