WE HEAR THAT

Stirling A. Colgate, formerly of the University of California at Berkeley, has recently assumed the positions of president of the New Mexico Institute of Mining and Technology and director of the Institute's Research Division. Dr. Colgate succeeds E. J. Workman, who has accepted an appointment as professor of physics and director of the Cloud Physics Laboratory at the University of Hawaii.

T. Neil Davis was recently appointed to the positions of assistant director and professor of geophysics at the Geophysical Institute of the University of Alaska. Dr. Davis, who is currently associated with the Goddard Space Flight Center, will join the Institute later this year.

The Physics Department of the Drexel Institute of Technology in Philadelphia has announced plans to institute a PhD program next fall, when the available areas of specialization are expected to include nuclear physics, solid-state physics, theoretical physics, and atmospheric and space physics. Construction of a new building will begin this year, and an expansion of the Department's staff, particularly at the level of graduate teaching and research, is anticipated. Current new additions to the staff include two professors of physics: Edward M. Corson (quantum mechanics and relativity); and Herman Newstein of New York University (atmospheric physics). New assistant professors in the Department are Leonard D. Cohen from the General Electric Space Sciences Laboratories (nuclear and space physics); John A. Taylor, a nuclear physicist who recently graduated from MIT; and Keith H. Johnson, a solid-state theorist who recently graduated from Temple University.

The Physics Department of Michigan State University has announced that Aaron I. Galonsky, formerly of the Midwest Universities Research Association, and Edwin Kashy, formerly of Princeton University, have been appointed associate professors in the Experimental Nuclear Physics Group of

the Department's Cyclotron Laboratory. Charles R. Gruhn from Boston University has joined the Group as an assistant professor. In theoretical nuclear and elementary-particle physics, Peter S. Signell, formerly of Pennsylvania State University, was appointed as associate professor, and Krishna Kumar from the Carnegie Institute of Technology was appointed a research associate. Jack Bass from the University of Illinois has been named assistant professor in the Solid-State and Low Temperature Laboratories of the Michigan Department, and Carl L. Foiles from the University of Arizona and Venkataraman Nagarajan from Andhra University in India have been appointed research associates in these laboratories. Maciej Suffczynski from the University of Warsaw has joined Michigan's Theoretical Solid-State Group as visiting professor, and William Silvert from Boston University has been appointed a research associate in this Group. Professors currently on leave of absence from the Michigan Department include Donald J. Montgomery, now with the National Aeronautics and Space Administration, Jerry A. Cowan, who is at the Centre d'Etudes Nucléaires de Saclay, and Meyer Garber, currently at Brookhaven National Laboratory.

Morton F. Kaplon was recently appointed chairman of the Department of Physics and Astronomy at the University of Rochester. Professor Kaplon has been serving as director of the Department's Cosmic-Ray Group, associate dean of the University's College of Arts and Science, and director of the University's Space Sciences Group.

Albert D. Frost of the University of New Hampshire, is spending the current academic year as a visiting member of the Long Baseline Interferometer Group of the University of Manchester's Nuffield Radio Astronomy Laboratory in Jodrell Bank, England.

Nicola N. Khuri has been appointed associate professor at Rockefeller Institute, Dr. Khuri, who was formerly a member of the Institute for Advanced Study in Princeton, spent the past academic year as visiting associate professor of physics at Columbia University.

John K. Major, Perkins professor of physics at Western Reserve University, is currently on leave of absence as a staff associate in the Science Development Evaluation Group in the National Science Foundation's Division of Institutional Programs.

James C. M. Li, staff scientist in US Steel Corporation's Edgar C. Bain Laboratory for Fundamental Research in Monroeville, Pa., is on leave of absence during the current academic year while serving as a visiting professor of metallurgy in the Henry Krumb School of Mines at Columbia University.

H. G. MacPherson has been named to succeed J. A. Swartout as deputy director of the Oak Ridge National Laboratory. A member of the Oak Ridge staff since 1956, Dr. MacPherson has been an assistant director at ORNL for the past three years. Dr. Swartout has been named to serve as the Atomic Energy Commission's assistant general manager for reactors.

Peter G. Bergmann, professor in the Department of Physics at Syracuse University, has returned to the Department after spending a year as chairman of the Department of Physics at the Belfer Graduate School of Science of Yeshiva University. E. C. G. Sudarshan, who spent the last academic year on leave of absence at Brandeis University and the University of Bern in Switzerland, has been appointed professor of physics at Syracuse. New assistant professors in the Department include Alan J. Macfarlane, formerly of the University of Rochester, and Marcel Wellner from the British Atomic Energy Research Establishment at Harwell. Two visiting appointments at Syracuse are held by Lochlain O'Raifeartaigh of the Dublin Institute for Advanced Studies, who is visiting associate professor at Syracuse, and A. P. Balachandran, of the University of Chicago, who is visiting assistant professor.

