Gupta (February, page 86) must be protested.

The comment that "Marshak never made any really great contribution to physics" is unfair. His work on weak interactions and N-N scattering satisfy most theoretical physicists as being important contributions. His taste and judgement in both science and people account for his "influence" and possibly explain the lack of such influence of Gupta.

Bragging about his critical evaluation to CCNY officials in PHYSICS TODAY reflects far more adversly on Gupta than on Marshak. Finally, this letter writer is not a student, nor a present or former coworker nor a colleague of Marshak. I did, however, largely agree with his Guest Comment (May 1983, page 9).

BRIAN DEFACIO
Institute for Theoretical Physics
Chalmers University of Technology
3/84 *Göteborg, Sweden*

Don't forget Thomson

Writing in PHYSICS TODAY (November 1981, page 69), Victor F. Weisskopf tells the remarkable story of the development of field theory throughout the last 50 years. The triumph of Dirac's quantum electrodynamics was, however, left in sharp contrast by the awesome remarks that "we have no explanation for the mass of the electron; that is, the smallness of the ratio ($^1/_{1836}$) between the electron mass and the proton mass" and "there is not the slightest indication why electrons with different masses should exist." Here Weisskopf had in mind the normal electron, the τ-electron and the muon.

Forgotten, it seems, in these modern developments is the classical basis of electrodynamic theory developed by J. J. Thomson. Thomson gave a formula specifying the energy of the electron as $2e^2/3a$, where a is the radius within which its electric charge e is confined. He did not know about muons and antimatter, but it needs little imagination to write $\mu^+ + \mu^- = Q^0$, where Q^0 is an energy quantum formed from the mutual annihilation of a positive and negative muon. Adding energy to such a quantum could well produce a pair of Thomson-sized charges, including Q^-. Thus, for charges e and $-e$ in touching relationship, the total energy, including that of the Coulomb interaction, is:

$$W = P^+ + Q^- - e^2/(x+y) \quad (1)$$

where $P = 2e^2/3x$ and $Q = 2e^2/3y$. Eliminating x and y:

$$W = P + Q - 3PQ/2(P+Q) \quad (2)$$

Given a background source of muon pairs and an amount of energy P used to create N protons, we have N systems given by equation (2), NP constant and NW tending to a minimal value, for optimum stability. We can therefore differentiate W/P with respect to P to find its minimum. This occurs when $P/Q = [(^3/_2)^{1/2} - 1]^{-1}$ and tells us that $P \simeq 1836$ because $Q \simeq 2\mu \simeq 413$ in electron mass–energy terms.

This is such a remarkably simple result based on the Thomson formula, that one really must exclaim, "Let us not forget the heritage he left us."

Proton creation follows naturally from the existence of the dimuon energy quantum. Also remarkable is the fact that W is exactly half the mass energy of the τ-electron (half of 1.782 GeV or 1743 electron units). Put $P = 1836$ and $Q = 413$ in equation (2) and W is 1743.

Such results cannot be fortuitous; bear in mind that the formal derivation of the proton–electron mass ratio using equation (2) in terms of a theoretical determination of Q gave 1836.1523. This was published in 1975 in a paper I coauthored[1] with D. M. Eagles of CSIRO in Australia. It antedates by eight years the measurement by Van Dyck, Moore and Schwinberg,[2] which puts the ratio at 1836.152 470(80). The discrepancy is one part in ten million, but even this is explicable from the basic theory as it stood in 1975, as I have recently shown.[3] Using the same Thomson formula, the muon–electron mass ratio of 206.7683 has also yielded to theoretical explanation at its one-in-a-million level of measurement. Classical electromagnetic theory can, therefore, be usefully combined with quantum electrodynamics to solve some of the mysteries of particle mass.

References

1. H. Aspden, D. M. Eagles, Nuovo Cimento, **30A**, 235 (1975).
2. R. S. Van Dyck Jr, F. L. Moore, P. B. Schwinberg, Bull. Am. Phys. Soc. **28**, 791 (1983).
3. H. Aspden, Lett. Nuovo Cimento, **38**, 423 (1983).
4. H. Aspden, Lett. Nuovo Cimento, **38**, 342 (1983).

