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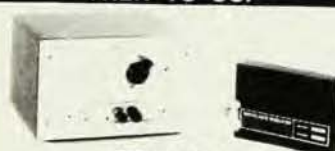
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letters

per unit volume (E) required to expose a resist—is not a constant (as Spohr and Fischer assert it to be). In fact, E can increase by more than a factor of 10 for some resists, such as polybutene sulfone (PBS), while for others, such as novolac or polystyrene, E can decrease by a factor of 10 as dE/dX increases. Poly methyl methacrylate (PMMA) is unusual in that E is roughly constant.

The explanation for these results involves the basic chemistry of the particular resist in conjunction with the radial distribution of energy around the ion (or electron) path. These results are not without precedent if the larger question of the response of materials to ionizing radiation is examined. The formation of nuclear tracks in solids,² radiation dosimetry, and the relative biological effectiveness of ionizing radiation³ are related subjects.

References

1. T. M. Hall, A. Wagner, L. F. Thompson, J. Vac. Sci. Technol. **16**, 1889 (1979).
2. R. C. Fleischer, P. B. Price, R. M. Walker, *Nuclear Tracks in Solids, Principles and Applications*, U. of California Press (1975).
3. R. Katz *et al*, Radiation Research **47**, 402 (1971).

A. WAGNER

Bell Laboratories

5/2/80

Murray Hill, New Jersey

THE AUTHORS COMMENT: We completely agree with A. Wagner. The energy-dose concept is an undue oversimplification, however useful it may be as a first-order approach in a number of systems.

B. E. FISCHER

R. SPOHR

GSI, Darmstadt, West Germany

Help Sakharov do physics

I am writing to call attention to a particular difficulty in the situation Andrei Sakharov is facing now. As you know, he was sent by the Soviet authorities to internal exile to the city of Gorky in January 1980 and is prohibited from leaving the limits of this city, which is closed to foreigners. It is needless to repeat what kind of arbitrary persecution (without any grounds in the Soviet law) he is suffering from. However, I want to stress one of the aspects of this persecution, the most shocking for a scientist.

When Sakharov was banished to Gorky he was officially told that all his correspondence from abroad would be prohibited. This plainly means that he will be prevented from receiving the letters from his family members, children or grandchildren living in this country, but, moreover, he will not get

any single reprint, preprint, scientific letter or issue of scientific magazine mailed by his colleagues abroad. Up to the present moment this is indeed the case. Sakharov does not receive any scientific materials.

Despite all his trials for the last years, Sakharov is actively working in theoretical physics (see, for example, his most recent publications below). In the present circumstances he cannot either use the library or have access to recent journals or preprints. The Physical Institute of the Academy of Sciences, the Theoretical Department of which Sakharov still is formally acknowledged to be a member, has a very good library that he had been using before his exile to Gorky. Moreover, Sakharov no longer has access to his books at home in Moscow. There is no library in the city of Gorky that Sakharov has access to and which contains literature in the fields of his interest. I ask all specialists in the fields of current interest of Sakharov (high-energy physics, elementary-particle theory, and cosmology; see references 1-4 for details) and all physicists to send their reprints, and especially new preprints to Sakharov at his address:

Gorky, Sherbinka-2

Gagarin St. 214, ap. 3

Dr. A. D. Sakharov

CCCCP

2. Горький, Щербинка-2,
Улица Гагарина 214, КВ. 3
Др. А. Д. Сахаров

I use this opportunity to remind you of the call by Sakharov's wife, Mrs. E. Bonner, to speak out against unjust persecution of Sakharov and other scientists in the USSR.

References

1. A. D. Sakharov, "The baryonic asymmetry of the Universe," JETP **76**, 594 (1979). (English translation).
2. A. D. Sakharov, "Cosmological models of the Universe with rotation time's arrow," Zh.E.T.F. (to appear); SLAC Trans. #0192.
3. A. D. Sakharov, "Mass formula for mesons and baryons," Zh.E.T.F. (to appear); SLAC Trans. #0191.
4. A. D. Sakharov, "Estimate of the quark-gluon field coupling constant," Zh.E.T.F. (to appear); SLAC Trans. #0190.

