

2nd Annual Physics Today's

Buyers Guide

... A revised and expanded directory of equipment for physics research, offering easy access to over 2,000 "physics" products, many of which have not appeared elsewhere.

Designed and edited for physicists, and counseled by a select Advisory Committee, the Guide will draw from the many thousands of items available from North American and European sources.

This second edition will be an integral part of the August '85 issue of *Physics Today*.

For information on listings (product and company), write to Ms. Elaine Cacciarelli, % American Institute of Physics. For advertising info, write or call the AIP Advertising Division.

**AMERICAN INSTITUTE
OF PHYSICS**
335 East 45th Street
New York, NY 10017
(212) 661-9404

Lounasmaa and collaborators in 1983 reported nuclear antiferromagnetic ordering in a sample of metallic copper at a temperature of 0.06 microkelvins. They also pioneered studies of new flow phenomena, ion motion and surface states in superfluid helium and, most recently, its properties under rotation.

Thouless was honored for his "elucidation of the subtle effects of fluctuations and disorder on low-temperature systems, including his theories of phase transitions in two dimensions and of electron localization and magnetism in disordered materials." Thouless re-

ceived his PhD from Cornell in 1958. He and J. M. Kosterlitz developed the theory of two-dimensional phase transitions that has been applied to many systems, including superfluid He^4 films, superconducting films, arrays of Josephson junctions and liquid crystals (*PHYSICS TODAY*, August 1978, page 17). He collaborated with Philip W. Anderson and R. G. Palmer in 1977 and with J. R. L. de Almeida in 1978 on studies of the infinite-range interaction model of spin glasses. In addition, Thouless and his collaborators have contributed seminally to the theory of electron localization in disordered systems.

Deutch named provost of MIT

John M. Deutch, the Arthur C. Cope professor of chemistry at the Massachusetts Institute of Technology and dean of MIT's School of Science since 1982, has been named provost of the university, effective 1 July 1985. Deutch received his PhD in chemistry from MIT in 1965, and has been a member of the faculty there since 1970. From 1976-77 he took a leave of absence to become the first director of energy research of the newly created Department of Energy. In 1979 he served as Assistant Secretary, Acting Under Secretary and Under Secretary for Energy Technology. He also served on President Reagan's Commission on Strategic Forces in 1983.

Deutch will succeed physicist Francis E. Low, who has served as provost since 1980. Low announced earlier his desire to leave the post to return to teaching and research.



DEUTCH

obituaries

James H. Crawford Jr

James Homer Crawford Jr, professor in the physics and astronomy department at the University of North Carolina at Chapel Hill, died on 20 October 1984, at the age of 62.

Crawford was born on 19 May 1922, in Union, South Carolina. After earning his BS from Wofford College and serving as a US Army meteorologist in World War II, he came to Chapel Hill as a graduate student and earned his PhD in chemistry.

Crawford's professional career was based in two institutions—Oak Ridge National Laboratory, from 1949 until 1967, and the University of North Carolina, Chapel Hill, from 1967 until his death. At Oak Ridge he served as assistant director and then associate director of the Solid State Division. He conducted extensive research on the

effects of high-energy radiation on the electrical and structural properties of crystalline and glassy solids, including pioneering investigations of the effects of fast neutrons and gamma rays on semiconductors. Along with related efforts by the Lark-Horovitz group at Purdue, these experiments provided the first detailed information on the electron donor-acceptor states due to point defects in germanium and silicon. In 1961, Crawford and Douglas Billington wrote *Radiation Damage in Solids*, which described these effects.

