

## New linear accelerator to take wing?

At a time when physics is faced with funding crises everywhere, it is reassuring to find that some research projects can still be run on mere chicken feed. In this regard, we call attention to the recent announcement, by the National Research Council of Canada, of the successful operation of a new linear chicken accelerator, or LCA (see *Chemical and Engineering News*, 2 November 1970, page 56). The LCA, which is capable of accelerating a four-pound chicken to speeds of 620 mph, is currently being used as a flight-impact simulator in an engineering study of airplane-bird collisions. But we believe it may have application as a basic research instrument, since—in more familiar terms—it has a rated energy of  $5 \times 10^{14}$  GeV, which makes the LCA the most powerful accelerator of its kind in the world today.

A careful study of high-energy chicken-chicken collisions, with due attention paid to the production of virtual chickens (i.e., eggs), could lead to a resolution of an age-old question of causality, namely, which came first, the chicken or the egg? At somewhat higher energies, one could look for the production of the intermediate vector chicken, or hawk, and in general study the problem of rooster-hen coupling. At yet higher energies, the scattering would of course be discussed in terms of the Pomeran-chicken trajectory. Crossing symmetry would be important here, and one could hope to discover why, or even whether, the chicken crosses the road. By simply replacing the chickens with ducks, one could undoubtedly establish a threshold for the production of quacks.

Although group-theoretical cacklations based on the eight-fowled way can be expected to establish a pecking order, a really comprehensive theory would be based on an appropriate egghenvalue equation. Quantization would then naturally proceed by introducing the "capon," with appropriate truncation. It should be noted that capon-chicken coupling may be assumed to be very weak to all orders. A clue as to the correct form of the egghenvalue equation might be provided by noticing that Coop(er) pairing is obviously described by interactions such as  $\psi^*R\psi$ , where  $R$



is the propagator, or rooster function. Owing to a lack of bilateral symmetry, it seems clear that operations such as  $R\psi$  probably do not occur naturally,

## Reply to accusations against Polaroid

Scientists attending the New York meeting of the APS and AAPT in February could hardly have missed hearing or reading assertions that the Polaroid Corporation is assisting the repression of blacks in South Africa [see page 65]. These statements have been made over the past several months by a small group called the Polaroid Revolutionary Workers Movement, and they have been uncritically accepted by some members of the Scientists and Engineers for Social and Political Action (SESPA) as evidence of the misuse of science. As Polaroid scientists who were there, we were distressed to see the statements presented as fact to a scientific meeting and feel they demand our response.

The substantive assertion made by SESPA was the following, quoted from one of their handouts: "The Polaroid ID-2 system is now being used to produce the 15 million passbooks that every Black South African must carry at all times or else face imprisonment."

if at all. These theoretical difficulties obviously leave us with nothing to crow about.

Yet much can be done. The LCA should be used to measure breast masses and farm factors. A determination of Rooster's angle would probably help to establish the correct egghenvalue equation. Coherent production of chicken-anti-chicken pairs could be investigated by analogy with the well known dove-hawk interaction, which quickly produces a state of incoherence and annihilates to a large number of put-ons. In this regard, we might ask whether the beautiful picture of an elementary particle that appeared on the cover of the 27 November 1970 issue of *Science* is really a put-on or a capon? We suggest that a Feather's analysis be carried out immediately. Who knows: there may be a Pulletzer prize in all this. We have only scratched the surface!

Colonel Sanders  
c/o R. T. Robiscoe  
Montana State University  
Bozeman, Mont.

The truth is that no passbook photographs are now or have ever been taken with the ID-2 system. The revolutionary group has known this for four months.

Polaroid has no investments in South Africa, and it has no subsidiary there. Polaroid sells its products to a single, independent distributor in South Africa, Frank and Hirsch, Ltd. Sixty-five ID-2 systems have been sold in South Africa, 52 to private businesses and 13 to the armed forces. Sales to the apartheid agency have been specifically forbidden by company policy.

When, in October, the revolutionary group first asserted that Polaroid was aiding apartheid, the company responded with a serious and extensive investigation ("Polaroid—A Corporate Guinea Pig," *Boston Sunday Globe*, 31 January 1971, page 1). Its aim was to determine how our other products were in fact being used in South Africa, and how, as a single US company,

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Polaroid should best use its influence against the apartheid system.

The investigation determined that about 10% of the photographs in passbooks were made on Polaroid film, the photographs having been taken in government offices, private photo studios, or by itinerant photographers. The cameras used are regular Polaroid cameras and special identification cameras made by other US companies.

To determine how Polaroid should best oppose apartheid, four employees (two black and two white) went to South Africa and spent eleven days talking with over 150 people from underground black leaders to government officials. The group reported an overwhelming feeling among the black people interviewed that Polaroid could help most by keeping its business tie there, exerting pressure for reform by its presence and example, and influencing other American companies to do the same.