DAVID CHUDNOVSKY

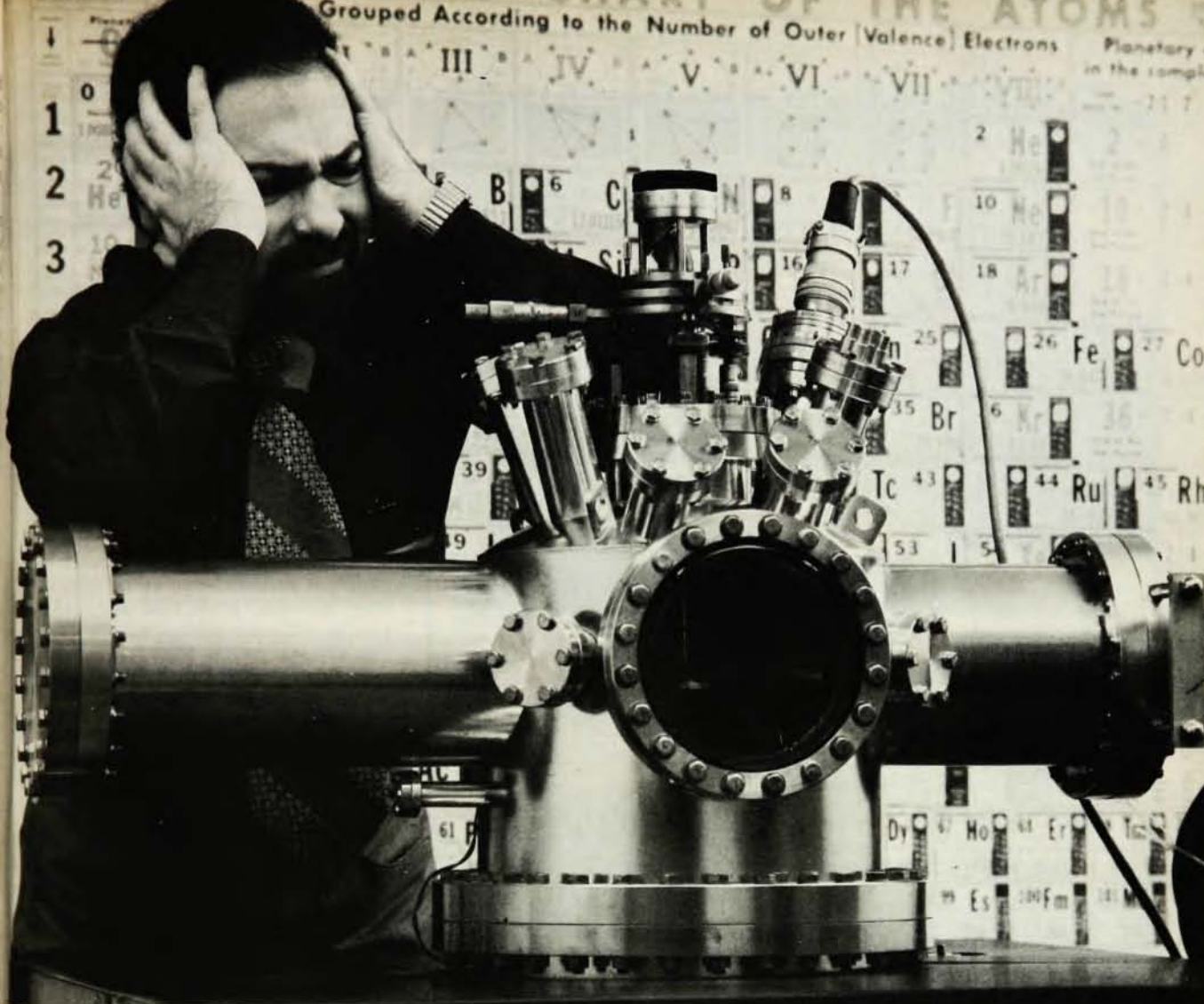
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New York, N. Y.

