

510 f. 10

MC 0572

[Institute of High Energy Physics, Serpukhov, 1975-1976]

OK

BOX 6-07, FOLDER 7

Columbia University

DEPARTMENT OF PHYSICS

NEVIS LABORATORIES

P.O. Box 137
Irvington, N.Y. 10533
914 LY 1-8100

May 19, 1977

Dear

It is now clear that the Serpukhov meeting made a serious error in turning the future of VBA over to IUPAP. The result has been unimaginably sluggish even when there are essentially no issues. I learned from Van Hove that Gregory's negotiations with the Russians were complicated by much "higher" level French-USSR problems but that he nevertheless assumed that the USSR demand for an extra delegate to the VBA panel was a real issue. Having read Ned's 10 May letter only three times, I begin to suspect that Gregory had no grounds for this. I told Van Hove that most of us don't care about an additional USSR or Dubna delegate and are more anxious to get down to the scientific level - the sooner the better. Van Hove thought this was an important point that should be made known. To make progress I suggest that Viki be authorized (say by the lack of protest telexed within 24 hours) to telephone or telex Van Hove, Logunov and Yamaguchi, proposing an organizational meeting of the VBA panel in CERN. A choice of dates, e.g. August 1, September 1, could be given. Gregory/Rousset should then be invited. We could then decide whether to remain with IUPAP or use some other framework. If we can't even assemble the VBA working group within 15 months of the Serpukhov meeting, perhaps it is a hopeless case.

Sincerely,

Leon M. Lederman

copies to: M. Bardon, V. Weisskopf, F. Low, R. Wilson,
E. Goldwasser, S. Drell

UNIVERSITY OF TOKYO

3-1 HONGO 7-CHOME
BUNKYO-KU, TOKYO (POSTAL CODE 113)

DEPARTMENT OF PHYSICS
FACULTY OF SCIENCE

TELEPHONE (TOKYO 03) 812-2111
CABLE TOKUNIV RIGAKU

May 3, 1977

Professor L. Lederman
Physics Department
Columbia University
New York, N.Y. 10027
U. S. A.

Dear Leon,

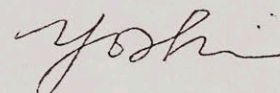
I heard that you gave an interesting talk on VBA at the accelerator conference in Chicago. I like to have a copy of your talk if available.

I guess that you must be a member of ICFA from U.S.A.. I shall also be a member if IUPAP agrees. I heard a rumour that ICFA may have a meeting in this summer. Do you know anything on such a possibility? I like to hear from you all about ICFA, I am quite isolated from "outside" since Serpukhov/Moskow (if some should be treated as confidential, you can trust me of course). Also I wonder how you and Viki are doing for ICFA, though I know our (and perhaps international) proverb: the more haste, the less speed.

It is quite interesting that the European LEAP, the post PETRA project, may grow into an intercontinental one: what would be a relation between the future (?) ICFA and a super European LEAP? Or what kinds of impetus to ICFA will be given by this super LEAP? It seems to be a time for us to "work" !?

I hope to hear from you soon.

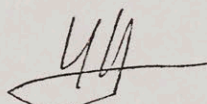
Yours Sincerely,



Yoshio Yamaguchi

P.S. I send this letter to Columbia, Fermi Lab, and CERN.

YY/ni

The Original was sent to Columbia 



Fermilab

Fermi National Accelerator Laboratory
P.O. Box 500 • Batavia, Illinois • 60510

Directors Office

May 10, 1977

Professor B. P. Gregory
Delegation Generale a la Recherche
Scientifique et Technique
DGRST
35, Rue Saint Dominique
75700 Paris, France

Dear Professor Gregory:

Norman Ramsey has just returned from CERN and has indicated to me that you are awaiting some kind of word from me which might unblock the present stalemate in establishing the ICFA Committee and in scheduling its first meeting. This came as a surprise to me, because I have received no such information from you. I believe that the last word I have received from Rousset indicated that you were on your way to the Soviet Union and that you had hopes of resolving the impasse during that trip. I have heard no subsequent report on the outcome of your efforts.