H. ASPDEN
University of Southampton,
3/84 *Highfield, Southampton, England*

Unions of the campus

I have read with interest the debate involving Edward Harrison and Charles Nissim-Sabat about unions in the universities (January, page 11; June, page 11; October, page 11) and I wish to contribute a few remarks from a somewhat different viewpoint. Italy

continued on page 134

letters

continued from page 15

is a country where unionization of the campus has been rampant for over 30 years, and the effects of it in the long run are there to see for anybody interested; and they are not, I can assure, pleasant ones. The salary of an Italian university professor is determined by only three elements, namely: rank (associate or full professor), seniority and status (full-time or "definite-time").

While rank and seniority are clear to everybody, status needs to be explained. A full-time professor is somebody who does not receive any income outside of his salary, except for copyrights, and personal income from property. A "definite-time" professor is anybody else. Since the salary of the highest-ranking, highest-seniority full-time professor is about $1200 US per month, it is not surprising that any professor who has the ability to make some outside money chooses the definite-time position, which penalizes him by about $300 US per month and prevents him from holding any administrative position (chairman, dean, and so on). Whether the latter limitation is a penalization or an advantage is open to question. This, of course, also means that all administrative positions are held by people who wouldn't be able to make any money outside of their guaranteed university salary if they tried.

The crux of the matter is, I think, in the observation by Nissim-Sabat that it is hard to believe that the "the majority of [Harrison's] colleagues at the University of Massachusetts are mediocre." They probably are not; but let the unions run rampant for several years, and they will be. The unions tend to favor career advancement by seniority only; to oppose salaries differentiated on the basis of merit (and rightly so, if one considers that they represent umpteen bluecollar workers for any one university professor they may also be representing); and to pursue political power. In a modern postindustrial society where the majority of the population is likely to be displaced from the job market by automation, robotics and whatnot, this is a healthy attitude. It also, however, favors mediocrity; and the very fact that it *does* favor mediocrity makes it desirable, since (let's be honest about it) the majority of people are mediocre. I wholeheartedly agree with Harrison when he says that while he is aware of tendencies towards scholarly mediocrity at this university as a consequence of the union, he is unaware of any towards excellence. This is exactly what one would expect from a union; and, given enough time, the mediocre people will be a majority—as they undoubtedly are by now in Italian universities. This is so well-established a fact in Italy that scholarly excellence, if occasionally present in some of the faculty members, almost has to be kept hidden from the local academic authorities who, fortunately, are themselves mediocre enough to fail to recognize excellence most of the time.

