

Six months among the cannibals or finding a job in physics

In the current job market in physics, there are more and more physicists looking for fewer and fewer academic positions. Here is a summary of what I learned about competing in this market during my own successful job search in 1972-73. My advice mainly concerns applications for "teaching" positions (perhaps offering some research possibilities), rather than "research" positions.

In this competitive market, the key principle is to make yourself stand out above others. The first step is of course the preparation of a curriculum vitae. Consider having yours professionally done, but at any rate ask somebody who sees a lot of them to criticize yours. An academic resume should contain at least:

- ▶ Your name
- ▶ Personal data such as age, marital status, number of children
- ▶ Home and office addresses and telephone numbers. It is best to list an office phone that will be manned all day.
- ▶ Education, listing degrees, names and addresses of institutions, dates of attendance, major fields.
- ▶ Record of employment, listing dates and names and addresses of employers.
- ▶ Description of your areas of competence and experience.
- ▶ List of publications.

The single best piece of advice in starting a job search is to start early. If you see the handwriting on the wall, don't wait until the last minute. At least one full year should be allowed, and plan to spend a considerable fraction of your time on the effort. It would be even better to allow two years; the first to look for the position you would like to accept; the second to look for the position you have to accept.

There seem to be approximately 150 ± 50 academic positions in physics in the US opening per year, and about 1500 ± 500 job-hunters, including a growing pool of "underemployed" who failed to find satisfactory positions in previous years. For most positions there will be about 300 applications (the lowest number I came across was 40; the highest, 750). These applications are typically reviewed by a search committee of about five members, not all of whom are necessarily physicists.



Each member will be assigned a stack of applications to review, with some overlap among committee members, and will flag some as being interesting. The committee as a whole will review a total of approximately 20 such selected applications (the "magic circle"). Letters of reference will be obtained for this select group only, and even here there are enough applications so that several may be dropped if the letters of reference are not received reasonably quickly. From this group, about four or five people (the "double magic circle") will be invited for interviews.

The first thing your application must do for you is to get you into the magic circle. The "magic circle" for teaching positions is usually selected on general qualifications with an emphasis on teaching qualifications, so your application must convey your interest, energy and experience applied to teaching. Any sign that your letter of application is the same one you send to other places almost surely means instant death for your chances. The letter should be individually typed and contain appropriate references to the name and character of the institution, the nature of the position for which you are applying and your particular qualifications for

that position. Your letter or curriculum vitae must contain something that will stand out and catch someone's eye, such as Physics Workshop, use of Keller Plan or other innovation, educational publications, development of new courses, good ratings from a student-run faculty rating system, administrative or industrial experience, and so on. If at all possible, plan your teaching activities with this in mind. Teach a lab course, or a geology or astronomy course, but do something different to distinguish yourself from the vast majority of applicants who have taught the same old courses in the same old way. If no one on the search committee finds your application out of the ordinary, you are done for. In this sense, preparation for your application should begin three or four years ahead of time.

The magic circle seems to be chosen primarily on the basis of general teaching ability and experience, plus something sexy. To get from there to the double magic circle, you must fit the specific needs of the institution. For instance, some, but not all of the places that say "equal opportunity" or the equivalent really mean it (the ones that do mean it seem to be in danger of losing money if they don't increase the percentages of women and minority group members). The great majority of job descriptions do not fully explain the requirements. This seems to be because most search committees do not comprehend the number of applications they will receive, and start out by trying to encourage everybody to apply. They end up, of course, being extremely selective. Therefore, in almost all cases you should call the department and speak to someone on the search committee before you write your application, to find out what they are really looking for. Incidentally, the person you speak to will usually complain about the number of applications, and expect your sympathy. Most such people, however, are quite willing to talk about what they are looking for in an application and to discuss your qualifications. Some factors that typically influence promotion to double magic status are:

- ▶ Are they looking for someone to teach a specific course or type of course (level, subject matter, and so on)?

Question: What is a digital delay generator?

Answer: A test instrument that provides precise time delays in digital increments.

Question: Who makes them?

Answer: Berkeley Nucleonics Corporation.

Question: What are the delay increments?

Answer: 1 ns, 10 ns and 100 ns.

Question: How long a delay can I get?

Answer: Up to 10 secs, fully programmable.

Question: How accurate is the delay?

Answer: Up to 0.1 ns.

Question: What is the jitter between my trigger and the delayed pulse?

Answer: As short as 100 picoseconds.