It is quite true that I might have some reluctance to accept one or another proposal regarding international representation on the ICFA Committee. As of now, however, negotiations are being guided by information which you received after the Commission's Tbilisi meeting and by your interpretations and reactions to that information. In my letter of January 19, I indicated my own readiness to accept the revised representation, 3-3-3-1-1 which had been proposed by you. I did, at the same time, indicate my own opinion that a better way to proceed would be exactly in accordance with the agreement we had formally reached in Tbilisi with the understanding that the Eastern Europeans would be informed that all questions of representation could be reopened at the 1977 meeting of the Commission and perhaps revised at that time. It was further my realization that under those conditions the Eastern Europeans might choose not to participate in ICFA, pending resolution of the representation problem. I was ready to take that risk, feeling that not to do so would be setting a precedent under which formal actions taken by the IUPAP Commission or by the new Committee would always be tentative, subject to unilateral afterthoughts, and therefore of very little significance.

Although the above describes my own personal preference, I also indicated to you in my telex to A. Rousset on October 8, 1976 that if you had a solution in hand, involving a change in the agreed upon representations, I would be willing to go along with those changes. I did raise the question of whether, in fact, the Commission, as a whole, could be expected to go along with such a change without taking a mail poll. It was your judgment, as I remember it, expressed in your letter of January 6, that the relationship between representations of various "delegations" should not be significantly changed. I don't believe that such a possibility was ever explicitly placed before me or before other members of the Commission. I therefore do not believe that I have ever turned down such a possibility, although there may, indeed, be serious objection to it.

Again, speaking for myself, I would be quite ready to consider unilateral increased representation for Eastern European countries, but I feel that such a possibility should be considered only in response to a specific request by them for a reconsideration of the problem, and preferably only at the next meeting of the IUPAP Commission. Nevertheless, although that is my immediate reaction, if I were to be presented with a concrete proposal, I would certainly give it further serious consideration and would discuss it with others whom I feel I represent. Until now, I have not felt that any such proposal had been made. Please let me know if I have misunderstood some communication from you.

Sincerely,

Edwin L. Goldwasser

Edwin L. Goldwasser

cc: F. Low
V. Weisskopf ✓
R. Wilson
L. Lederman
S. Drell

(415) 854-3300
X2601

DATE: March 29, 1976

To : Memorandum to the Files

FROM : W. K. H. Panofsky *W K H P*

SUBJECT: VBA File - Discussions with David Elliott at NSC

Bill Wallenmeyer and I met with David Elliott on Friday, March 26. Jim Kane did not attend.

We briefed Elliott on the status of the VBA; he was vaguely acquainted with the project but had known little detail. His general views were:

1. The current "cooling off" in connection with the Soviet-U.S. bilateral agreements affected only cabinet level meetings. Since the Serpukhov meeting was at two levels below that and in addition had become trilateral, he concluded that we should proceed on a "business as usual" basis.

2. Elliott will discuss the question of publicity with his colleagues. He will let us know if any but a "low profile" but public posture in connection with the Serpukhov meeting would be advisable.

We agreed that considering the present status of the VBA discussions the Executive Office and the White House had no current role, but we should keep one another informed.

We acquainted Dave Elliott with the current foreign travel support difficulties as they relate to the forthcoming Tblisi meeting.

Dave Elliott agreed to intervene with OMB in case these Serpukhov discussions would in any way interact with the development of U. S. budgetary plans in high energy physics.

We had some general discussions on the status of Chinese high energy physics.

cc: V. Weisskopf
W. Wallenmeyer
S. Drell

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
 COMPTROLLER'S ACCOUNTING OFFICE
 TRAVEL EXPENSE VOUCHER

PROJECT/ACCOUNT NO. 83858
 ACCTG. VOUCHER NO. _____

NAME Victor F. Weisskopf EMPLOYEE YES NO
 ADDRESS 6-303
 DATE TRIP STARTED 7-15-76 TIME _____ AM/PM DATE TRIP ENDED 7-21-76 TIME _____ AM/PM
 PURPOSE OF TRIP Attend Conference at Tbilisi, USSR, from Geneva, Switzerland

TRANSPORTATION LEAVE AMOUNT COLUMN BLANK IF TICKETS WERE FURNISHED				
DATE	FROM	TO	MODE	AMOUNT
7-15-76	Geneva, Switzerland	Moscow USSR	Air	XXXXXXXX
	Moscow, USSR	Tbilisi, USSR	Air	XXXXXXXX
7-21-76	Tbilisi, USSR	Moscow, USSR	Air	XXXXXXXX
	Moscow, USSR	Geneva, Switzerland	Air	XXXXXXXX