Wilfred Roth has joined the University of Vermont as professor and chairman of the Department of Electrical Engineering. He was previously owner and director of the Roth Laboratory for Physical Research in Hartford, Conn., and will continue to maintain his association with the Laboratory as a director and consultant.

Frederick Kaufman, formerly of the Ballistic Research Laboratories at the Aberdeen Proving Ground in Maryland, has been appointed professor of chemistry at the University of Pittsburgh under the auspices of its NASA Space Research and Coordination Center. Dr. Kaufman spent the past sixteen years at Aberdeen as chief of the Chemical Physics Branch of the Interior Ballistics Laboratory.

John N. Howard, formerly senior scientist in the Optical Physics Laboratory of the Air Force Cambridge Research Laboratories, was recently appointed to head the AFCRL's newly created Office of Chief Scientist. Dr. Howard, who is also editor of Applied Optics, will serve, in his new position, as an advisor to the AFCRL commander on existing and future research programs in the physical and environmental sciences.

Robert W. McAllister, formerly of Cornell University, has joined the Physics Department of the Colorado School of Mines as an assistant professor.

George C. Towe, associate professor of physics at Alfred University, has been appointed acting chairman of the Department of Physics. Michael W. Webb, who recently received his PhD from the University of Bristol, has joined the Department as assistant professor.

Arthur H. Benade on leave of absence from the Case Institute of Technology, and Jon Mathews, on leave from the California Institute of Technology, are serving as visiting professors of physics at the Indian Institute of Technology in Kanpur, India.

Thor L. Smith, director of the Propulsion Sciences Division at Stanford Research Institute, has been ap-



CRYOGENIC PROBLEM-SOLVERS

Our complete line of cryogenic research systems and components can help you

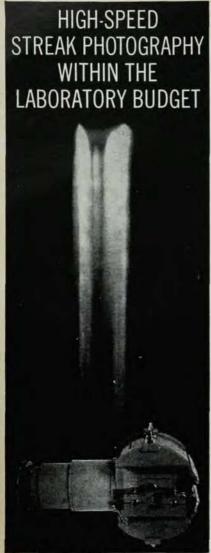
- conduct ultra-low temperature research anywhere between 0.3 and 4.2°K
 with our Helium-3 Refrigerators
- prepare for general or specific experiments at liquid helium temperatures with sturdy, non-magnetic stainless steel Dewar systems*
- control vapor pressure over a liquid cryogen, hence control bath temperature with our Vapor Pressure Regulators
- control sample environmental temperature anywhere between 1 to 300°K
 with Variable Temperature Test Chambers, full range, full control
- instrument your experiment
 with our new line of linear and very reproducible temperature sensors

Other Cryonetics Corporation equipment includes: solid state temperature controllers; liquid level sensors and controllers; liquid cryogen transfer equipment*; and flow controls.

We've solved hundreds and hundreds of cryogenic research problems. Whatever your problem, the solution may be right here in our files . . . or within "thinking distance" of our staff of cryogenic experts. For information, write or call: CRYONETICS CORPORATION, 2 Northwest Industrial Park, Burlington Massachusetts 01804. Telephone: (617) 272-4250.

CRYONETICS PHYSIC CORPORATION BOOK

PHYSICS SHOW BOOTH #100



Live spark gap in air. 30-kv, 0.05-microfarad capacitor charged to 24 kv was discharged across gap. Distance between electrodes was 0.05 inch.

The Avco MC-300 Rotating Mirror Camera

Only \$5,800 complete

- Requires no synchronization with event
- Maximum writing rate of 3.9 mm/sec.
- Adjustable lens f/2.5-f/16
- Large 2¾" x 16" film
- Maximum mirror speed of 3000 rps

For complete information, write: Department IPS-5



Industrial Products Subdivision

353 Middlesex Ave., North Wilmington, Mass. 01888

pointed a scientific fellow in physical sciences at the Institute. In his new position, Dr. Smith will pursue research problems of his own choice and act as a consultant to the Institute's management on scientific matters and on the development of new research programs.

