

placing physicists in many jobs because physicists are overspecialized and prefer to remain so. Meanwhile different companies are exploring different ways to avoid obsolescence in specialized technical and scientific personnel. Employers have many suggestions for universities. Principal among them is the recommendation that the physicist gain a broad education and become aware of practical problems that need solution.

Copies of the report (AIP Pub. No. R 224) are available from Back Numbers Section, AIP.

McElroy Reorganizes NSF, Which Will Have 4 Assistant Directors

Director William D. McElroy has reorganized the National Science Foundation to meet the requirement of the NSF Act of 1968. All existing activities will be apportioned among four assistant directors, who will be responsible for the general areas of institutional programs, education, research and national and international programs. McElroy has named acting directors to serve until President Nixon makes the four appointments. He also announced that Louis Levin will perform the functions of deputy director temporarily.

AIP Survey Will Study Jobs Held by Recent Physics PhD's

The American Institute of Physics Education and Manpower Division is surveying recent physics PhD's to determine how closely present employment matches job goals. A questionnaire, prompted by the recent concern about the physics job situation, is being sent to those physicists whose response to the graduate-student survey (PHYSICS TODAY, March 1969, page 53) indicated that they expected a PhD in the years 1967-69.

Susanne Ellis and Arnold Strassenburg who are conducting the survey, have chosen their questions with an eye to results from previous employment studies. Many respondents to previous surveys, for example, held temporary jobs, and AIP now expects to determine whether these jobs were accepted by choice or necessity.

Those physicists surveyed will be asked to detail their education, military service, present employment and job offers. Among specific facts re-

quested are ratio of job offers to applications, relation of present job to training, and number of positions held since PhD was received. The questionnaire was mailed in December.

U. of Penna. Compiles Catalog Of Extragalactic Variables

Photocopies of individual cards from a card catalog of optically variable galaxies and quasars are available from the catalog compiler, Benjamin S. P. Shen at the University of Pennsylvania. Observational data and references are listed for each of about 50 objects; the number is readily increasing. Shen asks authors to provide him with copies of relevant new publications. Details are available from the Department of Astronomy, University of Pennsylvania, Philadelphia, Pa. 19104.

Union Carbide, AEC Support Negro Technical Education

The Atomic Energy Commission is extending its cooperative education program at AEC facilities to six predominantly Negro colleges in Washington and the South. Each school will nominate six students, who will begin work the summer that they graduate from high school and then spend alternate quarters at school and at work. The jobs are provided by Union Carbide's Nuclear Division at the Oak Ridge National Laboratory, Oak Ridge Gaseous Diffusion Plant, and the Y-12 Plant at Oak Ridge.

International Group Aims at Long-Term Weather Forecasts

A committee of the National Research Council proposes US participation in the Global Atmospheric Research Program, a ten-year international effort to improve long-range (more than four- or five-day) weather forecasts. The report recommends large-scale and regional atmospheric studies, a Pacific test of a global weather-observing system and, to improve numerical models of the atmosphere, experiments on energy exchange between the atmosphere and its surroundings, such as the ocean.

X-Ray Emitting Electronic Tubes Ordered Off Market

The Environmental Control Administration has ordered off the market

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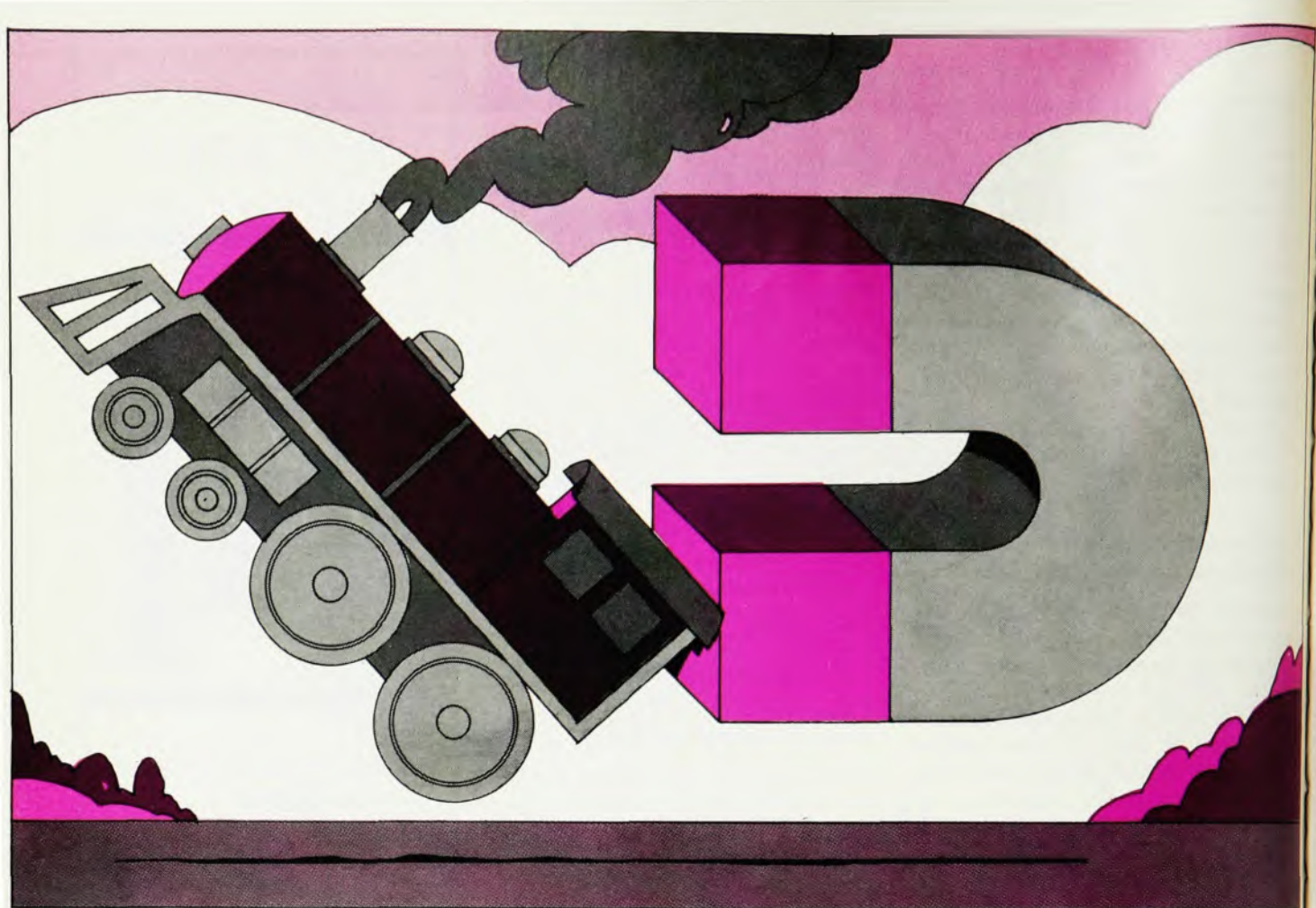
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Rare earths for better magnets