PRIVATELY OWNED AUTOMOBILE _____ MILES @ _____ PER MILE
 TOLL CHARGES _____

TAXI, BUS, ETC.			
DATE	FROM	TO	MODE

SUBSISTENCE

HOTEL	NUMBER OF NIGHTS
	NUMBER OF MEALS
PER DIEM ALLOWANCE (IN LIEU OF HOTEL AND MEAL CHARGES)	DAYS @ PER DAY

OTHER EXPENSES (ITEMIZE)

<p>PLEASE ATTACH TICKET STUBS AND HOTEL BILLS</p> <p><i>Victor F. Weisskopf</i> SIGNATURE OF TRAVELER</p> <p style="text-align: right;">DATE <u>September 23, 1976</u></p> <p>APPROVED _____ DATE _____</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">TRAVELER'S EXPENSE</td> <td style="width: 10%;">\$</td> <td style="width: 20%;">\$</td> </tr> <tr> <td>LESS-CASH ADVANCE</td> <td></td> <td></td> </tr> <tr> <td>NET AMOUNT DUE:</td> <td></td> <td></td> </tr> <tr> <td>M.I.T.</td> <td>\$</td> <td></td> </tr> <tr> <td>TRAVELER</td> <td>\$</td> <td></td> </tr> <tr> <td colspan="3" style="text-align: center;">FURNISHED TICKETS</td> </tr> <tr> <td colspan="3" style="text-align: center;">ACCOUNTING USE ONLY</td> </tr> <tr> <td colspan="2" style="text-align: right;">TOTAL COST OF TRIP</td> <td>\$</td> </tr> </table>	TRAVELER'S EXPENSE	\$	\$	LESS-CASH ADVANCE			NET AMOUNT DUE:			M.I.T.	\$		TRAVELER	\$		FURNISHED TICKETS			ACCOUNTING USE ONLY			TOTAL COST OF TRIP		\$
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TRAVELER	\$																								
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ACCOUNTING USE ONLY																									
TOTAL COST OF TRIP		\$																							

October 4, 1976

Mr. George Macpherson
U.S. Energy Research and
Development Administration
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439

Dear Mr. Macpherson:

I am sorry about the mix-up with my trip report. I started my trip abroad and stayed abroad until now. This is why I did not have the detailed correspondence in hand and I did not know about your request for a trip report. I did write a report to Dr. Wallenmeyer but he probably considered this letter as a personal communication to him. Attached you will find my report.

Sincerely yours,

Victor F. Weisskopf

VFW:dle

encl. (8 copies)

TRIP REPORT

October 4, 1976

Contract No.: E(11-1)-2959
Traveler: Dr. V. Weisskopf
Dates of Travel: July 16-21, 1976
Report Due Date: October 15, 1976 (extended)

The reason for my trip was to attend a meeting of the IUPAP Division for High Energy Physics which was supposed to discuss the decisions in regard to the VBA (Very Big Accelerator) which were taken at a Serpukhov meeting in May -- the official report of which I also include. The IUPAP Division Meeting coincided with the Tbilisi International Conference in High Energy Physics, of which I attended only a very few and scattered events. My report covers only the IUPAP Division Meeting.

The Serpukhov report contains a proposal to the IUPAP Division of Particles and Fields to appoint a subcommittee with the following three terms of reference.

1. To co-ordinate design and construction of new regional facilities around the world.
2. To encourage and support joint utilization of regional facilities by the world community.
3. To provide studies leading to the next generation of super-high facilities leading to the start of the design of international projects in about 10 years.

B. Gregory, the president of the IUPAP division, chaired a meeting of that division -- to which a number of additional people were invited. The American members are: F. Low and N. Goldwasser; I was invited to join. The European members were: Stafford (?) and M. Conversi, and the following people were invited: Van Hove, von Dardel, A. Rousset, and Salam. There were, of course, a number of Russians and Easterners present, among them: Yarba, Chuvilo, Soloviev, Dzhlepov, Lanis, Bogoliubov; there was also a Polish and a Japanese representative.

.....

V. F. Weisskopf Trip Report (continued)--2

The group accepted the proposal of the Serpukhov meeting after a little discussion. No very critical remarks were uttered. People seemed to like the idea. The Russians did not oppose in any way statements to the effect that the most important task of the subcommittee would be No. 3. Gregory, who is strongly in favor of VBA led the meeting in an excellent manner.