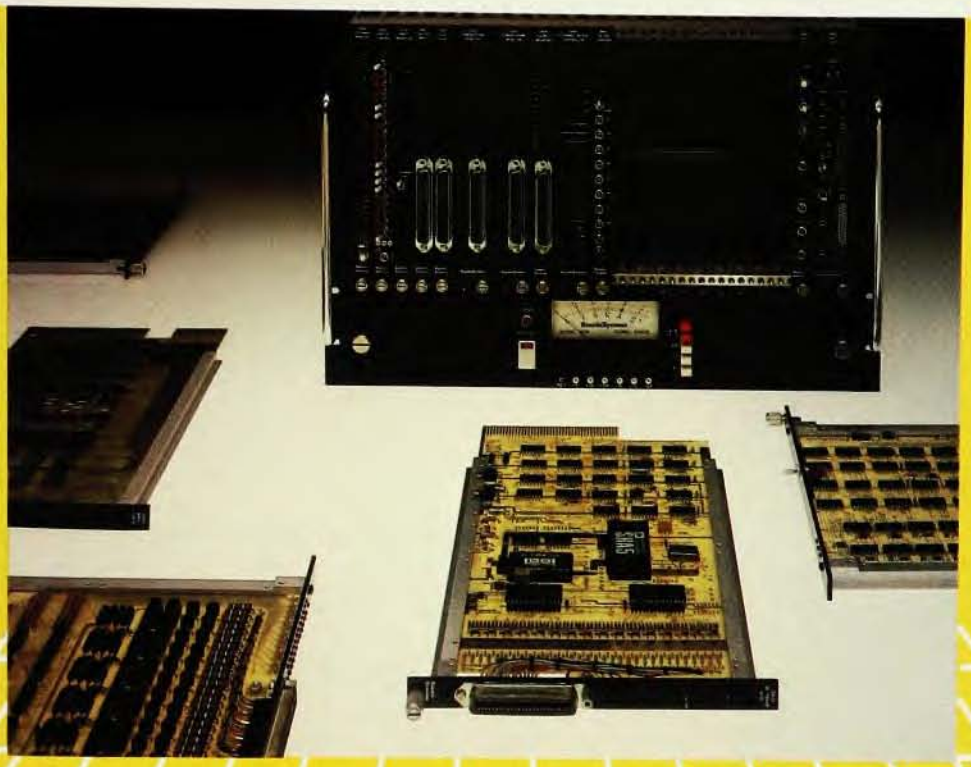
The University of Naples, where I work, was founded in 1224 by the Emperor Frederick II, and there are today more than 100 000 students enrolled. It has survived the obscurantism of the Middle Ages in its first 200 years; invasions by Moslem, French, Spanish and untold other armies; the Fascist dictatorship; and destruction by German troops in World War II. But I seriously doubt it will survive the effects of unions.

GIANNI ASTARITA
University of Naples
7/84 *Naples, Italy*

AN AUTHOR COMMENTS: My letter addressed itself primarily to Harrison's refusal to pay a union agency fee. He alleged that the union was an alien intrusion and that his refusal should be supported in defense of both academic freedom and liberty of conscience. I had responded that, because the University of Massachusetts faculty elected the union as their representative, paying the agency fee could not be construed as a profession of belief—especially as far as physics is concerned. So, the issue of academic freedom was irrelevant.

Also, inasmuch as Harrison had found neither unions nor compulsory fees objectionable *per se*, his refusal cannot be characterized as conscientious objection. None of the letters (see October, page 11) before us consider the agency fee, while Harrison's rejoinder (June, page 11) addresses itself only to the very last point. He objects to the compulsory nature of the agency fee because the union is a private entity, while other fees he does not object to are paid to public bodies. Not true! I'd bet that Harrison is a subscriber to a private health plan (such as Blue Cross/Blue shield) with his dues being paid without his having any say about it. Also, may I point out that a union member has much more of a say about union matters than a Blue Cross subscriber has about how that corporation is run? Finally, I doubt that Harrison would want unions to become public bodies in the same way that unions have been forced to operate under fascist and communist regimes.

Most of Harrison's rejoinder and all of the letters mentioned above have shifted the debate to an issue which is merely peripheral to the agency fee question, but one which deserves full discussion on its own: Are unions good or bad? First of all, it is alleged or implied by all that unions do little (or



Meeting All Your CAMAC Needs For Laboratory Automation

When your research projects call for the real-time computing power of CAMAC (IEEE-583), call on KSC to fill your needs. Scientists like yourself have been depending on our CAMAC systems for more than a decade, automating everything from plasma fusion reactors and proton synchrotrons to X-ray fluorescence spectrometers and radiation monitors. Hundreds of our CAMAC installations operate continuously year after year on a 24-hour-a-day basis.

You'll find our CAMAC systems located around the world in such major laboratories and universities as: *Argonne - Fermilab - CERN - LLNL - Bell Labs - Swiss Nuclear Institute - Princeton - Naval Research Laboratory - LANL - IIT - Sandia Labs - KFA - MIT - Oak Ridge - Hahn-Meitner Institute.*

KSC's line of serial highway products, including fiber-optic highway adapters, drivers, and crate controllers, is unsurpassed by any other manufacturer. Interface to virtually any major computer - DIGITAL, MODCOMP, SYSTEMS, Hewlett-Packard, even the IBM PC. Our DIGITAL-compatible line alone includes LSI-11, PDP-11, and VAX-11 interfaces, all available both with and without DMA.