Polaroid was faced with the following question: Should the company cease selling its products, or should it attempt to act upon the recommendation of the South African blacks? Cutting off sales would not necessarily keep Polaroid pictures out of passbooks, since the film is available in stores throughout the world. On the other hand, staying and working for change might well produce no changes at all.

The basic decision of the Polaroid management was to stop sales of any of our products to the government, while staying in South Africa and, experimentally, trying to work for change. The experiment has several aspects. First, Frank and Hirsch is cooperating with Polaroid to raise the salaries and responsibilities of black employees. Second, Polaroid has established 500 scholarship opportunities for black South Africans. Third, the company is investigating the formation of a black-owned manufacturing subsidiary in another African country. Fourth, Polaroid will try to inspire other American companies to undertake similar experiments.

How this will turn out can not be known yet; it is an experiment. We believe it will work, and that a scientific attitude is a valid way to find the right course. If the present policy is not successful, it will be changed.

We would like to add that we believe Polaroid's goals truly are the growth of each individual and the creation of humanly useful products, and we are working to help achieve these goals. We fully appreciate the danger that science may ultimately be used for inhuman ends. But we feel that Polaroid has shown an exceptional sense of caution and responsibility throughout

its history as a science-based company, and we believe that as part of such an enterprise we can best work for the humane use of science.

Stephen A. Benton, John J. McCann,  
Stewart W. Wilson, William R. Wray,  
plus six others

Polaroid Corporation  
Cambridge, Mass.

### For high-energy physicists

High-energy physicists and departmental librarians appear not to be aware of the fact that the *Soviet Journal of Nuclear Physics* (*Yadernaya Fizika*) is one of the major outlets of Soviet publication in high-energy physics, both experimental and theoretical. For example, the February 1970 issue (translated from the Russian issue of August 1969) contains an article "Search for Particles with Fractional Charge (Quarks) in the 70 BeV Accelerator at the High Energy Physics Institute" with 16 authors, and an article "On Muonic Charge and Muonic Photons" by L. B. Okun. The content of the journal is divided about equally between nuclear and high-energy physics. The high-energy articles are sometimes important and often written by first-rate people.

The AIP Translations Board (of which I am a member) has been disappointed by the rate of subscriptions to the *Soviet Journal of Nuclear Physics*, which lag behind the subscriptions to comparable translated journals such as *Soviet Physics JETP*. No doubt the main reason for the lag is the misleading name of the journal, which causes most high-energy people to pass it by. Its circulation has also probably suffered from another fortuitous and remediable handicap. If you pick up the journal and look at the outside back cover you see only the titles of papers in nuclear physics proper, because these are habitually printed first. If you want to see what the journal has to offer in high-energy physics, you have to look at the continuation of the list of contents on the inside back cover. No wonder a lot of people have missed it.

Freeman J. Dyson

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### Multidisciplinary research

As Marvin Goldberg has suggested (December, page 26), there are many ways that physicists can contribute to a better understanding of the problems of the environment. I wish to endorse particularly what he said about their participation in multidisciplinary teams and the need to have small multidisciplinary centers at universities

that "form the glue for any serious effort in environmental education programs."

In spite of all that can be said in favor of such university centers, it has been difficult to implement them. A major problem arises in obtaining the necessary support. Although the total available funds for such centers is clearly limited, this does not appear to be the central issue. Rather, the difficulty appears to be more related to the evaluation of program proposals, which, more often than not, has been made by discipline-oriented people within the context of their discipline. One can almost be assured that a multidisciplinary research program will fall short of what each discipline would hope for, if that discipline were to examine the problem in its own way. We must quickly evolve an interdisciplinary means of evaluating such proposals that will not lead to a compromise in the quality of the work.

In addition, I suggest that we must guard against the feeling that everyone should join in the effort to find immediate solutions to the problems of the society. The public, and some of our Federal agencies, seem to feel that a basic understanding of these complex systems exists and that adequate solutions can be achieved simply by applying existing technology. This is simply not true, and, as Goldberger emphasizes, research is very much needed. New methodologies must be developed if we are to have any chance of coping with many of these complex issues. The responsibility of pointing this out must rest with the scientific community. We are now being charged with a lack of sensitivity to the problems of our society. Let us not open the way for a future charge that we are even incapable of developing the necessary tools for attacking them. Although research will not guarantee that all the tools will be available when needed, properly oriented research can have a profound impact upon our capabilities.

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Ford Motor Company  
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### Clean reactors

I read Walter Jordan's comments to Elizabeth Hogan's letter (November, page 9) with great dismay. I recently heard Jordan expound his views on reactor safety at the IEEE Symposium on Nuclear Science held in New York, 4-6 November. He attempts to justify what is evidently the industry's apathy and short-sighted self-interest. First, he tells us that reactors pollute less than fuel-burning plants, and that, statistically, we are safer from the reactor than from, say, taking an x ray.