In 1967, Crawford became the chairman of the physics and astronomy department at the University of North Carolina. He returned to full-time teaching and research in 1977, and recently became the first chairman of a new cross-disciplinary curriculum in applied science. During his tenure at North Carolina, Crawford maintained

The Latest in Physics from CAMBRIDGE

THE EXCITATION AND PROPAGATION OF ELASTIC WAVES

J. A. HUDSON

*Cambridge Monographs on Mechanics
and Applied Mathematics*
Paperback \$1995

ELEMENTARY PARTICLES

Second Edition

I. S. HUGHES
Forthcoming

THERMOLUMINESCENCE OF SOLIDS

S. W. S. MCKEEVER

Cambridge Solid State Science Series
\$69.50

FERROHYDRODYNAMICS

RONALD E. ROSENSWEIG

*Cambridge Monographs on Mechanics
and Applied Mathematics*
Forthcoming

SPACE-TIME STRUCTURE

The late ERWIN SCHRÖDINGER

Cambridge Science Classics
Paperback price forthcoming

QUARKS, GLUONS AND LATTICES

MICHAEL CREUTZ

*Cambridge Monographs on
Mathematical Physics*
Paperback price forthcoming

QUANTUM FIELD THEORY

LEWIS H. RYDER

\$74.50

THE THEORY OF CLASSICAL DYNAMICS

J. B. GRIFFITHS

Forthcoming

THE THEORY OF THERMODYNAMICS

J. R. WALDRAM

Cloth \$59.50/Paper \$24.95

THE TRANSFER OF SPECTRAL LINE RADIATION

C. J. CANNON

\$99.50

ANALOG SIGNAL PROCESSING AND INSTRUMENTATION

ARIE F. ARBEL

Paperback \$24.95

THE IDENTIFICATION OF PROGRESS IN LEARNING

T. HÄGERSTRAND, Editor

\$39.50

GENERAL RELATIVITY

HANS STEPHANI

Paperback price forthcoming

COMMUNICATING IN SCIENCE:

Writing and Speaking

VERNON BOOTH

\$6.95

AN INTRODUCTION TO SCIENCE STUDIES:

*The Philosophical and Social Aspects of
Science and Technology*

JOHN ZIMAN

\$22.95

CREEP OF CRYSTALS

J. P. POIRIER

Cambridge Earth Science Series

Cloth \$49.50/Paper \$22.95

THE PRINCIPLES AND PRACTICE OF ELECTRON MICROSCOPY

IAN M. WATT

\$49.50

STOICHIOMETRY AND THERMODYNAMICS OF METALLURGICAL PROCESSES

Y. K. RAO

Forthcoming

THE VERY EARLY UNIVERSE

G. W. GIBBONS, S. W. HAWKING,

S. SIKLOS, Editors

Paperback \$24.95

INTERACTING BINARY STARS

J. E. PRINGLE and

RICHARD A. WADE, Editors

Cambridge Astrophysics Series
\$49.50

GRAVITATIONAL PHYSICS OF STELLAR AND GALACTIC SYSTEMS

WILLIAM C. SASLAW

\$90.00

NON-LINEAR VIBRATIONS

GÜNTER SCHMIDT and

ALEŠ TONDL

Forthcoming

APPLIED DIFFERENTIAL GEOMETRY

WILLIAM L. BURKE

Cloth \$54.50/Paper \$19.95

INTRODUCTION TO PHYSICAL MATHEMATICS

P. G. HARPER and DENIS WEAIRE

Cloth \$42.50/Paper \$14.95

For further information write to the Marketing Manager, Sciences.
Order from your bookstore or call our Customer Service: 1-800-431-1580 (outside NY State and Canada).
MasterCard and Visa accepted.

Cambridge University Press

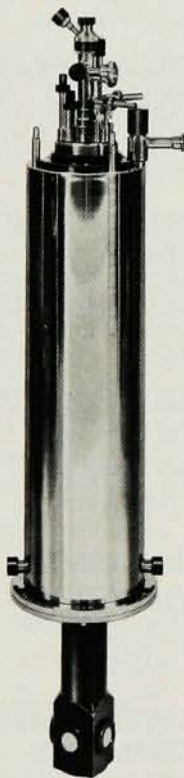
32 East 57th Street, New York, New York 10022



Just 6 good reasons for
choosing our

MODULAR CRYOSTATS

- ☐ 1.5-500K temperature range
- ☐ Sample in vacuum, exchange gas or liquid
- ☐ Rapid sample change whilst cold
- ☐ Automatic temperature control
- ☐ Wide range of alternative windows
- ☐ Range of capacities from 3 to 13 litres



... and there are many more.
Send for full details.