The final decision was as follows: The appointment of the subcommittee was unanimously approved. The composition will be determined as follows: Gregory will write an explanatory letter to one man in each region: Drell in USA, Van Hove in Europe, Chuvilo (I think) in USSR, the director of KEK in Japan. He will also appoint one person from IUPAP, to represent the Non-machine countries. He will appoint A. Rousset as the executive secretary of the group.

The sub-committee should get together for the first time this fall. It is an organizing, not a working committee. It should initiate working groups, organize meetings and report from time to time to the community at some of the Rochester conferences.

Victor F. Weisskopf

Dismal



UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
CHICAGO OPERATIONS OFFICE
9800 SOUTH CASS AVENUE
ARGONNE, ILLINOIS 60439

TELEPHONE
(312) 739-7711

X 2156

In Reply Refer To:

September 14, 1976

Mr. Paul C. Powell, Asst. Director
Office of Sponsored Programs
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

OFFICE OF SPONSORED PROGRAMS

SEP 20 1976

Dear Mr. Powell:

RE: TO _____ 8385B

CONTRACT NO. E(11-1)-2959
TRAVELER: DR. V. WEISSKOPF
DATES OF TRAVEL: JULY 16-21, 1976
REPORT DUE DATE: AUGUST 5, 1976

THIRD REQUEST

We have not received Dr. Weisskopf's trip report as requested in our letters of July 20 and August 26, 1976.

We would appreciate receiving this report in eight copies as soon as possible.

Sincerely,

Seymour Zirin
Senior Contract Administrator
Contracts Management Office

cc: Dr. V. Weisskopf
Dept. of Physics

Gerry Zingale



August
5 July 1976

Dr. William A. Wallenmeyer
Assistant Director for
High Energy Physics Programme
Division of Physical Research
ERDA
WASHINGTON, D.C. 20545

Dear Bill,

This is to report shortly what has happened in Tbilisi in regard to the VBA. Things went smoothly along the line of the Serpukhov Report, which you are acquainted with. In that report it was proposed to the IUPAP division of particles and fields to appoint a subcommittee with the following three terms of reference.

1. To co-ordinate design and construction of new regional facilities around the world.
2. To encourage and support joint utilization of regional facilities by the world community.
3. To provide studies leading to the next generation of superhigh energy facilities leading to the start of the design of international projects in about 10 years.

B. Gregory, the president of the IUPAP division, chaired a meeting of that division - to which a number of additional people were invited. The American members are : F. Low and N. Goldwasser; I was invited to join. The European members were : Stafford (?) and M. Conversi, and the following people were invited : Van Hove, von Dardel, A. Rousset, Salam. There were, of course, a number of Russians and Easterners present, among them : Yarba, Chuvilo, Soloviev, Dzhlepov, Lanius, Bogoliubov; there was also a Polish and a Japanese representative.

The group accepted the proposal of the Serpukhov meeting after a little discussion. No very critical remarks were uttered. People seemed to like the idea. The Russians did not oppose in any way statements to the effect that the most important task of the subcommittee would be No.3. Gregory, who is strongly in favour of VBA led the meeting in an excellent manner.

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region : Drell in USA, Van Hove in Europe, Chuvilo (I think) in USSR, the director of KEK in Japan. He will ask for the nomination of 2 people each from Europe, USA, SU, one from Japan. He will also appoint one person from IUPAP, to represent the Non-machine countries. He will appoint A. Rousset as the executive secretary of the group.

The sub-committee should get together for the first time this fall. It is an organizing, not a working committee. It should initiate working groups, organize meetings and report from time to time to the community at some of the Rochester conferences.

In private discussions with Drell, we thought that Lederman and Sandweiss would be a good US-representation. Perhaps one should ask Pief to be an, if he agrees. Lederman is a necessity since he is really full of enthusiasm for the whole thing.

So far the IUPAP session. You will have received reports on Tbilisi. I was there only half of the time. My impression was that the conference was somewhat better than most of us feared. The Russian rapporteurs were not the best Russians, but they worked very hard and projected the main statements in English (good idea). Of course, the conference was overshadowed by the new charm-particles and the new lepton (which I do not yet believe). Most of the important Russian theorists were present : Gribov, Okun, Lapidus, Yaffee, Migdal, etc., but they were not given rapporteur talks, nor introductory parallel session talks. Even Sacharov was present.

I will be back at the end of September. Of course, Sid and Francis Low can give you more information.

Best wishes !