6/16/80

Warning about jobs in Brazil

I would like to warn colleagues in physics about "too good to be true" contracts for research positions (advertised in PHYSICS TODAY last Winter) at the Instituto de Pesquisas Espaciais of the Conselho de Desenvolvimento Cien-



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letters

tifico e Tecnológico (INPE/CNPq) in Brazil by an Ivan Lima. They are just that: "too good to be true." The people here do not honor any part of these so called contracts; they are merely worthless pieces of paper. I issue this warning as a public service to physics colleagues.

I answered one such ad, received an immediate favorable response with an offer of a two-year contract following about a month later at a salary of about \$35 000 per year in Brazilian cruzeiros. Of the five or six areas of research mentioned in the ad, I have worked and published in several of them: surface physics, amorphous magnetism, metal-insulator transitions, magnetic impurities and itinerant magnetism (my thesis area circa 1970). A further letter three months later strongly reaffirmed the great overlap interests with complete freedom for the new appointee.

But arriving here was like stepping into a bad dream. This organization is run by two young physicists, N. Parada and C. Lima whose verbal word, as well as written word, is completely worthless.

First, *beware*; the "contract" for two years is really only for a three-month evaluation interview. This is nowhere mentioned in the contract nor is it indicated verbally by these two directors. I personally gave up a position I had and turned down three other offers in the US to come here. By the time I arrived six months later, with a well-defined research program ready to implement, these two directors had changed their minds about the pre-agreed-upon subject area. They refused to discuss these areas and the resultant differences, in any face-to-face meeting, but insisted I conform to their group's program, which after some months of asking I am still hard put to define. Great political resistance by non-physicist engineers within INPE, which has directness and logic on its side (even though it is a bit anti-physics) is the only believable opinion here. A three-month interview-vacation to Brazil for the summer sounds (and is) lovely if it is honestly and clearly spelled out as being of finite duration; when one turns down three other excellent job offers and leaves a fourth, it is a disaster.

Secondly, your passport is confiscated upon arrival, ostensibly to facilitate bringing any unaccompanied luggage through customs. This can (and did) take 3-4 months, during which time you, in addition to having virtually no clothes nor materials brought down for your research, are a virtual prisoner.

