letters

The job situation—more views

As a physicist who has been on both sides of the job interview desk in the last three years, I would like to make some observations about the employment situation that appear to have escaped general comment.

First, the extent of the employment crisis depends upon the physicist's area of specialization. The number of positions available for an experimental solid-state physicist is not the same as the number of positions available for a high-energy theorist. Yet the available statistics and projections are concerned with total positions open and total physicists available. From some impressions gleaned from posted listings I am suggesting to my graduating seniors experimental research in the areas of observational astronomy, laser optics, plasma physics, and solid-state physics as the best opportunities for future employment. A projection of future employment by research specialization would be very helpful in counseling prospective graduate students.

Second, most proposed solutions of the unemployment crisis within the physics community are aimed at the new PhD just entering the employment market. These are supposedly the most creative members of the physics community. If the physics community can not accomodate this influx of creativity, it will lose that vigor and adaptability which is the justification for its industrial and government support. Recent surveys have shown little hope of large-scale employment for physicists in interdisciplinary and "physics-related" fields. Yet within the academic community there are many unfilled positions open to physicists. These positions, college and university presidencies and deanships, are as available to physicists as to members of any other academic discipline, but physicists do not seem to be actively seeking these positions. For example, of approximately 200 applicants for the position of dean at our college only one was a physicist. Of course, the new PhD would not be considered for such positions, but the older established members of the physics community would. In general, each physicist who moved into college administration would leave behind a position for a younger physicist.

Third, any estimate of future physics employment that assumes a constant number of physicists employed by small private colleges is unduly optimistic. For the small, private college, physics is a traditional but usually expensive luxury. In many such colleges one or two physicists teach upper-division courses to three or four majors. This type of teaching is very expensive, and with the present financial squeeze on small, private colleges many schools are economizing by reducing physics staff and program. In this area at least two colleges have reduced their physics staff by 50% or more in the last year. Moreover, the number of small private colleges that are closing is increasing. Each such closing reduces the numbers of employed physicists without a compensating increase in some other school.

Fourth, the present umemployment crisis is not limited to physicists. It is unrealistic to suppose that the unemployment situation will improve for physicists unless it also improves for the engineers, chemists, mathematicians, and other scientists seeking employment. Thus it appears that some type of coordinated effort with the professional societies representing these other groups is necessary, if the technological employment crisis is to be solved.

George H. Jirgal
Park College
Parkville, Missouri

•

Obviously you don't need another letter telling you how bad the employment situation is for physicists. Indeed I think that there has been so much in *physics today* on this subject that the picture being painted is blacker than it should be. I am concerned here about highly qualified undergraduates who are physics majors and who upon reading *physics today* might be scared from the field. The facts are that outstanding PhD graduates still have job offers, and indeed both universities and industrial organizations are still bidding (some at pretty fancy starting salaries) for such outstanding graduates.

For example, the organization of which I am a part has been trying to hire a small number of physicists, and invariably those to whom we tender an offer have two or three other offers either from universities or other industrial organizations. I can only take this to mean that the young men whom we feel are outstanding are found to be attractive to other organizations as well. Furthermore, these other organizations have openings for such people.

Again, I am not trying to say that there exists no employment problem for physicists, but I do make a plea for not painting the picture so black that we chase away those people who rightly belong in physics and who will make a contribution to it and to society through their physics.

M. Berger
Esso Research and Engineering Co.
Linden, N. J.

•

Put two or more young PhD physicists together and they whimper about the wretched employment situation. Perhaps physicists not personally seeking employment wonder at the distemper of their youthful colleagues. Consider my experience.

Callously exploiting the typing skills of my wife, I sent personal letters to the

Here are five ways to handle pulse height analysis. All of them are probably better than what you're using now.

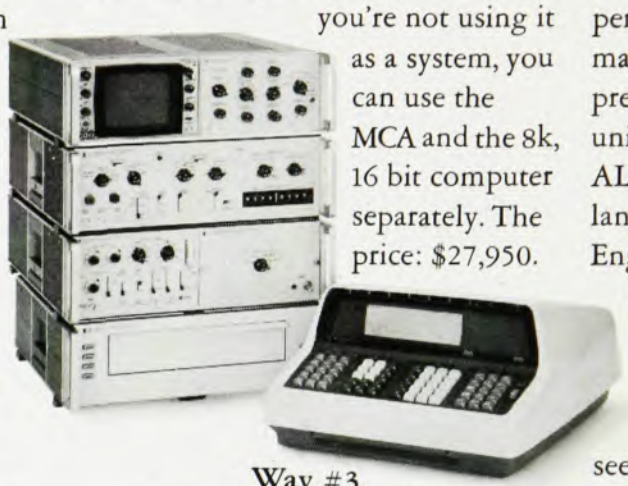
HP's nuclear systems provide capabilities you're just not going to find anywhere else, whether you're looking for a straight-forward multichannel analyzer or a system with the most sophisticated data reduction capabilities.