V.F. Weisskopf



UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
CHICAGO OPERATIONS OFFICE
9800 SOUTH CASS AVENUE
ARGONNE, ILLINOIS 60439

In Reply Refer To:

July 20, 1976

Mr. Paul C. Powell, Director
Office of Sponsored Programs
Massachusetts Institute of Technology
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

Dear Mr. Powell:

CONTRACT NO. E(11-1)-2959

The official foreign travel of Dr. Weisskopf is approved. In accordance with the provisions of this contract covering foreign travel, funds in an amount not to exceed \$660. may be used to defray his travel expense.

In accordance with 49 U.S.C. 1517, this approval is contingent on the use of United States air carriers for the transportation involved, to the extent that service by these carriers is available. In order to be reimbursed for transportation not furnished by United States air carriers, you will have to furnish satisfactory proof of the necessity therefor.

This approval is granted on the express condition that the traveler will prepare a trip report which will be submitted in eight copies within fifteen days after completion of the trip.

The trip report should be prepared in accordance with the reporting requirements as outlined in the enclosed ERDAM CH-CA Appendix 1501. These reporting requirements include:

1. A summary of meetings, conferences attended emphasizing conclusions reached or recommendations made.
2. A general discussion of laboratory visits; an itinerary of such visits and the names of those contacted.
3. An appraisal of the work of conferences from a scientific standpoint and from the standpoint of U. S. interest, including the view of participants from other countries.
4. Details of social and political events should be held to a minimum, but impressions and observations that the traveler considers significant should be reported.



HTA-FL 0376



UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
WASHINGTON, D.C. 20545

AUG 8 1976

Professor Victor F. Weisskopf
Department of Physics
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

Dear Professor Weisskopf:

Please accept my belated thanks for your informative letter describing the meeting of the Study Group on International Collaboration at Serpukhov. I am, of course, greatly interested in the activities of this group, most particularly in how their views of the future relate to the more short-range plans that ERDA must make.

Since we last met, HEPAP has strongly endorsed the construction of ISABELLE as the next major high energy physics construction project. I attended two days of their meeting, and was impressed with the unanimity which prevailed. There is little chance that ISABELLE will be in ERDA's FY 78 budget submission, but I will do my best to get it included in the FY 79 planning. PEP, the Saver/Doubler and then ISABELLE will give the U.S. an excellent complement of facilities for the time you call Period I.

I concur most strongly that the entire scientific community must work even harder toward more fruitful collaborative use of the present and future machines. Such interaction will perhaps encourage the essential steps toward the ultimate goal of a truly international VBA.

Thanks again for your letter.

Sincerely,

James S. Kane
Deputy Assistant Administrator
for Physical Research





MEMORIAL UNIVERSITY OF NEWFOUNDLAND
St. John's, Newfoundland, Canada A1C 5S7

Department of Physics

Telex: 016-4101
Telephone: (709) 753-1200

August 27, 1976

The Editor
Physics Today
335 E. 45 Street
New York, N.Y. 10017
U.S.A.

Dear Sir:

In connection with remarks by Robert E. Diebold concerning a letter to the editor that I submitted, let me point out that the total construction costs for FNAL were \$250 million. $\$250 \text{ million} \times 25 = \6.25 billion . Taking inflation into account, this could easily exceed \$10 billion. The present annual operating budget for FNAL is \$50 million and it is rising. $\$50 \text{ million} \times 25 = \1.25 billion . If anything, my figures for the costs of the Very Big Accelerator were gross underestimates.

Yours truly,

A handwritten signature in cursive script that reads "Robert J. Yaes".

Robert J. Yaes

RJY/md



UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
WASHINGTON, D.C. 20545

AUG 2 1976

Professor Victor F. Weisskopf
Department of Physics
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

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Thanks again for your letter.

Sincerely,

James S. Kane
Deputy Assistant Administrator
for Physical Research



physics today

335 East 45 Street / New York, N.Y. 10017 / 212 685 1940

Harold L. Davis / Editor

23 June 1976

Professor Victor F. Weisskopf
Department of Physics
Massachusetts Institute of Technology
Cambridge, Mass. 02139

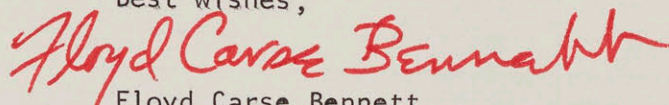
Dear Professor Weisskopf:

Here is the article on the Serpukhov study group's report we discussed on the phone; we expect to run the story in the "State & Society" section of our August issue. Would you mind taking time to examine it? I'd like to know if there are any errors, omissions or distortions of fact. Also, I used some of the information (paraphrased) from your comments; if there is any of this material in the story that you think should not be included, we'll gladly omit it.