Choose from hundreds of versatile process interface modules:

- A/D converters
- D/A converters
- Signal multiplexers
- Stepping motor controllers
- Timing pulse generators
- Input gates
- Output registers
- Event counters
- Loop adapters
- Preset scalers
- Interrupt registers
- Display generators

Whether you want a complete data acquisition and control system with application software or just CAMAC modules and crates, see how fully KSC serves your needs.

Contact Us For More Information

KineticSystems Corporation

Standardized Data Acquisition and Control Systems

U.S.A.
11 Maryknoll Drive
Lockport, Illinois 60441
Phone: (815) 838 0005
TWX: 910 638 2831

West Coast Office
39175 Liberty Street, Suite 245
Fremont, California 94538
Phone: (415) 797 2351
TWX: 910 997 0544

Europe *(Service)*
3 Chemin de Tavernay
1218 Geneva, Switzerland
Phone: (022) 98 44 45
Telex: 28 96 22

Europe *(Marketing)*
Gewerbestrasse 13
CH-4528 Zuchwil, Switzerland
Phone: (065) 25 29 25
Telex: 845/934648

Circle number 74 on Reader Service Card

letters

perhaps nothing) to promote academic excellence. This is not surprising. The promotion of academic excellence is not a union's primary concern. In this, the union is not different from pension plans, health insurance or, especially, the tenure system— which has often been criticized on the same grounds. The impact of each of these on academic excellence is what we would call a second-order effect and thus, probably, considered small. One hopes that the effect is positive, but it need not be so for one to be in favor of the institution in question. It can be argued that health benefits allow sickly individuals to linger on in academia while their performance becomes inadequate. Perhaps. But I would favor health insurance nonetheless, and all the while press for measures whose effect on academic excellence is large and positive. In what follows I hope to show that, on the whole, the effect of the union has been positive.

The lesson union advocates would point out in Stidham's biblical tale is that Esau could have gotten a better deal if hunters had been unionized. A hungry and isolated individual cannot always be assured fair treatment. I recall administrators boasting they could hire some faculty members cheaply because they were women, because they were classicists, or because, under their personal circumstances,they needed a job very badly. In other words, they were hungry. Such exploitation can only have a deleterious effect on the morale and, most likely, the performance of the people affected. Inasmuch as unions had curtailed this long before Affirmative Action was adopted, they ought to be credited with a positive contribution to academic excellence.

At this point Astarita and others would say, "But the trouble with unions is exactly that they don't recognize merit." This is how I understand the merit thesis:

- ▶ People vary in their merit. Merit can be ascertained reliably to an accuracy of 5% or better over a period of a year or two. (This is what is necessary in order for one to be able to say that this year Professor X deserves $42 000 per year and Professor Y, $40 000.)
- ▶ Union contracts insist on treating everyone alike.
- ▶ This is unfair; people should get what they deserve.
- ▶ This also harms academic excellence; those with merit will perform worse because their merit is unrecognized, and those without merit will have no incentive to improve.

Let me grant the first premise for the time being, so that I may point out that the second is, as far as I know, absolutely false. Every union contract I know of recognizes seniority and, to some extent, seniority reflects merit, contrary to what Astarita thinks. First of all, people learn from experience. Also, those who have been around a while have survived one or more evaluations of their work until they are granted tenure. I think it is safe to say that, at a specific institution, the tenth-year faculty members are better than those in their first year. The union contract sees to it that they get paid more. Of course there is a point of diminishing returns, and I see no reason why a premium should be put on experience beyond 15 years or so.