Way #1

Our basic MCA, the 5401B, includes 8192 channel ADC; 1024 channel memory, expandable to 8192; scope display. It's extremely accurate, stable and fast. Use it for pulse height analysis, multichannel scaling and noise measurements (sampled voltage analysis mode). Signal averaging and remote control are available. This is the best MCA on the market and the price is just $10,600.

Way #2

Have a computer control your MCA and data reduction. Our 5402A MCA/BASIC system uses a simple easy-to-learn language, yet adds new versatility and convenience to automation of measurements. It also gives you a powerful tool to develop new data analysis techniques. When you're not using it as a system, you can use the MCA and the 8k, 16 bit computer separately. The price: $27,950.



Way #3

A calculator-controlled system, the 5403A, performs computer-type functions without computer-type costs. Automate data accumulation and reduction with programs you can learn to write in an afternoon. Or use the programs we furnish. The 5401B MCA and 9100A Calculator can also be used independently of one another when system functions aren't needed. It's all yours for $19,600.

Way #4

The 5406B Nuclear Analyzer System, the most versatile and complete computer system for nuclear applications. Tailor the number of ADC's, memory size (from 8k to 32k), the input and output peripherals, use of magnetic tape, magnetic disc, etc., to your needs present and future. Write your own unique applications program in ALGOL, FORTRAN, or Assembly language. Your HP Systems Sales Engineer will help you pick the best configuration for your particular application.

Way #5

Your system. If you still don't see what you want, call your nearest HP field engineer. Together you can work out the specific system you need. We've got lots of possibilities.

Bonus

Our 5586A Spectrum Stabilizer. Eliminate the need for routine calibrations with this NIM module without sacrificing accuracy or system reliability. It costs only $2400 and it's easy to use. Just plug it into the HP 5580B NIM Power Supply. Check with your HP Sales Engineer for complete information about this and other NIM products.

Or write Hewlett-Packard, Palo Alto, California 94304; Europe 1217 Meyrin-Geneva, Switzerland.

020

HEWLETT hp PACKARD

NUCLEAR SYSTEMS

chairman of the physics departments at 67 colleges and universities. Along with the letter, I sent a multilithed resume and three-page description of four rather unusual courses I wish to develop (e.g. physics of music and physical aspects of ecology). Five years ago, with my background of a PhD from Berkeley and two years postdoctoral research experience, one in England and one at Cornell, I could have expected numerous enthusiastic responses. Instead, this year, 11 schools have not bothered to reply—even after six weeks. Among the other 56 schools, I have uncovered exactly three full-time faculty openings.

There are many ways to say "no openings," of course, ranging from the uplifting and pleasing, "such a fine application that it stands as a model of its kind," from Mt. Holyoke, through an amiable, tidy, thoroughly acceptable form letter from lonely little Eastern Montana College, to a rather shabby form letter from an Eastern university in which inappropriate paragraphs were scribbled out. Nevertheless, I have received my responses in comparative dignity—colleagues have received disgracefully public mimeographed postcards.

Edward Dickson
Cornell University
Ithaca, New York

•

This letter describes three aspects of my recent job-finding experience: the search, contacting my congressman, and an anecdote. They all point to the same conclusion: The situation is desperate.

When I found out in late August of 1970 that my job was to terminate, I wrote a personal letter to many of the scientists and laboratories in the world engaged in atomic-collision work—a total of 120 letters—50 in the US and 70 in 20 countries abroad. That such a massive campaign was necessary is evidenced by the statistics of the response to date (mid-February): 79 absolute rejections, 6 applications with award dates too far in the future, 15 interested inquiries, and 20 who did not bother to respond at all. Of the 15 interested inquiries, about half followed up with a call or second letter, and I finally received several offers, one of which I have accepted (in France). All but three of the 15 positive responses were from abroad. Of the three positive responses in the US one was a remote possibility for September, and the other two were postdoctoral possibilities that were showing no signs of turning into offers after five months of correspondence. In short, the current adage, "leave physics or leave the country," is apt in my case. I shall begin work in France in early summer, after half a year of unemployment. I am, of course, delighted to have a job, but the situation overall is clearly desperate. Had I been unwilling to leave the country I would either have had to continue on unemployment compensation and food stamps, or find a nonphysics job.