Scientists at Bell Laboratories have cast some of the most powerful small magnets ever made... from new materials containing rare earths. The new materials, alloys of cobalt, copper, and samarium or cerium, have the highest known intrinsic coercive force (field required to reduce intrinsic magnetization to zero). So, they make excellent permanent magnets.

It often requires very high magnetic fields to completely magnetize intermetallic compounds of samarium, cerium, and other rare-earth metals in certain crystal directions. While iron may require fields of hundreds of oersteds, and cobalt probably ten thousand (depending on grain orientation), compounds of rare-earth metals may need up to 200,000 oersteds. To students of magnetism, this indicates a material of high coercive force.

In practice, however, it is difficult to calculate coercive force accurately because the process of demagnetization in these alloys is not well enough understood. Predictions are often higher than what is realized. But we do know that very small grains tend to produce higher coercive force. Also, the better the grain alignment in a favorable magnetic-field direction, the higher the magnetic flux.

By taking a new approach toward the best grain size and alignment in pieces of samarium- or cerium-cobalt, E. A. Nesbitt and his colleagues at Bell Laboratories produced a magnet having a coercive force of at least 28,700 oersteds. First, they combined essentially non-magnetic copper-samarium with a magnetic material, cobalt-samarium, into a new alloy possessing a solid mass of very fine grains. Then by

cooling the melt rapidly in one direction, they produced long, thin crystals along which desirable magnetic properties tend to align. Finally, they annealed the material at about 400° C.

The highest coercive force is reached in a composition ranging from $\text{Co}_{3.5}\text{Cu}_{1.5}\text{Sm}$ to $\text{Co}_3\text{Cu}_2\text{Sm}$. Excellent permanent magnets can also be made by using cerium, which is cheaper than samarium.

Today, commercial permanent-magnet materials have intrinsic coercive forces below 5000 oersteds. The high forces achieved in the new materials permit practical strong magnets in small shapes, such as discs. Such shapes would be ideal for, say, miniature d-c motors.

From the Research and Development Unit of the Bell System—



Bell Labs

three types of electronic tubes, used for high-school and college classroom demonstration of fluorescence, heat and magnetic-deflection effects. It was the first Administration directive issued under the Radiation Control for Health and Safety Act. The tubes were manufactured by Electro-Technic Products of Chicago. 27 of 175 tested were found to emit x rays from 100 to more than 5000 milliroentgens per hour at a distance of 12 inches.

IN BRIEF

Distribution of 8.2 kilograms of lunar rocks and dust to scientific investigators around the world began on 12 Sept. Samples are going to 106 principal investigators in the US and to 36 in eight other countries.

New facilities at the NASA Lewis Research Center in Cleveland include a vacuum chamber 30.5 meters in diameter and 33.5 meters high in which vacuums of 10^{-8} torr (about that found at 480-km altitude) can be held, and a stand capable of testing engines up to 100 000 pounds of thrust in simulated space conditions.

At Stevens Institute of Technology, a \$670 000 Departmental Science Development grant from NSF will be used to add six physics faculty, support some other department members and buy equipment. The Cryogenics Center has taken over a three-story building converted for its exclusive use; John G. Daunt is director.

Three manufacturers of cryogenic equipment recently disclosed their consolidation. They are Sulfrian Cryogenics of Rahway, N. J., Dacatone Fabricators of Linden, N. J., and Andonian Associates of Walham, Mass.

Twenty fellowships for summer 1970 seminars on teaching science to non-science majors are available at Stanford. The contact is Paul D. Hurd, Director, Shell Merit Program, School of Education, Stanford University, Stanford, Calif. 94305.

Continuing-education programs for research scientists in large laboratories are surveyed in a new National Science Foundation Report, "Continuing Education for R&D Careers." Copies are available from the Government Printing Office. □

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