

CREATIVE RESEARCH For The PHYSICIST

**WITH VISION,
IMAGINATION AND
FORESIGHT**

Our objective at our Princeton, N.J. R&D Laboratory is to probe for scientific and technological advances.

It is this type of atmosphere we provide for the discerning M.S. or Ph.D. in physics, with experience or interest in Solid State, Lasers, or Electro-Optics, plus the latest equipment, facilities and commensurate rewards.

Please direct your inquiry to:
PERSONNEL SERVICES PT10



**AMERICAN
CAN COMPANY**

100 PARK AVE., NY 10017

An Equal Opportunity Employer

THE REVIEW OF SCIENTIFIC INSTRUMENTS

A monthly devoted to scientific instruments, apparatus, and techniques. Includes original review articles on instrumentation in physics, chemistry, and the life sciences, book reviews, and sections on new instruments and new materials.

Annual Subscription Price

Nonmembers

\$13 domestic \$15 foreign

Individual Members of Member Societies

\$11 domestic \$13 foreign

Send orders and inquiries to

**Department S
AMERICAN INSTITUTE OF PHYSICS
335 East 45 St.
New York, N. Y. 10017**

from Robert T. Siegel, Physics Department, College of William and Mary, Williamsburg, Va. 23185.

Plasma diagnostics

The Institute of Physics and the Physical Society's Spectroscopy Group, in collaboration with the United Kingdom Atomic Energy Authority, will hold a conference on ultraviolet and x-ray spectroscopy of laboratory and astrophysical plasmas at the Culham Laboratory from March 29 to April 1. Sessions will be held on laboratory plasmas, solar plasmas, stellar plasmas, fundamental data, and instrumental techniques. During the meeting, Culham Director Dr. J. B. Adams will deliver the Institute and Society's 1965 Guthrie lecture.

Further information and application forms for the required advance registration will be available in December from the Meetings Officer, The Institute of Physics and the Physical Society, 47 Belgrave Square, London SW 1, England.

Nuclei and particles

Nuclear structure, nuclear reactions, and particle physics will be the main topics of a conference to be held by the Institute of Physics and the Physical Society from March 30 to April 1 at Oxford University.

Three-hundred-word abstracts of ten-minute contributions should be submitted by February 4 to Dr. P. S. Fisher, University of Oxford, Nuclear Physics Laboratory, 21 Banbury Road, Oxford, England.

Further information and application forms for advance registration will be available in January from the Meetings Officer, The Institute of Physics and the Physical Society, 47 Belgrave Square, London, SW 1, England.

Neutrons

An American Physical Society topical conference, cosponsored by the National Bureau of Standards and the Atomic Energy Commission, on neutron-cross-section technology, will be held March 22 to 24 at the Shoreham Hotel in Washington, D. C.

The program will include invited and contributed papers on discrepancies in available measurements, sensitivity of reactor characteristics to cross-section uncertainties, theoretical interpretations of cross-section data, projection of needs for cross-section data, future prospects for sources, detectors, and experimental techniques, and other topics related to the measurement and applications of neutron cross sections.

Two-hundred-word abstracts of contributed papers, should be submitted by Dec. 20 to Prof. W. W. Havens, Conference on Neutron Cross Section Technology, Department of Physics, Columbia University, 538 West 120th Street, New York, N.Y. 10027. Abstracts are to be published in the *APS Bulletin*, and should conform to APS abstracts regulations. Full manuscripts of papers will be required at the time of the conference and will be published in the proceedings.

Magnetics

The Liederhalle in Stuttgart, Germany, has been chosen for the fourth international conference on magnetism, which will be held April 20 to 22. Sponsored by the Magnetics Group of the Institute of Electrical and Electronics Engineers and the German Working Group for Ferromagnetism, the meeting will consider contributed papers in all areas of applied magnetism and related magnetic phenomena. Topics of particular interest include computer magnetism, superconducting devices, magnetic recording, ferrite microwave devices, magneto-optics, magnetic material properties, and combined magnetic and semiconductor devices.

Information regarding the submission of abstracts (due by December 7) is available from Dr. E. W. Pugh, International Business Machines Corporation, 1000 Westchester Avenue, White Plains, N. Y.

Quantum electronics

The fourth international quantum electronics conference, sponsored by the American Institute of Physics, the American Physical Society, the Opti-

LECTURES IN THEORETICAL PHYSICS

Volumes VII A, B, and C. Lectures delivered at The Summer Institute for Theoretical Physics, University of Colorado, Boulder, 1964, have been published in three volumes by the University of Colorado Press. The lectures—sponsored by the University's Department of Physics and Astrophysics and supported by the National Science Foundation—treat subjects with unusual depth and are of considerable interest to those engaged in nuclear physics, high energy physics, many body problems, and related areas.