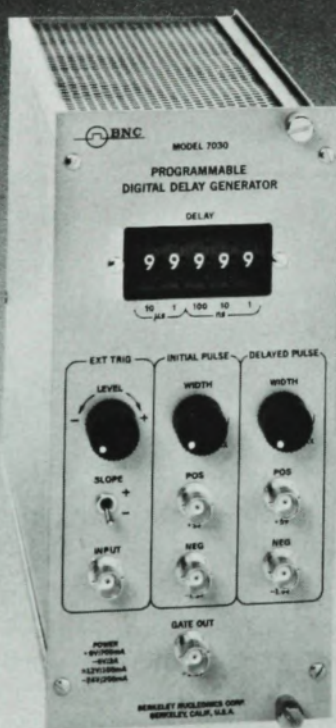
Question: What do the instruments look like?

Answer: See photos below.



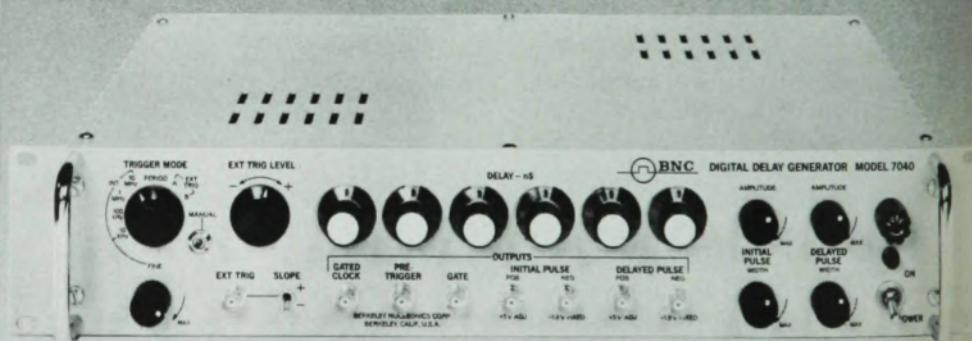
Model 7020

100 ns increments, delays to 10 secs, price \$850.



Model 7030

1 ns increments, jitter less than 100 picoseconds, price \$1950.



Model 7040

1 ns increments, delays to 1 millisc, price \$3150.

Question: How do I get more information?

Answer: Phone (415) 527-1121 or write:



Berkeley Nucleonics Corporation

1198 Tenth Street, Berkeley, California 94710

Circle No. 9 on Reader Service Card

letters

The old bit about physicists being flexible is inoperative here—there will be good applications from people who have taught the stuff before, so why take a chance on someone who has not had the experience?

► Does your research fit in with any of the programs in progress or contemplated? Most colleges and universities have at least some members of the department doing some research. They are proud of this research and would like company. If you don't fit in exactly, a strongly expressed willingness or desire to change fields *may* help your standing. On the other hand, if there is no research, you should not overly stress your commitment to research, if you want the position.

► Experimentalists have a large edge if any lab course or demonstration development is involved, since everybody thinks they can make equipment work. On the other hand, theorists can carry out a research program with fewer resources.

As the applications pile up and it becomes clear that there will be more than enough highly qualified possibilities, the committee will start to choose among them using these criteria. After seeing this pattern time after time, I adopted the procedure of keeping in touch with each committee that ranked my application fairly high, and of sending supplements to my original application whenever I felt the selection criteria were tightening significantly. I do not know whether this helped or hindered my standing with committees, and it does involve a great deal of effort, but it is certainly something to consider doing.

Some of the restrictive employment patterns that held in the recent past seem perhaps to be breaking down under the pressure of the current job market, and in many cases are no more than myths now. In particular:

Myth 1—You can't climb back up the ladder

A fair fraction of the applications for many positions appears to come from people who have fallen several rungs down on the academic prestige ladder and are trying to climb back up. Several years ago the convention was that you can't climb back up, but now these applicants are quite competitive. There seems to be an increasing awareness on the part of the search committees that qualified people may have been forced down the ladder by the job market, and an increasing tendency to judge applications on their merits, rather than by the institution's name on the letterhead. Also, applicants standing on the lower rungs usually have secure positions. This gives them a psychological advantage—no-

body is trying to get rid of them.

Myth 2—You can't come in from the cold

Many physicists in industry apply for academic positions and they can also be quite competitive. Departments are becoming interested in teaching industrially valuable skills to their students, to increase the viability of the department. Even if the department has an idea of which skills might be industrially valuable, someone who has such skills and some industrial contacts can look quite attractive.

Job hunting is extremely time-consuming. Each application involves a good deal of effort. You must file a lot of applications to increase your statistical chances. I found that the number of applications I could file (about 50) was limited not by the number of positions I could find to apply for but by the amount of time I could spend on the process. Teaching, research and personal commitments were ignored or put off for as long as possible, but time was still the dominant factor.

There are many services available to help you in job-hunting, and using them can increase the effectiveness of the time you spend. Some of them charge fees, and that can make them seem unattractive. However, subscribing to all of those listed below would not end up costing more than \$100, and if one of them finds the position you end up accepting, it is money well spent. There are other services than those I have listed here and I do not claim to have found the best.

