letters

Cooperation between universities and community colleges

We want to describe a cooperative program between a university physics department and neighboring community colleges. A program involving modest expenditure of time and money was developed in response to community-college faculty suggestions; it consisted of one-day up-dating sessions in various frontier topics, extended discussions and laboratory visits. The program has lasted 1½ years at a cost of $2000 per year.

In November 1974, the National Board of Graduate Education organized a two-day conference on "Graduate Education and the Community Colleges,"[1] financed by the Lilly Endowment, Inc. The conference "was a unique national attempt by representatives from graduate arts and sciences departments, community colleges, and schools of education to discuss in detail the contributions each sector can make to the preparation and continuing professional development of community college faculty."

The report of this conference inspired us to consider a cooperative program suited to an active university physics department and neighboring community colleges. The first priority in program design, in agreement with the Lilly Conference conclusions, was to consider the needs expressed by community college faculty, rather than decide for them what they could best use.

A preliminary meeting was planned one Saturday morning in January 1976. Invitations were sent to all the community colleges within one hour driving distance of Stanford, 18 colleges in all, with 90 physics or science teachers. (The names were taken from the *Directory of Physics and Astronomy Department Staff Members*, published annually by the American Institute of Physics, New York.) Gerald Holton from Harvard University (who, by chance, was at the Center for Advanced Study in the Behavorial Sciences) and Joel Primack from the University of California at Santa Cruz discussed respectively, "Science for Citizens" and "Science and Society," in order to focus the meeting. Twenty faculty from 14 community colleges came to this first meeting; a follow-up discussion meeting produced a format for a cooperative program between Stanford physics department and the neighboring community college physics departments.

The community-college faculty who attended the two organizational meetings had a large spread in age and experience. Some had taught for 20 or 30 years, others were recent PhD's. When asked, "What can Stanford do for you?," diverse responses were obtained:

- Community college teachers are extremely isolated professionally. Can Stanford give evening, weekend, "short" or summer courses to bring community college teachers up to date?
- Can community college teachers audit courses (lecture or laboratory)?
- Can Stanford assist in developing interdisciplinary courses (such as nuclear physics, with input from chemistry, mathematics, engineering, astronomy, philosophy, political science)?
- Can Stanford assist in developing model lectures, demonstration equipment, laboratory equipment, problem sets?

These requests had to be reconciled with the resources available: Seven faculty members from Stanford's physics faculty of 21 had volunteered to devote one day during the year to a cooperative community-college program; $2000 was offered by the Center for Teaching and Learning at Stanford, an office supported by the Danforth Foundation. Alternative funding would have involved time-consuming proposals and uncertain responses from the National Science Foundation or other foundations.

It became clear in the discussion with the community-college instructors, that Stanford could fill one definite need: to present updating reviews in frontier fields of physics in which the Stanford faculty is active. The format that emerged was simple, yet successful enough to survive for the 1½ years of the program.

The program. The Center for Teaching and Learning assisted in the program organization and in mailing of (90) notices for each meeting. The $2000 budget covered an honorarium for the seminar leaders, and coffee and lunch expenses. The community-college instructors paid for their own transportation or were reimbursed through their college.

The group met on Saturdays, three times during the summer and once per quarter during the academic year. At 9:30 a.m. a Stanford faculty member gave a one-hour "updating" seminar. A brief reference bibliography was distributed at the meeting. After a coffee break, the participants spent an hour asking questions and discussing difficulties related to the seminar topic. We considered this to be the heart of the program, although initial encouragement was needed to ask questions. After lunch, a laboratory tour was arranged, usually taking one-and-one-half hours. When possible, the tour was coordinated with the seminar topic.

The seven-session program covered the following physics spectrum:

Between 20 and 30 community college faculty members attended each of these meetings. We noticed that the discussion period became less effective when the attendance exceeded 25. One-half of the attendees were steady, the others changed, so that finally 55 different faculty attended at least one of the meetings, representing 60 percent of all the faculty on our mailing list.

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Black hole confirmed

I wish to report the discovery of a black hole. It has eluded discovery until now for two reasons. Firstly, being located in that remote hinterland, Nova Scotia, it does not enter the field of view of any major radio telescope. Secondly, suggestions based on theory as to where and how to search for a black hole have overlooked evidence of the sort to be presented here. How long this black hole has existed is uncertain, but local evidence likely appeared in the 19th century, well before the work of Hawking, Wheeler, or even Oppenheimer and Snyder.