I discussed the employment situation for scientists with Congressman Donald Fraser of Minnesota's 5th district in a rather lengthy conversation in January and in subsequent correspondence. He is deeply interested and concerned. He has, among other actions, sponsored legislation to establish a National Economic Conversion Commission. Congressman Fraser has indicated that he would appreciate further information concerning unemployment of scientists and engineers. Readers having such information or suggestions for improvement (I suggested doubling the NSF budget!) might write to Congressman Fraser, House of Representatives, 1111 Longworth, Washington, D.C. 20515. Perhaps we can convince Congress of the gravity of the crisis, of the deleterious long-term consequences of the situation, and of the necessity for action now.

I placed a "positions wanted" classified ad in the October 1970 issue of *physics today*. I awaited with eager anticipation the deluge of letters offering me a position. None arrived for six weeks after the ad appeared. Finally I received a solitary reply. I excitedly opened it, to find a resume and letter from the director of research of a large company. He had apparently misread my ad and was applying for "the position." That letter was the only answer to my ad; it was hardly worth $50 to find out that someone else was also out of a job!

Alfred S. Schlachter
Minnetonka, Minn.

•

I have recently received a letter from the National Science Foundation regretfully informing me that my application for a postdoctoral fellowship has been turned down. The letter also contained some statistics that lead to an interesting exercise in arithmetic.

The letter stated that 1546 applications were reviewed by a panel of 117 "leading" scientists, engineers and mathematicians. Of these only about 1/9 could be awarded fellowships. This presumably means that about 172 fellowships were awarded. Since these fellowships usually carry an annual stipend of about $6000, which is barely enough to live on, the cost of the program was about $1 056 000, or about 1/500 of the NSF annual budget of $500 million. If every applicant had been awarded a fellowship, it would have cost $9 276 000, or less than 1/50 of the annual NSF budget. I assume that the difference of $8 220 000 could not be diverted to fellowships because it has already been allocated to such absolute necessities as summer salaries and travel to European meetings. I believe that the amount spent on fellowships is an indication of where, on their list of priorities, agencies such as the NSF and AEC place younger scientists who are trying to survive in today's disastrous job market. "Where their treasure is, there shall their hearts be also."