Thirdly, with a cruzeiro devaluation of 30% ("supposedly" a surprise) and

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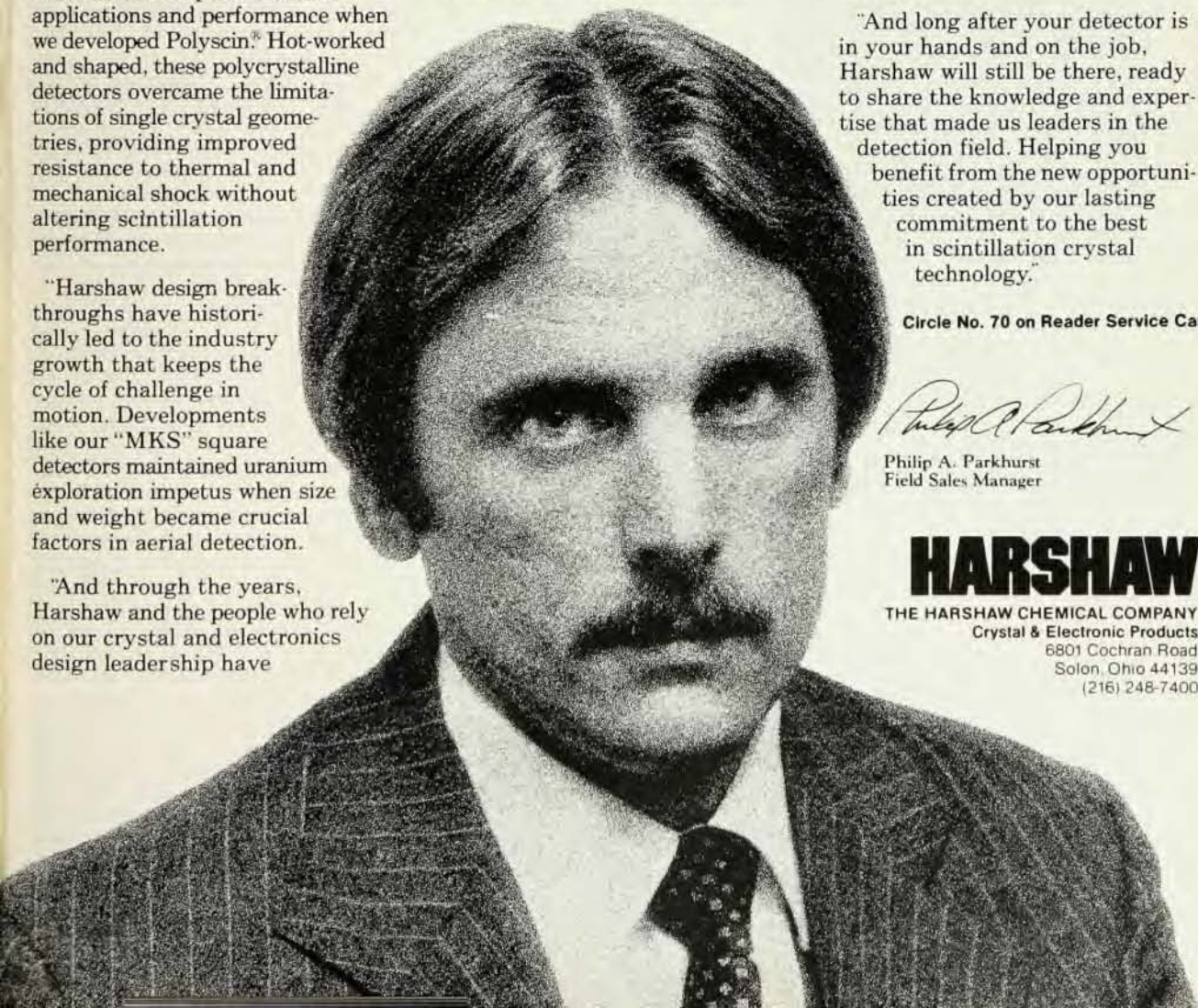
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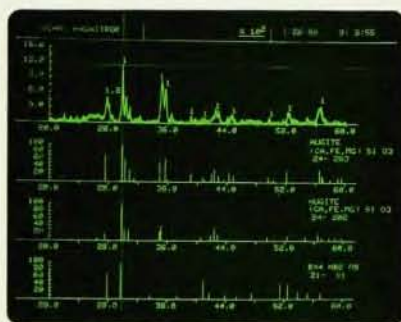
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letters

an inflation rate of 7% per month, and severe problems transferring your money out of Brazil, your earnings are worthless.

Fourthly, the contract offer to expedite your problems in a new Portuguese speaking culture is not honored. You are on your own and this institute, through design or poor management, offers no help whatever, but is only a hindrance.

I issue a very strong warning to any prospective physics colleagues contemplating applying to, or accepting an offer to come to Brazil, this IN-PE/CNPq laboratory in particular. *Beware!* With the exception of some sight-seeing in South America, accepting their contact offer here is a total mistake. Their word, their contract and their laboratory and program is *bad news*, surely an embarrassment to the Brazilian government. Let the reader *beware!* (Shades of a communist totalitarian country.)

EDWARD SIEGEL

Brooklyn, New York

2/13/80

DEPARTMENT HEAD RESPONSES: This rebuttal to Edward Siegel's letter expressing his radical opinion of our institute is mainly intended for those who do not know him.

We shall make no comment on Siegel's work and publications in several areas mentioned in the PHYSICS TODAY ad, and in his well-defined research program ready to implement in pre-agreed-upon subject areas.

We shall merely straighten the record concerning some facts, which any interested reader can easily verify:

► "Too good to be true" contracts, unfortunately, are not what we can provide, nor can we understand how anyone might come to think our working conditions are "too good to be true." As a matter of fact we are having a very hard time filling available positions with competent and adaptable foreigners in spite of widespread advertising of the sort Siegel replied to. Because of inflation (a continuous process) and periodic readjustments in the salaries (once every six months at present), salaries here in the past year have saw-toothed between 22 and 30 thousand dollars per year at the official rate of exchange (about 10% different from the "parallel market") for a person with Siegel's position. Siegel might have had some special ideas concerning what working here would be like before he came. He asked us in particular in a letter, if it would be possible to live in the sea-side resort of São Sebastião, and commute. This would be somewhat akin to asking if one could work in Boston and commute from Cape Cod.