X-ray emission and other radiation from celestial objects such as Cygnus X-1 have not yet provided indisputable proof for the existence of black holes; however, the evidence for Nova S-1 is unequivocal (see figure 1). This structure is located near the sea in western Nova Scotia. The absence of a distance on the sign is consistent with the strongly non-Euclidean nature of spacetime near a black hole.

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One wonders how many personnel of the Nova Scotia Department of Highways disappeared before attempts to establish a distance were abandoned.

In full awareness of the significance of this discovery, I followed the clue evident in figure 1. As expected, the road led

downward. Soon the undulations and slope increased to such an extent that I deemed it wise to abandon my car and proceed on foot. With my own safety in mind and to ensure communication of this discovery to the outside world, I stopped well short of the Schwarzschild surface and took a photograph (figure 2). As one would expect, the strongest tidal effects on our planet are found in this region. Near the invisible horizon is the Bay of Fundy.

In recent years much work has been done on the dynamic properties of the Bay of Fundy to evaluate the feasibility of extracting energy from its large tides. All of these studies have dealt only with a resonance involving the Bay of Fundy—Gulf of Maine system. The several uncertainties still outstanding will doubtless disappear when the influence of the black hole, Nova S-1, is taken into account.

R. L. BISHOP
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10/24/77 *Wolfville, Nova Scotia*

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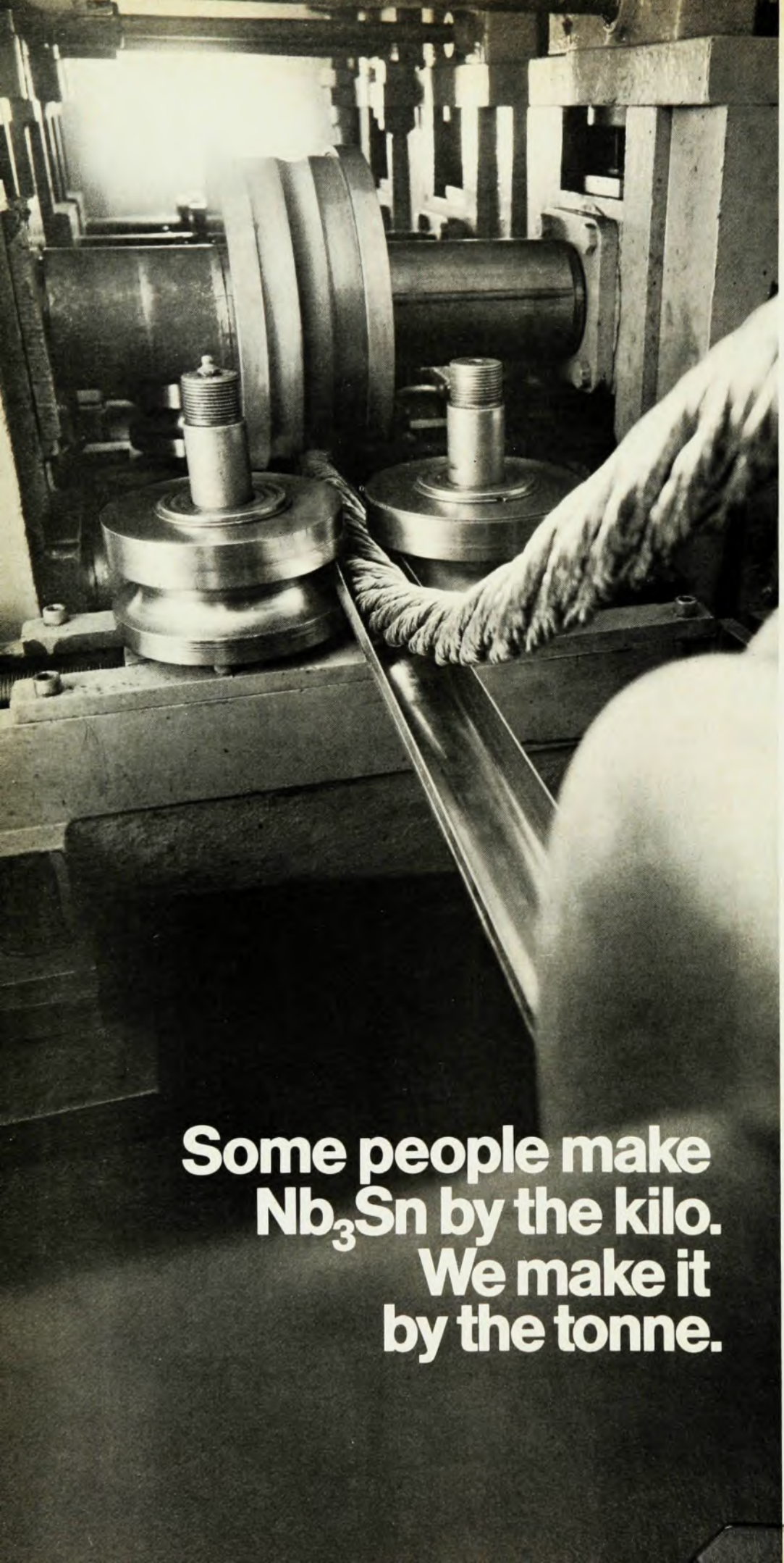
After four meetings, a questionnaire was distributed to the participants asking about the usefulness of the program, possible deficiencies, the format, the impact on teaching and the desirability of other activities.