VOLUME VII A—THE LORENTZ GROUP: A commemorative volume marking the 25th anniversary of the publication of *On Unitary Representations of the Inhomogeneous Lorentz Group* (Annals of Mathematics, 1939) by Prof. Eugene Wigner, and dedicated to him.

Edited by Wesley E. Brittin and Asim O. Barut, Department of Physics and Astrophysics, University of Colorado. 388 pages, paperback, \$6.50.

GÉRARD EMCH: Representations of the Lorentz Group in Quaternionic Quantum Mechanics

P. MOUSSA and R. STORA: Some Remarks on the Product of Irreducible Representations of the Inhomogeneous Lorentz Group

STAFFAN STROM: On the Representation of Finite Lorentz Transformations

ARNE KIHLEBERG: On a Class of Explicit Representations of the Homogeneous Lorentz Group

H. JOOS and R. SCHRADER: On the Primitive Characters of the Poincaré Group

R. HAAG: Lorentz Invariance and Breaking of Lorentz Invariance in Quantum Theory

LOUIS MICHEL: The Group of Automorphisms of the Poincaré Group

A. O. BARUT: Analyticity, Complex and Quaternionic Lorentz Groups and Internal Quantum Numbers

H. JOOS: Complex Angular Momentum and the Representations of the Poincaré Group with Space-Like Momentum

DAVID N. WILLIAMS: The Dirac Algebra for Any Spin

PETER MINKOWSKI, DAVID N. WILLIAMS, and RUDOLF SEILER: On Stapp's Theorem

DANIEL ZWANZIGER: Invariant Amplitudes for Massless particles and Universal Electromagnetic Coupling.

JOSEPH DREITLAIN: Relativistic Particle Correlations.

I. MUZINICH: Crossing Relations of Helicity Amplitudes for Processes with Particles of Higher Spin

JAMAL N. ISLAM: Analytic Properties of Vacuum Expectation Values of Products of Field Operators

A. O. BARUT and Y. C. LEUNG: Analytic Properties of the Partial Wave Amplitudes for Production Processes in the Complex J-Plane

YEHIEL ILAMED: Hamilton-Cayley Theorem for Matrices with Non-Commutative Elements

WILLIAM C. PARKE and HERBERT JEHL: Appendix—Covariant Spinor Formulation of Relativistic Wave Equations Under the Homogeneous Lorentz Group

VOLUME VII B—ELEMENTARY PARTICLES: Experimental and theoretical physicists review the subject matter of their specialties and report on their latest contributions.

Edited by Wesley E. Brittin and Leona Marshall, Department of Physics and Astrophysics, University of Colorado. 480 pages, paperback, \$7.00

RICHARD H. CAPPS: Bootstrap Models and Internal Symmetry

ARTHUR W. MARTIN: Baryonic States and a Test of the Bootstrap Hypothesis

SYDNEY MESHKOV: SU₃ Reaction Predictions and Symmetry Breaking

BENJAMIN W. LEE: Unitary Symmetry and Weak Interactions

P. CARRUTHERS: Excited States of Baryons

ARTHUR W. MARTIN: Crossing Relations, Unitarity, and the Prediction of Symmetries

TOICHIRO KINOSHITA: Restrictions Imposed by Unitarity and Analyticity on the Behavior of Scattering Amplitudes at High Energy

JOSEPH DREITLAIN: Dynamic Properties of the Ω^-

FRANCO SELLERI: Theoretical Models for Simple Inelastic Reactions

LOYAL DURAND III and YAM TSI CHIU: Absorptive Processes and Single Particle Exchange Models at High Energies

FRANCO SELLERI: Pole Model of Isobar Production

A. D. KRISCH: Diffraction Phenomenology: Elastic and Inelastic Processes in Strong Interactions

M. L. STEVENSON: Review of Recent Work on K⁺ Meson Interactions

F. AYER, L. MARSHALL, and T. OLIPHANT: Applications of the Optical Model to 2 BEV/C K-P Interactions

GERSON GOLDBABER: Multipion and Baryon Resonances in the $M \rightarrow \pi$ Reaction

SULAMITH GOLDBABER: A Comparison of Resonance Formation in $M \rightarrow \pi$ and $M \rightarrow p$ Reactions