Union contracts vary widely in other respects, so I will discuss only the contract now in force between Local 4100 of the American Federation of Teachers and the Illinois Board of Governors of Universities, including my own. The contract provides that, in addition to seniority, one's salary may depend on rank, years at rank, highest degree and initial salary (the dean may adjust it to reflect special qualifications). All four of these reflect merit. In addition, faculty members may qualify for one-time $250 merit awards given in recognition of specific achievements. Finally, our contract has a counter-offer clause, according to which the president may choose to match a bonafide written offer a faculty member has received from another institution. The contract thus makes it possible for one faculty member to earn 2.3 times as much as another. We are not all treated the same—far from it! Too far, I think. For better or worse, our contract does not allow for minute salary increments on the basis of what's thought to be merit.

Yet, even if the second premise were true, we would still need to examine the validity of the third and fourth premises. When Polonius proposes to treat the visiting actors "according to their desert," Hamlet asks "... use every man after his desert, and who should escape whipping? Use them after your own honour and dignity...." The standard that Hamlet sets allows us to pay a decent salary to the person temporarily impeded by ill health or by overwhelming personal difficulties, all the while allowing each one of us to recognize our own shortcomings.

As far as the threat to academic excellence is concerned, merit advocates are quick to point out that it does not apply to them. I have yet to meet anyone who would say he would teach better or publish better work if only he would be paid a little more. They are all doing their best. It is "other people" who need the carrot-and-stick merit rewards to spur them on. I think that

letters

statements that apply only to "other people" are akin in their absurdity to those uttered by Cretan liars. On the other hand, would you want to read a paper written for the purpose of getting its author an extra $500 per year? Would you want the author in your department? Merit advocates postulate that a Pavlovian stimulus–response pattern of behavior is present in academia and that it ought to be further encouraged. I disagree on both counts. Besides, being a department chairperson, I cringe at the possibility that,under a merit pay system, I would have to tell Professor *X*, "Your work was lousy this year, so you don't get any raise at all." And he would reply, "You are right; but I don't want a salary raise, so lousy work is what you're going to get." Under the present system, I can demand, and I do get everyone's best possible performance, however it may vary. Finally, we ought to go back to the first premise, and realize that merit is not as easy to measure as all that and that, for each individual compensated for what is deemed extra merit, there may be another professor who feels unappreciated and rejected. The decline in performance in the latter person may, in fact, more than cancel out whatever further achievements the one who has received recognition may feel moved to produce. The merit rewards may then produce a negative-sum game. Also, one ought to recognize that fairness and academic excellence may be in conflict. Could the University of Chicago have paid Enrico Fermi what he was truly worth and still have enough money left over to mount a decent program?

Concerning Astarita's letter, I must point out that Italian universities and Italian unions are so different from ours that it is very difficult to generalize from one country to another. In our own country, we have an example of an institution where excellence has flourished under unionism: our major symphony orchestras. Yet I think that Italian universities are doing the right thing in paying less to those who do not give their university work their full attention. Also I feel certain I can reassure Astarita that, as long as Naples remains a city of more than modest size, there will be a university there, albeit perhaps not the kind of university he would like.

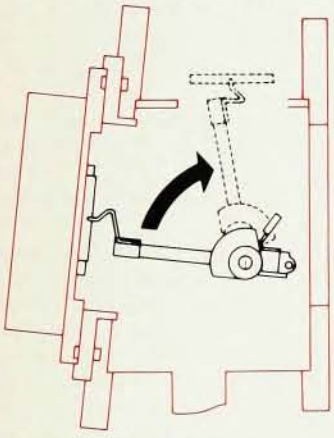
Either implicitly or explicitly, all of the correspondents object to the union's alleged role in faculty governance. Stidham lists seven areas wherein faculty authority, he predicts, will disappear. It has not happened yet at the University of Massachusetts, he acknowledges. Yet he does not give us a single instance where it *has* happened.

SOFT X-RAY STREAK CAMERA
10eV TO 10KeV
SPATIAL DYNAMIC RESOLUTION:
20 LINE PAIR/mm*

*Demonstrated in tests at Los Alamos National Laboratories

DEMOUNTABLE PHOTOCATHODE

Photocathode can be replaced in minutes while camera remains mounted on vacuum chamber.



The photocathode manipulator illustrated above is based on a design by Livermore National Laboratories.