Twenty-four faculty members returned the questionnaires. The meetings were unanimously ranked as useful because of the updating element. The Saturday format was rated from "excellent" (5 responses) through "very good" or "good" (9 responses) to a low of "fine." The meetings provided "the intellectual stimulation which is necessary to make a good teacher." "The opportunity to interact with my colleagues teaching in other community colleges and with recognized persons doing significant research would otherwise be very limited for me. My community college does not encourage or significantly subsidize travel and release time to attend professional conferences and, as a consequence, opportunities for experiences of this nature would otherwise be very limited." "The opportunity to hear well-presented lectures by authorities in their speciality followed by a period of questions and answers is to me the most appealing feature. . . ."

The impact of the Stanford meetings on teaching of community-college faculty seemed to be most noticeable in the laboratory. "As a direct result of this program, I revisited the upper division physics laboratory (at Stanford) and I wish that I had taken one of our administrators along. Although we have a resonable enrollment in *ten* quarters of physics courses, we do not have even *one* laboratory room which is completely dedicated to physics teaching." "Tour of the undergraduate laboratory was very helpful. We are developing a modern physics laboratory and are considering following Stanford's format."

The faculty participants also appreciated the impact on their lecture courses.

"Students often suffer from myopia: all they can see is their textbook and they think that is all there is to physics. . . . I find it most helpful to spice lecture courses with some fairly detailed infor-



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mation about research frontiers, and my own efforts to keep up-to-date are valiant but still inadequate. It is also difficult to ask a question of a journal!" "Specific information I learned about lasers and spectrograph. It is now included in my introductory optics course." "I used the developing pion radiation treatment facility in my introductory quantum mechanics course as an example of the unexpectedly practical use of what seemed like highly esoteric physics only a short time ago." "... There's a tremendous ripple effect when scientists talk to teachers."

There was one element cited as a deficiency in the Stanford program. "I would have liked an opportunity to have had time and permission to do some of the upper division experiments. A summer open laboratory would be great for me."

Stanford cooperative program

Seminar Topic	Lab tour
Pions in Physics and Medicine	Discussion of summer session
Quarks & Gluons	Superconducting linear accelerator and free electron laser.
Lasers	Varian laser laboratories and advanced student laboratories.
The Solar System, the binary pulsar and Cygnus X-1: Testing grounds for General Relativity	Solar Telescope.
Advances in Low Temperature Physics	Lecture demonstrations in low-temperature physics.
The Search for Planets	Stanford Radio Telescope and solar-energy experiments.
Acoustic Microscopy	Acoustic Microscope Laboratory.

In response to this request, we gave the community college instructors the opportunity to perform experiments—during the summer—in our advanced laboratory. Approximately 20 modern-physics experiments are available at the senior and first-year graduate level. Two community college faculty took advantage of this offer.

The future. The seminar schedule for the next 12 months includes a variation on the theme of the community-college development program: a series of three seminars on ethical problems in the sciences, such as genetic engineering, applications of the sciences in warfare and medical ethics. These are issues that rank high in interest among students and faculty but are not covered in any traditional courses. The discussions would provide examples of relevance that are much in demand in beginning science courses. This new series will be open to both two-year and four-year college faculty members in the surrounding area.