W. SELOVE: $\pi - \pi$ Scattering and Resonances

DANIEL ZWANZIGER: Positive Definite and Covariant Spin Polarization Matrix

H. C. CORBEN: Relativistic Quantum Theory of Rotational States

A. O. BARUT: Remarks on the Group Structure of Corben's Wave Equations

LAURIE BROWN: Remarks on a Formula for the Meson Masses

V. PEREZ-MENDEZ and L. DAVID ROPER: Review of the π^- Nucleon Experimental Situation and Its Phase Shift Interpretation

VOLUME VII C—STATISTICAL PHYSICS, WEAK INTERACTIONS, FIELD THEORY

Edited by Wesley E. Brittin, Department of Physics and Astrophysics, University of Colorado. 496 pages, paperback, \$7.00

MICHAEL E. FISHER: The Nature of Critical Points

EUGENE FEENBERG: Notes on the Radial Distribution Function of a Quantum Fluid

ELLIOTT H. LIEB: The Bose Fluid

D. TER HAAR: On the Origin of Cosmic Rays

D. TER HAAR: Selected Topics in Many-Body Theories

GIDEON CARMİ: Heuristic Approach to Some Typical Many-Body Problems

C. L. MEHTA: Coherence and Statistics of Radiation

NORMAN DOMBEY: Lectures on Weak Interactions

YUKIO TOMOZAWA: Introduction to Axionic Field Theory

In Preparation

VOLUMES VIII A, B, and C— Lectures in Theoretical Physics

Now in preparation by the University of Colorado Press are the lectures delivered at the Summer Institute for Theoretical Physics, University of Colorado, Boulder, 1965. They will be published in the spring of 1966 as Volumes VIII A, B, and C:

Volume VIII A— Solid State and Statistical Physics

Volume VIII B— Nuclear Structure

Volume VIII C— Elementary Particles

ORDER BLANK

SEND TO:

UNIVERSITY OF COLORADO PRESS
UNIVERSITY OF COLORADO
BOULDER, COLORADO 80304

Gentlemen, Please send me _____ copies of *Lectures in Theoretical Physics, Volume VII A, Lorentz Group*, \$6.50 each.

_____ copies of *Lectures in Theoretical Physics, Volume VII B, Elementary Particles*, \$7.00 each.

_____ copies of *Lectures in Theoretical Physics, Volume VII C, Statistical Physics, Weak Interactions, Field Theory*, \$7.00 each.

_____ copies of *Lectures in Theoretical Physics, Volume VI (Lectures presented at the 1963 Institute)*, \$7.00 each.

_____ check enclosed
_____ mail book(s) and bill me
_____ purchase order enclosed

name _____

address _____

SPEX^{3/4 meter, f/6.8} HIGH APERTURE SPECTROGRAPH / SPECTROMETER

It will be our pleasure to send you the four pages of specifications which reveal what this case conceals or see for yourself at the Physics Show, January 26-29, 1966, New York City.

Fully rackable 4" x 10" plate camera replaceable by 6-channel polychromator with accurate, externally controlled (keep the lights on if you wish) slit positioning.

SPEX INDUSTRIES, INC. • 3880 PARK AVENUE • METUCHEN, N. J. 08841 • ☎ (201) -549-7144

UNIVERSITY APPOINTMENTS

THE UNIVERSITY OF NEW SOUTH WALES

invites applications for appointment to the position of

PROFESSOR OF PHYSICS

(in the field of theoretical solid-state physics)

This is a newly-established Chair in the School of Physics. The present professors are C. J. Milner (Head of School) and E. P. George. Further chairs will be created in the future.

The main research activities of the school are in experimental solid-state physics, about forty graduate workers being engaged in this area, chiefly in work on dielectric and semiconducting crystals. It is desired to appoint to this Chair a professor distinguished for his contributions to solid-state theory, and whose interests extend as fully as possible over solid-state physics.

Further information may be obtained from the head of school.

Salary will be £5200 per annum.

Subject to the consent of the University Council, professors may undertake a limited amount of higher consultative work.

Prospective applicants should write to the Appointments Section for supplementary information on the school's activities and for details of conditions of appointment including superannuation, study leave and housing scheme.

The University reserves the right to fill any chair by invitation.

One typed copy of the application, together with the names of three referees and a recent photograph, should be forwarded to the Appointments Section, Box 1, Post Office, Kensington, N.S.W. The closing date for applications is 31st December, 1965.
J. O. A. Bourke, Bursar.

Soviet Physics—SOLID STATE

Monthly. A translation of *Fizika Tverdogo Tela*. Offers results of theoretical and experimental investigations in the physics of semiconductors, dielectrics, and on applied physics associated with these problems. Also publishes papers on electronic processes taking place in the interior and on the surface of solids.

Soviet Physics—TECHNICAL PHYSICS

Monthly. A translation of *Zhurnal Tekhnicheskoi Fiziki*. Contains work on plasma physics and magnetohydrodynamics, aerodynamics, ion and electron optics, and radio physics. Also publishes articles in mathematical physics, the physics of accelerators, and molecular physics.