► For postdoctoral research positions, there is of course, the AIP's Physics Postdoctoral Information Pool with a \$15 registration fee. It circulates lists of positions open and of applicants and provides a matching service, matching applicants to positions. Contact the American Institute of Physics.

► EES, P.O. Box 3477, Eureka, California 95501. For \$12 a year they will send you regular lists of teaching positions uncovered by their search, as well as listing places that have no positions. The job descriptions are as complete as any, and they find a lot of positions.

► The American Association of Community and Junior Colleges operates the AAJC Career Staffing Center, P.O. Box 298, Alexandria, Virginia 22314, which for \$15 per year will circulate your qualifications among its 900 member institutions and in addition send you a list of open positions in community and junior colleges each March.

► The Education Exchange, Box 392, Newtown, Connecticut 06470, provides several services for fees. They will prepare your curriculum vitae and reproduce it (but you can usually get the department to do that if you are being

BELOW 1°K... no place to guess

SHE instruments for cryogenic thermometry take the guesswork out of ultra-low temperature measurement.



SHE has gone a long way toward simplifying cryogenic thermometry, especially in the region below 1°K. Consider our completely new, low-dissipation Model ARB automatic resistance bridge for use with almost any standard resistance thermometer:

- Unique, self-balancing circuit
- Direct reading digital display
- 0.5% accuracy at 10⁻¹³ watt
- Full-scale from 200Ω to 2MΩ
- Linear analog output
- Price: \$1,350

If your requirements include ultra-low temperatures (down to 0.003°K), then the SHE SQUID/CMN thermometer system provides reliability, sensitivity, and easy operation. Check these features:

- Miniature powdered gold-CMN thermometer
- Wide range—from 2°K to 3 mK
- High resolution, typically ($\delta T/T$) < 10⁻⁴T (e.g., 10ppm at 0.1°K)
- Shielded Construction allows use in static or varying magnetic fields up to several kilogauss
- System prices start at \$2,800

SHE also offers the only commercially available *primary* thermometer for temperatures below 1°K—the Model NVS SQUID noise thermometer. And for the ultimate in ultra-low temperature work, ask us about the new Instruments for Technology, Ltd. Model PLM-2 self-calibrating platinum pulsed NMR thermometer.

Send for our Applications Notes on Cryogenic Thermometry. You will discover new techniques and new apparatus to measure low temperatures—accurately and easily.



SHE CORPORATION

CRYOGENIC INSTRUMENTS AND SYSTEMS
3422 TRIPP COURT | SAN DIEGO, CA 92121 | (714) 453-6300

Circle No. 10 on Reader Service Card

WHAT'S **COLD** DOING IN **BROOKHAVEN?**

Brookhaven National Laboratory got seriously into cryogenics in 1948, when it purchased its first ADL-Collins Helium Liquefier. (Argonne and Oak Ridge bought their first Collins Liquefiers in 1948, too.) In the past quarter century, Brookhaven's use of Cold, both for basic studies and for high-energy-physics applications, has grown in quantum jumps.

Cryogenics at Brookhaven today revolves around applied superconductivity, and BNL scientists are readying a secondary beam line of the Alternating Gradient Synchrotron to take full advantage of this phenomenon. CTi Cold-producing equipment is totally involved.

Shown here is the cryogenic system for the bending magnets that will direct the particle stream from the AGS to the experimental area. A CTi Model 1400 Helium Refrigerator (in foreground) supplies 4.5°K cooling through 100-foot-long



transfer lines to and from a test cryostat. Two 40-kilogauss superconducting magnets and their dewars are under test elsewhere. This Model 1400, through the CTi-built transfer lines, can provide 70 watts of 4.5°K cooling at the magnets.

When in operation, the bending magnets will direct the particle stream to a third superconducting magnet, to be cooled by a CTi Model 4000 Helium Liquefier, and then to a 9500-liter liquid hydrogen bubble chamber. This 7-foot-diameter target is cooled by a CTi-Sulzer Hydrogen Liquefier.

CTi's position in the world of Cold is unique. We can offer almost every known cryogenic process at any temperature and of virtually any capacity. That's an important fact to remember, when you realize that applications of superconductivity are growing in quantum jumps, too.

Write or call CTi today for our latest brochure on Cold.

The growing Company that makes COLD as simple as heat.



CRYOGENIC TECHNOLOGY, inc.

Kelvin Park, Waltham, Massachusetts 02154 (617) 890-9400

Circle No. 11 on Reader Service Card

letters

terminated). They will circulate your qualifications in their publication (*The Academic Register*), which is claimed to have a wide circulation among academic institutions. There are several editions (College, Junior College, New England Public Schools, and so on), and the charge is \$20 for each edition. They have also recently begun to publish *The Academic Journal* (\$16 per year), which reports positions found by their search, lists other employment services, reports on trends in the job market and in the future will list appropriate positions for educators in business and industry.