Several appointments have been made in the Department of Nuclear Engineering at North Carolina State College of the University of North Carolina at Raleigh. Raymond F. Saxe, formerly of Queen's College of London University and consultant to the Atomic Energy Research Establishment at Harwell, England, has been appointed a professor in the North Carolina Department. Martin A. Welt, formerly with Chance Vought in Dallas and the Atomic Energy Commission, has been named director of the Department's nuclear reactor project and assistant professor. Ralph L. Ely from the Research Triangle Institute has been appointed adjunct professor. Raymond L. Murray, formerly head of the Department of Physics at North Carolina, has returned from a year's leave of absence lecturing in Europe, Asia, and Africa, to accept a new position as head of the Department of Nuclear Engineering.

William W. Longley, Jr., from the Theoretical Physics Institute of the University of Alberta in Edmonton, and Mukul K. Mukherjee from the Max Planck Institute for Metal Research in Stuttgart, West Germany, have joined the staff of the Midwest Research Institute as associate physicists.

R. Victor Jones and Peter S. Pershan of Harvard University's Division of Engineering and Applied Physics have received promotions in the Department. Dr. Jones has become Gordon McKay professor of applied physics, and Dr. Pershan was named associate professor of applied physics.

Kenneth W. Ford, formerly of Brandeis University, has been appointed professor and chairman of the Physics Department at the University of California in Irvine.

John Ging, formerly of the Applied Engineering Laboratory of the University of Virginia, has joined the faculty of Clemson University as assistant professor in the Department of Physics. Malcolm J. Skove and Ephraim P. Stillwell have been promoted to associate professors in the Department.

Wesley Unruh, formerly of Bell Telephone Laboratories, has been appointed assistant professor of physics at Ohio University in Athens.

New assistant professors of physics at the Georgia Institute of Technology include Ian R. Gatland, formerly of the Martin Company Research Institute for Advanced Study in Baltimore, A. L. Stanford, Jr., previously a research staff consultant at Sperry Microwave Electronics Company in Clearwater, Florida, and James Tanner, a recent graduate of the Institute. Earl W. McDaniel has joined the faculty of the Institute's School of Physics as a professor after three years as professor of electrical engineering at Georgia Tech.

George Adomian, formerly senior physicist at Hughes Aircraft, has been appointed professor of engineering research at Pennsylvania State University.

Harold W. Lewis, formerly of the University of Wisconsin, has been appointed as a professor in the Department of Physics at the University of California in Santa Barbara. Jose Fulco and William Ramsay, previously of the University of California in San Diego, have been named associate professor and assistant professor, respectively, in the Santa Barbara Department. New lecturers in the Department include Roger D. Woods from the University of Redlands, Jack S. Margolis from North American Aviation Science Center, and Allan S. Krass from the State University of

Marian N. Whitehead, formerly of the Stanford Linear Accelerator Center, has been named associate professor in the Department of Physics at the California State College in Hayward. John C. Giles, formerly associated with the University of Aberdeen, has accepted a position as assistant professor of physics at California State.

Francis S. Johnson has been made director of the Earth and Planetary Sciences Laboratory of the Southwest

If you're searching for new and precise student apparatus that vividly demonstrates

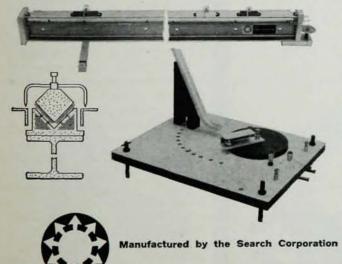
Acceleration of gravity Inertial mass vs. gravitational mass Motion under the influence of a constant force

■ Conservation of linear momentum ■ Motion of the center of a mass of a system of two coupled masses

■ Conservation of energy ■ Simple harmonic motion ■ Influence of damping coefficient on simple harmonic motion ■ Analog experiments on kinetic energy ■ Conservation of angular momentum for concentric disks ■ Angular acceleration as a function of applied torque ■

Moments of inertia about the center of a mass ■ The Ellipsoid of inertia, and many other similarly vital concepts,

these units from Macalaster are ideal.



Search Linear Air Trough

This is the only economical apparatus that precisely meets all the performance specifications described by H. V. Neher and R. B. Leighton in *Linear Air Trough*, Am. Journal of Physics (April '63). Requires only a source of clean, dry air to schedule a long varied, and significant list of experiments including the first nine of those listed above. Many accessories available.

Search Air Bearing Rotational Dynamics Apparatus

This is unique; there is no similar apparatus that provides the student with such a precise tool to perform experiments so diverse as those listed in the bottom half of the above list. A source of air — even a small paint-spray compressor — is all that is necessary to make this a most valuable addition to the classroom. Accessories available.