Soviet Physics—CRYSTALLOGRAPHY

Bimonthly. A translation of *Kristallografiya*. Experimental and theoretical papers on crystal structure, lattice theory, diffraction studies, and other topics of interest to crystallographers, mineralogists, and metallurgists.

Please address orders and inquiries to the publisher:

Dept. SP

American Institute of Physics
335 East 45th Street, New York 17, N. Y.

cal Society of America, and the Institute of Electrical and Electronics Engineers, will be held from April 12 to 15 at the Towne House in Phoenix, Ariz.

J. P. Gordon of Bell Telephone Laboratories and A. E. Siegman of Stanford University have been appointed conference chairman and program chairman, respectively. The Electronics Division of the Electrochemical Society and the Office of Naval Research are cooperating in the sponsorship of the meeting.

The program covers the three major areas of basic theory and basic physics, quantum electronic devices and technology, and applications of quantum electronic devices. The deadline for abstracts is January 3, and the deadline for manuscripts is April 15. Abstracts and requests for further details should be submitted to J. P. Gordon, Bell Telephone Laboratories, Murray Hill, N. J.

Applied mechanics

Experimental and theoretical work on the mechanics of solids, liquids, and gases, and on thermodynamics and heat transfer will be discussed at the fifth US National Congress of Applied Mechanics. It will convene at the University of Minnesota from June 14 to 17. The National Congresses meet every fourth year and are intended to supplement the International Congresses of Applied Mechanics. The program will consist of survey lectures in selected fields and contributed papers on work in progress. Two-hundred-word abstracts are due by January 15.

Requests for the required abstract forms and inquiries regarding the meeting should be addressed to Prof. Robert Plunkett, Secretary of Applied Mechanics Congress, 107 Aero Building, University of Minnesota, Minneapolis, Minn. 55455.

Quantum optics

Arrangements are being made for a second Rochester conference on coherence and quantum optics, to be held at the University of Rochester from June 22 to 24. Expected to be of somewhat wider scope than the first con-

ference (June 1960), the meeting is intended for scientists active in research on the basic physics of the field, with emphasis on statistical properties of electromagnetic fields and the interaction of the fields under conditions involving coherence effects. Related topics such as scattering of light will also be discussed, but subjects of purely spectroscopic interest will not be included.

Two copies of 1000-word abstracts, in English, are due by March 10. Abstracts and requests for further information and application forms should be addressed to Professor Emil Wolf, Second Rochester Conference on Coherence and Quantum Optics, Department of Physics and Astronomy, University of Rochester, Rochester, N.Y.

Rarefied gases

The fifth international symposium on rarefied gas dynamics will be held July 4 to 8 at Oxford University, covering both practical and theoretical aspects of high-altitude aerodynamics.

General areas of interest are transition flow, including slip and low Reynolds-number effects; kinetic theory of gases, including studies of the structure of shock waves; free molecular flow and particle-surface interactions; ionospheric aerodynamics, including basic studies of rarefied plasmas; and experimental techniques relating to any of the above.

Prospective contributors are requested to send a title and a brief description of their work to Dr. C. L. Brundin, Engineering Laboratory, Parks Road, Oxford, England, by December 31.

IUC

At the invitation of the Academy of Sciences of the USSR, the seventh general assembly and international congress of the International Union of Crystallography will be held at the University of Moscow from July 12 to 19, followed by a symposium on crystal growth on July 20 and 21.

The program of the congress will consist of five general invited lectures, sessions of contributed papers covering the main problems of experimentation and the theory of crys-

for
a
BREAKTHROUGH
in
your
research
Use
Gakei's
**HIGH-TEMPERATURE,
HIGH-PRESSURE
ELECTRIC
FURNACE**



Company and university laboratories are getting revealing results with these furnaces.



Designed for research scientists of compound crystals, Gakei's high-temperature, high-pressure electric furnace offers these proven features:

- Grows single crystals of compounds with high vapor pressure characteristics, e.g., II-VI compounds.
- Generates heat up to 4,500° F, permits pressure up to 4,000 psi, with power consumption of 30 kw.
- Heating element (graphite) mounted in the pressure chamber permits use of high pressure of controlled atmosphere such as argon gas, nitrogen gas, oxygen gas.
- Complete with program-controlled temperature controller and temperature control transformer (saturable core reactor type).
- Can be converted to a ZONE REFINING FURNACE for zone melting grown crystals, by equipping an up and down mechanism of crucible and two heaters.

FOR DETAILED INFORMATION PLEASE WRITE

GAKEI
ELECTRIC WORKS CO., LTD.
3108, Senju-Sakuragicho, Adachi-ku, Tokyo, Japan