IMMEDIATE DEMONSTRATION AND DELIVERY

CALL OR WRITE FOR INFORMATION

HAMAMATSU

HAMAMATSU CORPORATION • 420 SOUTH AVENUE • MIDDLESEX, NEW JERSEY 08846 • PHONE (201) 469-6640

International Offices in Major Countries of Europe and Asia.

Hamamatsu Photonics K.K., 1126 Ichino-cho, Hamamatsu, Japan, 0534/34-3311 • Hamamatsu TV Europa GmbH, Postfach 1140, D-8031 Seefeld 1, W. Germany, 08152/7705

Circle number 79 on Reader Service Card

letters

How can I answer him? But Stidham ought to be cautioned that faculty authority in these areas has always been quite circumscribed. Today, an individual faculty member has much less leeway as to what, how, and whom to teach than used to be the case—especially at the University of Naples in the Middle Ages. Increased bureaucratization has become the hallmark of our society—unions or no unions. Whatever contributes to it ought to be counteracted, and I agree that unions have not done enough in this respect.

I have already indicated the high regard in which I hold Harrison's work. I have admired Cranberg as an experimental nuclear physicist for 25 years, yet I cannot fathom what had led him to conclude I am a Marxist. May I suggest that his gratuitous name-calling is just as libelous as whatever I said about Harrison. Also, Cranberg should be cautioned that all three of the organizations that seek to negotiate for faculty members (AFT, NEA and AAUP) started out as opposed to collective bargaining. I hope his organization will resist following the same path and thus will be able to complement the others' work. We do indeed need, and I would join, an organization that views fostering academic excellence as its primary goal.

Speaking again of excellence, when we make more of an effort to look at it from students' points of view, we see that Harrison himself has given us an indication that the union at the University of Massachusetts has fostered academic excellence. His June rejoinder makes it clear that the University of Massachusetts employs a large number of part-timers (and, therefore, that much of the instruction is done by part-timers), and that the union enjoys their support—probably because of the benefits it has earned for them. My experience has been that one can get part-timers at any price, but one can get better part-timers when one is willing to pay more. Thus I think that the University of Massachusetts is now at an advantage in the competitive Boston market. In pursuing the interests of the part-timers, the union may have alienated some Amherst luminaries so much that they have decided to go elsewhere. Unfortunate as this is, the net result may still be an overall improvement of the quality of instruction at the University of Massachusetts. (Incidentally, Harrison has yet to tell us what he thinks the union has done wrong.)

To conclude, I would never say that a union deserves one's automatic support. The figures Stidham has given us show his salary has increased by almost 45% in five years, less than the Con-

Leaders Choose the Leader- VG Instruments

For MBE, Ion Beam Lithography and Chemical Vapor Deposition in the field of semiconductor development and production, the leading-edge companies and institutions choose VG Instruments as their source for their MBE, IBL, and CVD. Such key technology facilities as Bell Labs, EXXON, GE, Gould, McDonnell-Douglas, Sandia Labs, TI and Westinghouse have opted for VG because we not only offer a broad technical knowledge of semiconductor methods, but also the capability of providing instrumentation to suit the users' specific needs — from silicon to the III-V and II-VI compounds.

We consider our successful installations endorsements of our understanding of our users' requirements and our ability to produce (and install) systems with the flexibility to satisfy those needs. The result: instrumentation that delivers the performance and reliability users have come to expect only from VG.

For the leading edge in your research and production, choose the leader — VG Instruments.

We'd like to tell you how our MBE, Ion Beam Lithography and Chemical Vapor Deposition equipment can advance your operation. Call VG Instruments at (203) 322-4546, or circle reader inquiry number.