Robert J. Yaes
Illinois Institute of Technology
Chicago

•

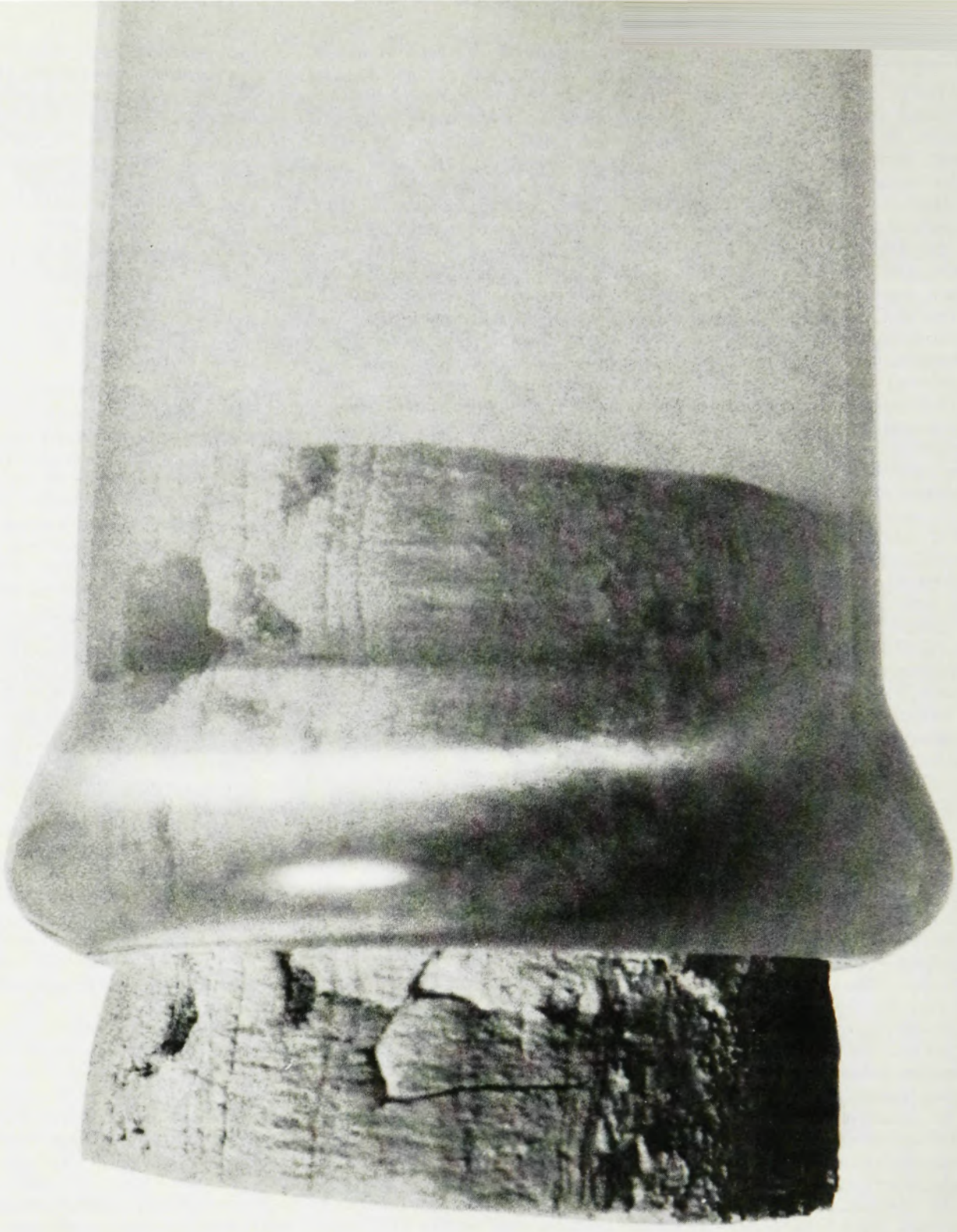
It seems that in the current discussion of the unemployment situation, a critical reason for the apparent overproduction of PhD's in physics has been overlooked. The current structure of physics research in the US guarantees a rate of increase of PhD's of the order of 10% per year in order to function. To illustrate this point, consider the following mathematical model of PhD production. Assume that 25% of all US PhD's in physics are employed as graduate professors at PhD-granting institutions. Further assume that each professor advises, directs, or otherwise assists one graduate student to get a PhD every two and one-half years, on the average. Simple arithmetic reveals an increase of 10% per year in the number of PhD's.

Let us examine the two assumptions for validity. The 1968 Manpower survey[1] revealed that 50% of all PhD's in physics were employed by academic institutions. To assume that one-half of these are graduate professors seems conservative in view of the large sizes of the staffs at most PhD-granting institutions.

Since the total graduate enrollment in physics amounts to about twice the total number of physics PhD's in education,[1,2] and since the average physics graduate student requires about five years to obtain a PhD, a figure of four PhD's per active graduate professor per decade seems reasonable. The number of first-year graduate students[2] each year is approximately equal to the number of graduate faculty members,[1] I have assumed. Even allowing for substantial, say 60%, attrition, a figure of four PhD's per decade is easily attained.

Thus if the production of PhD's in physics is to be cut much below the current 10% per year increase, a considerable restructuring of the physics community must take place. Either far fewer PhD holders must be engaged in the reproduction, or self-replication, of PhD's in physics or else each individual engaged in reproducing physicists must produce fewer offspring. Otherwise the population of physicists will explode beyond any reasonable demand, creating vast unemployment.

Neither of these conditions appears likely to occur without considerable



Our helium does nothing 0.0004% better.

We guarantee it to be 99.9999% pure. Better than any current government specification.
You can use it for chromatographic separations, even without further purification. And when the analysis comes out 2 parts per million Nitrogen you can be sure it's in the sample. Not in the carrier gas.
So if you'd like to find out more about how our helium does less, just call Hank Grieco at (201) 464-8100. Or write to him at Airco Industrial Gases, 575 Mountain Avenue, Murray Hill, New Jersey 07974. Where we do a lot to make sure our helium doesn't.

AIRCO
Industrial Gases

changes in the current structure of physics education and practice. The number of physicists engaged in education, particularly at PhD-granting institutions, is likely to grow, because the institutions are growing rapidly and because the PhD degree seems to be spreading to many new institutions. In any case, tenure regulations prevent any sizeable decrease in the numbers of professors.