Time is short, as you know. The story is to go to the printers on Tuesday, June 29th, but as I recall your schedule is tighter than that. I hope this will have arrived Friday the 25th, but otherwise please call in your suggestions or comments on Monday if possible.

Thank you so much for all your help.

Best wishes,



Floyd Carse Bennett
Assistant Editor

Published by
The American Institute
of Physics

Member Societies:
American Physical Society
Optical Society of America
Acoustical Society of America
Society of Rheology

American Association of Physics Teachers
American Crystallographic Association
American Astronomical Society
American Association of Physicists in Medicine

Serpukhov

temporary head

International collaboration on a Very Big Accelerator is a must if one is to be constructed, according to the more than 30 participants at a recent high-level meeting on future accelerators and high-energy physics. Further study of the concept of a VBA complex--one with such facilities as a proton accelerator capable of reaching energies of 10 TeV or higher, or a 200-plus-GeV electron-positron colliding-beam ring--was the major recommendation of the international Study Group which met recently in the USSR at Serpukhov (see physics today, May 1976, page 19). The Study Group also endorsed interregional coordination of the design and construction of several new regional facilities, as well as joint use of the new devices by researchers worldwide.

A formal instrument was proposed to aid in the coordination of regional efforts and to spearhead VBA planning; the Study Group called on the Division of Particles and Fields of the International Union of Pure and Applied Physics to appoint a subcommittee for this purpose. Creation of such a subcommittee was to be discussed at a conference on high-energy physics in mid-July at Tbilisi in Soviet Georgia.

Prospects for the VBA. The Study Group has explored preliminary ideas about the sort of facilities likely to be essential to the advancement of high-energy physics near the end of the century (see box). What emerged was a vision of accelerators and storage rings designed for particle collisions at better than five times the energy of any regional facility now under consideration (see table). These behemoths would have orbit radii of 5-15 km, and each could cost three to six times as much as the US's Fermilab accelerator or Europe's Super Proton Synchrotron at CERN. However, participants at the Serpukhov meeting concluded that by the time a VBA project nears realization, technical progress will have substantially reduced the pricetag. Still, the Study

Group expects that costs will remain so high that only an interregional team--the US, Japan, Europe and the USSR--will be able to undertake the VBA effort. They urged discussions leading to a beginning of VBA design in about ten years.

The American delegation reportedly pressed hardest at the meeting for endorsement of the VBA concept, but the idea also received substantial backing at a recent meeting of the European Committee for Future Accelerators. In the opinion of Victor Weisskopf (MIT), one of the US members of the Study Group, it would be in the Europeans' interest to push for further progress on the VBA, which would likely be located in their area, rather than to pursue a larger, post-SPS facility for CERN.

Regional facilities. While group members hope the VBA will become available as an interregional research center, they foresee a number of new regional projects in the near future. In the US, funding has already been authorized for construction of the Positron-Electron Project at Stanford, and the Energy Doubler/Saver at Fermilab is partially funded. PEP will produce 18-GeV colliding beams of electrons and positrons; it is expected to start operation in early 1980. The Doubler, a proposed ring of superconducting magnets to be installed in Fermilab's main ring, could be used to double the energy of the accelerator's proton beam or to conserve electrical energy. Two other major American facilities have been proposed: At Brookhaven isabelle, the Intersecting Storage Accelerator, would accelerate proton beams inside a storage ring, using the lab's Alternating Gradient Synchrotron as an injector. Fermilab's popae would produce 2-TeV (center-of-mass energy) colliding proton beams.

Japan's proposed tristan would encompass a variety of functions; like isabelle, it would involve particle injection from a smaller (12-GeV) synchrotron (see page xx) to produce colliding proton beams, and the designers visual-

ize the eventual addition of an electron ring for electron-proton collisions.

The Institute of Nuclear Physics at Novosibirsk (Soviet Union) proposes to build VEPP-4, latest in a sequence of electron-positron storage rings. A more ambitious project is the stationary-target proton accelerator UNK, to be located at Serpukhov. UNK, too, involves a group of proposals; its builders contemplate that the first stage would be followed by colliding-beam facilities for proton-proton and electron-proton experiments.