VG INSTRUMENTS

VG Instruments Inc.
300 Broad Street
Stamford, CT 06901
(203) 322-4546

Mass Spectrometers
Gas Analysis MS
Isotope Ratio MS
LC-MS
Surface Analysis
MBE
ICP-MS

AVS SHOW—BOOTHS #704, 705, 706, 707, 708

Circle number 82 on Reader Service Card

letters

sumer Price Index. That is unfortunate, but I don't know if the University of Massachusetts faculty could have done any better without a union—almost all other academics did worse. In any event, the University of Massachusetts faculty are free to decertify their union if they choose to. I doubt they will. Albert Einstein, who did not need a union to get himself a salary increase but nevertheless joined one, put it best with the quaint forthrightness characteristic of all his writings: "I consider it important, indeed urgently necessary, for intellectual workers to get together, both to protect their economic status and, also, generally speaking, to secure their influence in the political field."

CHARLES NISSIM-SABAT
Northeastern Illinois University
Chicago, Illinois
7/84

Soviet rights violations

The good intentions and deep concern for human rights voiced by your correspondents have been articulately presented in the letter by Edward Gerjuoy and his fellow committee members (July, page 13). I trust that they will agree that equally concerned persons may use different strategies. My admiration for the bravery of Sakharov is boundless. Yet I support—even beyond Harold Davis's editorial—maximally expanded exchange and contact with Soviet scientists to reach precisely the same objectives: improving the climate for free discussion and action, and movement in their society and all over the world. Both principle and practicality are, I believe, on this side.

First, principle: Surely we are both scientists and citizens, and as such (in Philip Handler's inimitable words) "we should be concerned with the human rights of the bootblack as much as the Nobel Laureate." Does the science community show this wider concern? In El Salvador, in Argentina? By any quantitative standards, if all persons are equal, the violations in El Salvador would use up all the pages of PHYSICS TODAY. Is Archbishop Romero less significant a human-rights figure than Andrei Sakharov? A second principle is a Biblical one: "Take out the plank from your own eyes before picking out splinters from your neighbor's." I have always felt that our rightful condemnation of the Soviets abominable treatment of Sakharov would be more effective, if accompanied by vigorous protest to our Administration and Congress about, say, the Greensboro, North Carolina, killings. (Five persons, including doctors deeply concerned for the poorest in our society, shot and killed, allegedly by Klansmen, all recorded on tv; all defendants acquitted.) APS could have a million times more effect on its own American society, and would thereby earn the respect of the USSR, who would be then much more likely to respond to our pleas. We do not concern ourselves with such cases because we are a scientific society. But human rights is a seamless web. and boycotts and cutoffs of contacts based on the human rights of a very, very few scientists cannot lay claim to that title.

Turning to practicalities: I submit that the hypotheses that "US practice of detente equals more human rights and free emigration" and that confrontation equals less of same are now the only ones with any supporting data. The burden of proof for the efficacy of continuing the tactics of public criticism, such as cutting off exchanges, now rests upon their advocates.

As a frequent visitor to Soviet laboratories with many colleagues there (and a one-time chair of the NAS US–USSR Exchange Committee), I find it repugnant to make statements that make me appear more moral, more concerned about others and human rights than such scientist colleagues. In fact and of course, all the "human rights actions" aim at trying to change the Soviet system of government where it is far from perfect by our standards. When done by individuals or professional societies, this strikes me as peculiarly quixotic, because these two enormously powerful governments only change each other very slightly now.

Finally, the physics community has, I believe, a particular responsibility for careful, less provocative actions, because the Damoclean sword of nuclear winter which hangs over the world is of its own fashioning and refining.

RUSTUM ROY
Pennsylvania State University
University Park, Pennsylvania
7/84

E. GERJOUY COMMENTS: After asking agreement that American physicists may employ different strategies in reaction to the Soviet government's treatment of Sakharov and other out-of-favor Soviet scientists, Rostum Roy "submits" there are data showing any strategy other than the silent acquiescence he favors is ineffective. Roy goes on to imply that American physicists who reject silent acquiescence are engaging in "provocative actions" which increase the threat of nuclear war.

I submit that few American physicists will agree that the "data" warrant Roy's conclusions about comparative efficiences of differing strategies, or about the risks of nuclear war they engender. Silent acquiescence is not more rational than public protest, and is literally more inhuman. In the light of all too recent history, the suggestion