► Educational Career Service, 12 Nassau St., Princeton, N. J. 08540, will, for \$36 per year, match your qualifications to those submitted to them by search committees and inform you of positions for which you appear to be qualified.

► The "News of the Week in Review" section of the Sunday *New York Times* has a section of advertisements for academic openings. Many of the commercial services, such as those limited above, also advertise there.

► PHYSICS TODAY also has a section of advertisements for academic openings. Since everybody knows this, competition for any reasonable position listed here is even more fierce than usual.

► The American Institute of Physics operates a Placement Service Register that will list your qualifications and arrange for interviews at APS-AAPT meetings. They publish the very helpful *Survey of Academic Openings* (this however is published infrequently enough so that some of the jobs are filled by the time the survey is received). They also operate a year-round Employment Referral Service in which qualifications and interests of registrants are maintained on file. The file is interrogated for registrants with qualifications meeting employers' criteria, and copies of resumes are supplied to employers. The service is free to all physicists and related scientists irrespective of their society affiliation. About half of the inquiries are for academic institutions.

► Your own college or university probably operates its alumni placement bureau, which is open to you if you are a graduate of the institution, and perhaps if you are a faculty member, especially with a terminal position.

► Larger or more prestigious institutions in your area may operate better placement services or openings listings than your own institution. Generally you would have to make use of such services indirectly, since they are not knowingly provided to persons from other institutions. For instance, in the Boston area, the MIT Physics Place-

ment service maintains a very good listing which includes some of the more informal contacts often not available to members of other institutions.

None of these services take you on as a client and find you a job like an employment agency. For the services that provide listings of open positions, you contact the institution on your own. Services that circulate qualifications or provide matching supply this information to employers who initiate negotiations.

In hunting for jobs you should also consider the American Institute of Physics and the US Government. The AIP and its journals hire physicists in editorial and other capacities. Many agencies of the US Government hire physicists in a variety of capacities. You can write directly to an agency or section that interests you, or apply to the Civil Service Commission. In either case you will eventually have to go through Civil Service. To apply through Civil Service, write to your local US Civil Service Commission area office (see telephone directory for its address) and ask for Civil Service Standard Form 171 and the booklet *Federal Jobs in Engineering, Physical Sciences and Related Professions—GS-5 Through GS-15*. The booklet is quite helpful and would be of interest even to people applying directly to an agency.

Once again, the best piece of job-hunting advice that you can get is to start early—two years early—and to plan your teaching activities to make an interesting curriculum vitae.

DAVID BOWEN

Northeastern University
Boston

Gravity waves

In his interesting article on gravitational theories, Will mentions that in the Brans-Dicke theory the gravitational and inertial mass of the earth are not exactly equal (Nordvedt effect) but fails to mention that this breakdown of the principle of equivalence will also occur for elementary particles. In scalar-tensor theories the difference between the inertial and gravitational mass of a particle is of the order of the gravitational self-energy, and hence any scalar-tensor theory that *does not* supply a proof that the gravitational self-energy of electron, proton, and so on is zero, or small (or, at least, a universal fraction of the total mass), must be regarded as *incomplete* in that it fails to offer an explanation of the experimentally very well established fact that all these particles fall at the same rate. A strict application of Will's TEST-1 therefore excludes present-day scalar-tensor theories.

In Einstein's theory the gravitational

Tubes? Forget them.

HERE'S 100 WATTS OF SOLID-STATE RF POWER!



A state-of-the-art amplifier.

ENI's new Model 3100L *all-solid-state* power amplifier provides more than 100 watts of linear power and up to 180 watts of pulse power from 250 kHz to 105 MHz. This state-of-the-art class A unit supplies over 50 watts at frequencies up to 120 MHz and down to 120 kHz. All this capability is packaged in a case as small as an oscilloscope, and it's just as portable.

Extraordinary performance.

Featuring a flat 50 dB gain, the Model 3100L is driven to full power by any signal generator, synthesizer or sweeper. AM, FM, SSB, TV and pulse modulations are faithfully reproduced by the highly linear output circuitry. Immune to damage due to load mismatch or overdrive, the 3100L delivers constant forward power to loads ranging from an open to a short circuit.

Solid-state reliability is here.

The price? \$5,690.

Write for complete information: ENI, 3000 Winton Road South, Rochester, N. Y. 14623
Call (716)-473-6900 or TELEX 97-8283

**ELECTRONIC
NAVIGATION
INDUSTRIES**

**ENI . . . The world's leader
in solid-state power amplifiers.**