Oxford Instruments Limited

Osney Mead, Oxford OX2 0DX, England
Tel: (0865) 241456 Telex: 83413

Oxford Instruments North America Inc.

3A Alfred Circle, Bedford, Massachusetts
01730, USA
Tel: (617) 275-4350 Telex 230 951 352

OXFORD

EVERYTHING CRYOGENIC

Circle number 55 on Reader Service Card

a vigorous and internationally recognized program of research on lattice-defect phenomena in ionic crystals. His work on lattice imperfections and ion transport in doped fluorite-type crystals provided valuable insights into the behavior of conventional nuclear fuel materials, which are less amenable to experimental study but have analogous crystal structures and defect properties. During recent years his interests were focused on the effects of high-energy radiation on crystalline oxides and on the complex color-center interactions in these materials.

Crawford was the editor of the *Journal of Applied Physics* (1960-64). He enjoyed teaching courses at the fringes of physics: photographic science, which allowed him to capitalize on one of his hobbies; and "Physics and archaeology," which gave him an opportunity to acquaint students with the growing use of physical techniques in archaeological explorations.

Crawford's scientific work was closely intertwined with his activities outside the laboratory and the university. He loved the outdoors and was especially fond of the mountains of North Carolina and Tennessee. Quite a few of his scientific papers were written in campgrounds in the mountains. He had a deep religious faith that was combined with humility, dedication and compassion. More than his many good works and accomplishments, those who knew him will miss his loving and gentle spirit.

E. MERZBACHER
L. M. SLIFKIN

University of North Carolina
at Chapel Hill

Josif Samuilovich Shklovsky



Josif Shklovsky was born 1 July 1916 in Glukhov, Ukraine, USSR, and died in Moscow, 3 March 1985. During his scientific career he held appointments

to the faculty of Moscow University in the department of radioastronomy and to the Sternberg Astronomical Institute. Since 1972 he served as chief of the astrophysical department of the Institute of Space Research in Moscow.

Shklovsky provided remarkable early solutions to many of the major theoretical problems of astrophysics. His research and publications were characterized by their elegant simplicity and penetrating insights. Several of his books were translated into English and widely read by American students. Most important were: *Cosmic Radio Waves* (1960), *Intelligent Life in the Universe* (with Carl Sagan, 1966), *Supernovae* (1968), and *Stars, Their Birth, Life and Death* (1978).

In 1945, Shklovsky produced a modern theory of the ionization of the solar corona. He was among a group of Soviet scientists, including Vitaly L. Ginzburg, who analyzed radio brightness measurements of the sun at meter wavelengths. Shklovsky's analysis emphasized the coexistence of million-degree thermal and sporadic nonthermal components. He also made the first suggestion of plasma oscillations as the source of solar radio bursts.

Without access to Hendrik C. van de Hulst's prediction of the intensity with which intergalactic gas emits the 21-cm line of hydrogen, Shklovsky published a calculation of the probability of this hyperfine transition in 1949. He demonstrated clearly that the 21-cm line could be detected with then-existing equipment. His paper also discussed expected radio-line radiation from deuterium and interstellar molecules of OH and CH, thus anticipating by two decades the rich field of galactic microwave spectroscopy that subsequently developed.

In the 1950s he became interested in the nonthermal emission from radio galaxies and, together with Ginzburg, proposed the novel explanation that it is synchrotron radiation generated by relativistic electrons in the galactic magnetic field. The explanation has since been thoroughly confirmed; the current theory of synchrotron radiation in astronomy is based almost exclusively on their work.

In 1953, before the radio emission from the Crab nebula was known to be polarized, Shklovsky proposed that it was synchrotron radiation, attributing it to relativistic electrons moving at energies up to several hundred million electron volts in a magnetic field of 10^{-3} gauss. He quickly applied similar reasoning to the amorphous optical radiation: Previous attempts at theoretical explanation based on thermal radiation of hot ionized gas had failed because such processes require temperatures of hundreds of thousands of degrees, totally inconsistent with the