Currently the bulk of US physics research is being done at universities, particularly at the large PhD-granting institutions. "Publish or perish" remains a fact of life in these quarters. In order to do this research, technical assistance is needed. Someone must do the calculations, design and build the apparatus, run the experiments or the computer and so on. This is usually the job for the graduate student, who willingly trades technical assistance for a chance to learn. Eventually, however, the graduate student attains his degree. So, another graduate student enters the laboratory or research group. If there is a sharp reduction in the number of graduate students, this supply of technical labor, which not only does research but grades papers, teaches lab sections and so on, assuming a considerable fraction of the teaching load, will be gone. It is not clear how, in the absence of the labor force, the current level of research and teaching will continue. Yet the production of PhD physicists must be cut for the good of the profession. We can not continue to grow at ten times the population and three times the GNP.

Somehow the doing of physics, that is, basic research, must be separated from the producing of new physicists. After all, most doctors practice medicine somewhere other than medical schools and most lawyers practice law outside the law school; but most physicists do their physics in the physics school, a habit that inevitably leads to overproduction of the species.

The big question is: How can we restructure the physics community so that research proceeds without necessarily producing hordes of new, probably unemployed, physicists?

References

1. *physics today*, October 1969, page 48.
2. *physics today*, March 1971, page 70.

Albert R. Menard, III
University of Florida
Gainesville

In defense of tenure

It was most distressing to find the February 1971 annual meeting of the APS and AAPT torn with angry accusations by those who cried out repeatedly that someone else should have done something to anticipate the events that trouble us today. In many sessions physicists were urged to take up the fight against pollution, to save the environment, to lend their talents to the fight against injustice, and in this period of a shortage of jobs, physicists were urged to refuse to accept jobs in government laboratories directly or indirectly involved in war-related projects.

The incredible climax was reached in a contributed paper in one of the sessions on Thursday afternoon, when a younger member of the community was delivering his prescription for steps he recommended that the community must take in order to improve the job and employment situation. One of the things he recommended was the elimination of academic tenure, or possibly reducing tenure to periods of seven years at a time. He spoke of wanting to get rid of bad teachers and of other academic deadwood. I listened in amazement as this aspiring "academic type" revealed his limited understanding of the basis and reason for academic tenure. Since I have never before heard tenure attacked in an APS meeting, I can only presume that the attacks coming at this time are motivated by a desire to fire older people to open their jobs for younger faculty, many of whom would then want to use their new academic positions to lead crusades against all of the evils in the society. Let me present some observations to suggest that the recommended cure would be worse than the disease and that those who now recommend the abolition of tenure would become the most outspoken defenders of academic tenure if they had the academic positions to which they aspire.

Many students today believe that tenure is a clever job-security gimmick achieved by a tight union of selfish, self-serving faculty who have thus achieved the ultimate in a "free ride." I have found that students are quite genuinely amazed to learn that academic tenure is the keystone of academic freedom. It guarantees an academician the right to make known the results of his investigations and studies without fear that he might be fired because of pressures generated by those who feel they might be threatened by the results of his investigations. I have worked for over 15 years in trying to solve environmental problems in my community, and I know that this urgent work often arouses the ire and anger of powerful establishments who would like nothing better than to be able to call up the University and say "fire those troublemakers!" Academic tenure protects us from retaliation as we seek to use our skills and abilities to voice and to implement a humane and conscientious concern for the welfare of mankind. It is perhaps growing more common

CRYOGENIC
Temperature Controller

Model 5301

Accurate temperature control in Research Dewars, Cryogenic Freezers, Tensile Cryostats for physics, chemistry, metallurgy and other scientific fields where the process, temperature and/or control requirements change frequently. System features control stability better than .01°K from below 0.3° to 320°K with less than one microwatt power dissipation in the sensor. Three mode control: Proportional, rate and reset with internal parameter controls, allowing to tune the controller to thermal characteristics of the system. 100 watts output, short circuit proof, DC for minimum interference to other low level instrumentation.

artronix
INSTRUMENTATION
716 Hanley Industrial Court, St. Louis, Mo. 63144
Area Code 314 Phone 644-2456

PROGRAMMER

Model 5350

The Model 5350 Programmer is an electromechanical function generator, consisting of a digitally controlled servo-system driving a 10 turn potentiometer at a wide range of sweep rates. The Programmer finds application in the process control field with other instrumentation, whose output is controlled by a resistance or resistance ratio, such as powersupplies, magnetic generators, audio or RF oscillators as well as temperature, deposition-rate, vacuum and similar controllers.

artronix
INSTRUMENTATION
716 Hanley Industrial Court, St. Louis, Mo. 63144
Area Code Phone 644-2456