Descriptive data available. Send for your copy today.



Exclusive International Distribution by

MACALASTER SCIENTIFIC CORPORATION

60 Arsenal Street, Watertown, Mass. 02172

WHEN INDICATION IS NOT ENOUGH...



Get measurement with the new Granville-Phillips Ion Gauge Controller

Today with more than 20 ion gauge controllers on the market, why should you buy the new Granville-Phillips Series 236 Gauge Controller?

Frankly, this same question bothered us a year ago and we'd like to tell you why we decided to market this new control.

For some unexplained reason ion gauge controllers haven't kept pace with other sophisticated developments in electronics and measuring techniques. Such performance limiting factors as partially regulated power supplies, 5% measuring resistors, negative feedback circuits with low loop gain and battery charger type meters may have been suitable for some applications in the past, but these pressure indicators simply do not meet today's need for critical low pressure measurement. ©

So... Granville-Phillips set out to design the best gauge controller available, and we did it. The Series 236 Controller is the most versatile, accurate, stable low pressure measuring instrument available—and the price is modest too.

Look at this list of features you'll find in the 236: Pressure range 10 Torr to 10-11 Torr with one gauge tube. Automatic range switching. Continuously variable emission current. Electron bombardment degassing. Accurate low drift electrometer circuit. Plug-in solid-state circuitry. And over 30 other useful features fully described in our brochure.

Next time don't be satisfied with less. Specify the Granville-Phillips Series 236 Ion Gauge Controller.

Granville-Phillips Company
5675 EAST ARAPAHOE • BOULDER, COLORADO 80301

SEE US AT THE PHYSICS SHOW BOOTH 107-108



Center for Advanced Studies' Graduate Research Center in Dallas. Professor Johnson joined the Dallas Center in 1962 as head of its Division of Atmospheric and Space Sciences.

Dave Pandres, Jr., formerly of the Lockheed Aircraft Company, has been named to head the Theoretical Physics Section of the Douglas Aircraft Company's Corporate Advanced Research Laboratory, which is scheduled for completion late next year at the Douglas Space Systems Center in Huntington Beach, Calif.

David W. Juenker, formerly of the Department of Physics at the University of Notre Dame, has joined the faculty of the University of Vermont as associate professor of physics.

Frank R. Pomilla, formerly associate professor of physics at St. John's University, has joined the Research Department in the Geo-Astrophysics Section of the Grumman Aircraft Engineering Corp., Bethpage, N. Y.

Joseph Feinstein has been named vice president for research at Varian Associates in Palo Alto, Calif. Dr. Feinstein has been executive vice president for research of the S-F-D Laboratories, a Varian subsidiary in Union, N. J. Robert Jepsen, formerly manager of research and development in Varian's Vacuum Products Division, has been appointed to direct the company's Central Research Laboratories.

Henry Brysk, formerly an associate professor at Adelphi University, has joined United Nuclear Corporation's Development Division as manager of the Division's Theoretical Physics Section. Other new members of the Section are Martin Cohen from the Nuclear Engineering Department at Columbia University and Simon Kellman from the Lawrence Radiation Laboratory at Livermore. Joan Brooks has returned to the Section after a period spent teaching at Adelphi.

Charles J. Brasefield has retired after having served for the past ten years as chairman of the Department of Physics at Southern Illinois University. Martin J. Arvin, professor of physics at Southern Illinois and a member of the Department since 1949, has been named acting chairman. Robert C. Etherton, assistant profes-

Change. Change. That's research.



Change is at the heart of our Research and Development program. The optical font characters in the illustration above are part of a language that both people and electronic computer systems can understand...just one of an ever-growing list of scientific achievements by NCR people that have brought about many changes in such areas as electronics, photochromics, semiconductor materials, and paper

technology. All of these advances are of vital interest to business, industry, government and military agencies.

For example, because of NCR research, it is now possible to reduce a full page the size of a newspaper to a tiny rectangle of space. The reduction is made possible through NCR's photochromic microimage process. A minute area can hold thousands of micro-capsules... cell-like structures containing useful

materials produced by means of NCR's amazing chemical process of micro-encapsulation.

Perhaps your own changing interests and professional employment objectives coincide with those of NCR. If so, and you would like to be considered for positions that are now opening, write in complete confidence to T. F. Wade, Technical Placement, The National Cash Register Co., Dayton 9, Ohio.