A comment about the nature of the present type of program is in order. Usually the initial impetus is generated by one or two persons who believe there is a need to be met—and if that is the case, the program will flourish. The life of the program is necessarily limited. First, there is the lack of institutionalization; second, there is practically no turn-over of the participants. One should contrast this with a college or a university curriculum: there is constant turnover of students, so that the same institutional program can continue "indefinitely," assuming periodic revitalization.

In principle, a cooperative program between a university and community-college departments could be institutionalized, if funding is available. But the number of participants is fixed. Once their needs are met in one area, interest wanes. We noticed towards the end of last academic year, the attendance at our seminars began to diminish, although this may be partly accounted for by end-of-year pressure. In a more intense summer program at the Lawrence-Hall-of-Science program only 8 out of 30 community college instructors requested a follow-up program in the following year. These experiences show the need for change, either of the participants or the program. By including four-year colleges and moving the basic theme of the seminar from science to ethics we believe that our cooperative program will be revitalized for another year or so.

These conclusions are not meant to be discouraging. On the contrary, we believe that the updating program we have described can be used as a model for other "busy" university departments who are surrounded by community colleges; the discipline is immaterial. (The radius can be extended to two hours driving distance. As the word spread, instructors came from that distance to the Stanford seminars). We have shown that with very modest expenditures of faculty time and funds, a program can be undertaken that has a definite impact on the "continuing professional development of community college faculty," in spite of the inherent limited duration of the program.

* * *

This model program would not have developed without the financial support to the Center for

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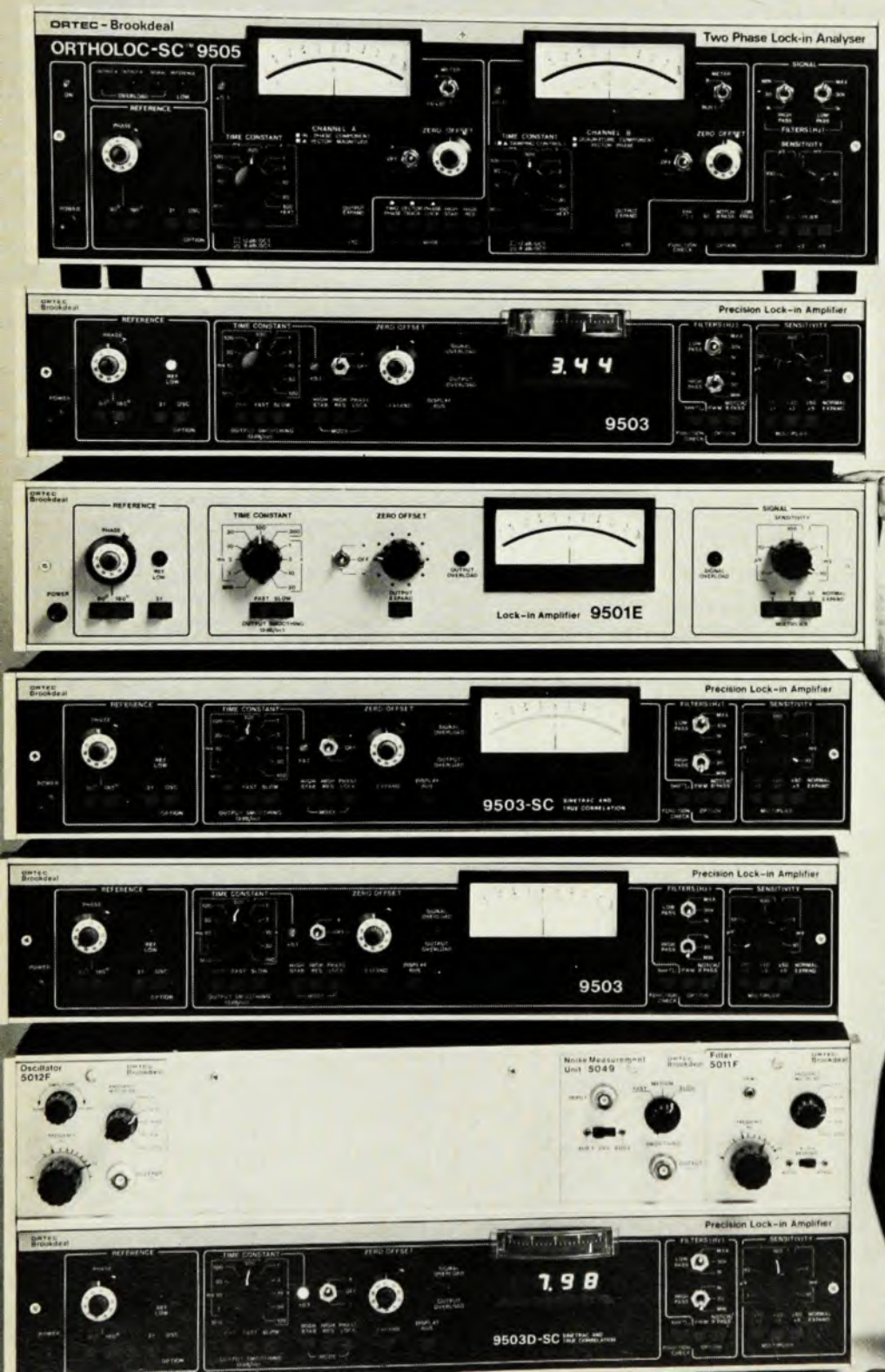