► The contracts of our institute con-

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form, obviously, with the laws of our country. As pieces of paper once signed by all parties, they are as worthless as Brazilian law, which for better or for worse is keeping 120 million people going. One could hardly expect contracts in our institute to be based on American, Swiss or Japanese law.

► Contracts for two years here are contracts for two years, no more and no less. What Siegel is referring to concerning a three-month interview is that the management asks the group leader for an evaluation of the appointee three months after the appointee's arrival: routine common practice.

► The program of the group Siegel was hired for is available to any interested party, free of charge.

► Nobody's passport is *confiscated* upon arrival. The passport must however appear at various stages in the process of obtaining a Brazilian ID and clearing unaccompanied luggage through customs, which one can do on one's own or get a professional to take care of. This second choice is the more common one, and the one preferred by Siegel. If, for whatever reason, one wants one's passport during the time the professional is slowly going through the steps of getting the formalities taken care of, one can obtain it from him within hours: it is just a question of going and picking it up.

► The Brazilian cruzeiro is not devaluing at 30% per month nor anywhere near this rate. One's earnings in Brazil permit very comfortable living with the sort of salaries mentioned above. Transferring money out of the country, if that is what one comes over here to do, is complicated, but quite possible.

► Expediting problems of appointees, which is in the interests of any institution when hiring, is something that can be done only to the limits of the institution's flexibility, and which depends strongly on the type and number of problems associated with the appointee. Complaints are always forthcoming in these situations, but that no help is offered and that the institute is only a hindrance is obviously an exaggeration, which leaves little room for bargaining.

In closing we would like to mention that there are a large number of foreign researchers at INPE, from all corners of the world, the US, Europe, India, Japan, Poland, other South American countries and so on.

In fact most Brazilian research institutions harbor a very large percentage of foreign PhD's. Only a few have had adaptation problems anywhere close to Siegel's. Many have stayed in Brazil for life. Many have eventually returned to their country of origin or moved on at their will. We hope this

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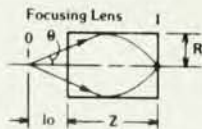
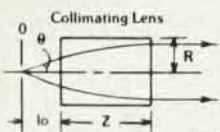
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case remains, as it is now, to our knowledge, unique.

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6/10/80

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Electric car needed now

William Walsh's review of battery technology (June, page 34) was interesting, but I wonder how long we can wait for better batteries. I felt concerned enough about auto fuel and pollution problems to act early this year. The best electric car I was able to buy uses old technology in all areas, but it meets about 95% of my trip needs and over 60% of my mileage needs. It brings about energy conservation naturally. Its limited power and range cause me to avoid wasteful driving procedures. Its equivalent fuel economy, based on the first 1000 miles of use, is nearly 70 miles for each gallon of oil burned at the power plant. Its availability for short trips around town has raised the economy of my "big" car (a Honda Civic) to about 40 miles per gallon. My "fleet average" is about 58 miles per gallon.

There are many needs which this car will not meet, but it could probably replace about ten or twenty million of the cars in the US that are used primarily for local driving. Such a replacement would offer important fuel savings and a large improvement in urban air quality.

At present production rates, the tiny, fragmented electric car industry will take several hundred years to build ten million cars. The ailing automobile industry should move immediately to build the best cars it can make with the existing technology. It has the organization, the plants, the dealership and service facilities to move quickly. The way things are going in the Middle East we may not have time to wait for a better battery.

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6/26/80

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AUTHOR COMMENTS: Richard Raymond exhibits an initial euphoria common to electric-vehicle owners. It is sad that his enthusiasm will probably be dampened during the next few months as his electric vehicle becomes more sluggish and he realizes that the expensive battery pack needs replacement. Today's traction batteries last only about 12 months under normal driving conditions.

On the bright side, battery technology is experiencing a renaissance, and dramatically improved batteries and electric vehicles will be available to the public in a few short years. I look