AN EQUAL OPPORTUNITY EMPLOYER

RE

BE SURE TO VISIT THE NCR PAVILION AT THE NEW YORK WORLD'S FAIR

THE NATIONAL CASH REGISTER COMPANY



WANTED Ph.D. IN PHYSICS

Zero to six years experience. Should have experience or interest in Ultra High Vacuum Techniques, Thin Films, Surface Properties of Materials.

The research studies will be of long term in nature to determine the solid state and thin film properties of materials of interest to the Rocky Flats Division of The Dow Chemical Company. The opening will be in a new research laboratory located approximately fifteen miles northwest of Denver.

Please send resume, including salary requirements to:

THE DOW CHEMICAL COMPANY ROCKY FLATS DIVISION Technical Employment

P. O. Box 888

Golden, Colorado 80402

(Operating Contractor for the Atomic Energy Commission)

An Equal Opportunity Employer Can Consider Only U. S. Citizens sor, has returned to the Department after having been on leave of absence while completing his work toward a PhD at Michigan State University. Gerald P. Alldredge, who also recently completed a degree at Michigan State, has joined the Southern Illinois Department as an assistant professor.

New promotions in the Department of Physics at the University of Tennessee include those of William M. Bugg from assistant professor to associate professor and of Edward G. Harris and Isabel H. Tipton from associate professors to professors. Carl O. Thomas, formerly of the Bell Telephone Laboratories, has joined the Department as associate professor. He will also be assistant dean of the Graduate School at Tennessee. Other new appointments in the Physics Department include those of Arthur A. Mason from the University Space Center in Tullahoma, Tenn., and Owen C. Eldridge from General Atomic in San Diego, as assistant professors; Harry C. Jacobson, who recently received his PhD from Yale University is now a research associate at Tennessee. Loucas G. Christophorou, of the Oak Ridge National Laboratories, and Kenneth Fox from Vanderbilt University have been appointed visiting assistant professors in the Tennessee Department.

John DeVelis, formerly of Boston University, Huoo-Long Fann, formerly at the University of Maryland, and Anna Mae Walsh, formerly of Fordham University, have joined the Department of Physics at Merrimack College as assistant professors. New instructors in the Department include Henry Atlas, previously associated with Science Associates in Portland, Me., and William Kennedy from Boston University.

Several new faculty members in physics and astronomy have joined the Case Institute of Technology. Lukas Plaut has been appointed visiting professor of astronomy. He is on leave of absence from the State University at Groningen, the Netherlands. New assistant professors of physics at Case include Michael H. Coopersmith from the University of Chicago, Mangalam A. Nagarajan, formerly of the University of Maryland, Edward A. Silverstein from the University of Wisconstein from the University of Wisconstein

sin, and Robert M. Woods, Jr., formerly of the University of Michigan. Iza R. Goroff, formerly of the Laboratories of Applied Sciences at the University of Chicago, and Donald I. Garber, who recently received his PhD from Case, have been named instructors in physics. Harvey S. Leff and Philip L. Taylor, formerly research associates in physics at Case have been promoted to assistant professors.

Robert E. Rowland has been appointed associate director of the Radiological Physics Division at Argonne National Laboratory. Dr. Rowland, who recently received his PhD from the University of Rochester, served as a physicist at Argonne from 1950 to 1962. Thomas H. Fields, professor of physics at Northwestern University and associate physicist at Argonne, was named director of the Laboratory's High-Energy Physics Division. He will continue to teach at Northwestern.

Charles R. Legendy from Cornell University and Henry C. Abbink from Iowa State University have joined the Applied Science Department of the United Aircraft Research Laboratories in East Hartford, Conn. Other new additions to the staff of the Department include Melvin P. Shaw, formerly of Case Institute of Technology, and Michael J. Brienza from Notre Dame University.

Bruno J. Zwolinski, professor of chemistry and director of the Chemical Thermodynamic Properties Center at Texas A & M University, has been named head of the University's Department of Chemistry. He succeeds Paul K. Calaway who will return to full-time teaching duties and serve as the Department's chairman of instruction.

Jane Slezak, who recently received her PhD at Rensselaer Polytechnic Institute, has joined the Chemistry Department at the College of Saint Rose in Albany, N.Y., as an assistant professor.

Frederick H. Gaskins has recently joined the staff of the New Concepts Division of the US Army Chemical Research and Development Laboratories at Edgewood Arsenal in Maryland. Dr. Gaskins, who is also a group leader in rheology at the Arsenal, was formerly a project leader at Aeroprojects, Inc., in West Chester, Pa.