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Delighted reader

The letters to the editor on "Kirkhoff versus Kirchhoff" in November (page 13) were as unexpected a delight as the student who asked me recently to explain "Gesundheit's Law," very carefully.

TED UZZLE
11/22/77 *Cambridge, Mass.*

Soviet discrimination

We wish to protest the discriminatory practices of the Soviet Union towards Israeli scientists wishing to participate in international scientific meetings held in the USSR.

The Fourth International Meeting on Ferroelectricity (IMF-4) was held in Leningrad during 18–23 September 1977. The meeting was organized by the Academy of Sciences of the USSR under the sponsorship of the International Union of Pure and Applied Physics, the International Atomic Energy Agency, and the European Physical Society. We both had delivered papers at the Third International Meeting on Ferroelectricity in Edinburgh in 1973, and we were looking forward to participating in IMF-4. However, at every stage—soliciting information regarding the meeting; inquiring as to the status of our submitted manuscripts; attempting to obtain any entry visa to the USSR—we, and several other Israeli colleagues, encountered incredible obstacles, which ultimately led to our being unable to attend the meeting. Our individual experiences were as follows:

Sidney B. Lang: The abstract of a paper was submitted on 29 March 1977 to G. Smolensky, Chairman of IMF-4 in Leningrad. Receipt of abstract was never acknowledged, nor was information sent regarding the status of the paper. After seeking the assistance of W. Cochran (University of Edinburgh) and W. J. Merz (RCA, Zurich), we received a letter from Cochran, dated 30 June 1977, stating that he had received a cable from Smolensky that the papers of Lang and Havlin had been accepted. Because of the impossibility of an Israeli receiving a visa to the USSR without first travelling to Western Europe, and lacking any official documentation from the organizing committee that could be used in requesting a visa from Soviet embassies in Europe, Lang was forced to withdraw his paper on 25 August 1977. On 16 September 1977, two days before the meeting opened in Leningrad, Lang received the "Second Circular" about the meeting, mailed from Romania on 30 August 1977. This circular bore no date, but it specified a number of deadlines between 30 April and 18 June 1977! It apparently was sent to the non-Israeli participants early in 1977.

Shlomo Havlin: The abstract of a paper was submitted on 7 February 1977 to Smolensky. As in the case of Lang, acknowledgement of the receipt of the abstract, as well as a response to previous letters requesting information regarding IMF-4, was not received. On 8 July 1977 the secretary general of IUPAP, in response to requests for assistance by the Israel Physical Society, cabled that Havlin's paper was included in the meeting program, and that he need only apply to Intourist for an entry visa. On 9 August 1977, Havlin arrived in Paris and on the same day began the procedure for a visa at the local Intourist representatives. For five weeks Havlin waited in the hope of receiving an entry visa. At every visit to the office of the Intourist representatives as well as to the Soviet embassy, he was assured that "tomorrow" his visa would be issued and there was no basis for concern. All that was issued was confirmation from Intourist at the end of August of a hotel reservation in Leningrad. Havlin had also informed the Soviet officials that he wished to leave Paris for Leningrad no later than 8 September. The seemingly sincere promise that the visa would surely be forthcoming led Havlin to remain in Paris beyond that date and during the last week he went to the embassy daily. On 11 September, with no visa yet available, Havlin finally realized that there was no further point in continuing his futile battle and he left Paris. Although the organizers of the Leningrad Meeting had made firm promises to IUPAP, to Cochran, and to Merz, the Soviet authorities refused to issue a visa.

From our experiences, it is obvious that

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