In the case of petra, the Positron-Electron Tandem Ring Accelerator under construction at DESY in Hamburg, the Germans have sought substantial international collaboration on its design and use. Two joint European projects in the planning stage are the Large Storage Ring, to be added on to the SPS, and the Large Electron-Positron device, which would produce substantially more energetic electrons than would any of the other facilities under consideration.

The potential for needless duplication of costly facilities and the value of responsible interregional cooperation in planning for regional accelerators and storage rings was recognized by the Study Group. The Soviet Union's UNK and the US's popae, for example, or isabelle at Brookhaven and tristan in Japan would have comparable capabilities; in such cases, should one nation change its plans, and if so which? Such problems are expected to face the proposed IUPAP subcommittee. The Serpukhov participants, however, have issued a clear call for international consultation on these new projects, including the possible exchange of expert personnel between regions for design and construction activities.

Instrumentation projections. On the basis of expected improvements in experimental techniques and equipment, the Study Group concludes that experimental costs in the new generation of high-energy facilities will not increase

relative to machine costs, and may even decrease. Among developments foreseen by the Serpukhov group were the following: integrated circuits for drift-chamber electronics, improved resolution in calorimeters, better Čerenkov counters (and use of the transition-radiation technique to replace them in particle identification), microprocessing by computers, superconducting spectrometer magnets and data transmission by satellite. The Study Group cites development of better experimental techniques as a prime area for close communication between groups of researchers throughout the world. They recommend joint studies of new technology and the joint design and/or construction of regional-project components.

--fcb

Physics projections

The Serpukhov study group outlined some of the unanswered questions in high-energy physics and identified the special capabilities of each type of projected accelerator.

Among the key questions, the group said, are: "Do quarks exist and, if so, how are they confined in hadrons, and what are the forces between them? The recent results about hadron collision products which possess high transverse momentum have shown how little we understand about the internal dynamics of hadrons. Secondly, is the Weinberg-Salam gauge theory of weak interaction pointing towards the real solution or is it a wrong approach? The quantitative agreement of neutral-current data with theory is strong encouragement for gauge theories. Nevertheless, no deviations from a four-fermion structure of the weak force have yet been observed."

For weak interactions, it is expected that at about 1000 GeV (center-of-mass system) the simple four-fermion theory will break down. There might be a whole series of intermediate bosons, Higgs bosons of different kinds and a series of heavy leptons and neutrinos.

For strong interactions, there is no indication of a definite critical energy range. One would like to know whether or not further quantum numbers exist, such as charm, flavor, color and so on.

The accelerators and storage rings being discussed for the VBA each have their advantages:

- Proton-proton and proton-antiproton storage rings, which reach the highest practicable center-of-mass energies at the price of lower luminosity, appear adequate for finding the weak-interaction intermediate bosons, provided

the Drell-Yan production model can be applied. In studying strong interactions, total cross sections and energy dependence of particle-production mechanisms will be probed in a significant way.

• The importance of conventional proton synchrotrons is in their higher luminosity, diversity of external beams and the opportunity to use nuclear targets.

• Electron-positron colliding beams allow the clean study, not only of quantum electrodynamics and electromagnetic production of hadrons, but of weak interactions as well. In addition any charged heavy leptons or other charged non-hadronic pairs (including intermediate bosons) would be produced at a measurable rate, if they exist.

• Electron-proton rings permit the clean study of strong interactions at small distances. They can test the idea that the strong interactions weaken at small distances and grow at large ones (asymptotic freedom). One can study the nature of proton constituents and how (or whether) they are confined. Finally, heavy leptons might be produced (if they exist).

Projected High-Energy Physics Facilities

Region	Facility	Status	Maximum Energy (GeV)					$e^+ e^-$ (c.m.s.)	circumference (km)
			p(l.s.) [*]	e (l.s.)	pp(c.m.s.)	$p\bar{p}$ (c.m.s.)	pe (c.m.s.)		
Japan	<u>tristan</u>	proposed	180	17	360		110	34	~2.0
West Germany	<u>petra</u>	funded		19				38	2.3
CERN nations	LSR	planned	400	20	800	800	180		6.4
	LEP	planned		<100				<200	<50.0
	PEP	funded	200	18			100	36	2.2
USA	Doubler	partially funded	1000						~6.0
	<u>isabelle</u>	proposed	200	20	400		130		3.0
	<u>popae</u>	proposed	1000	20	2000		280		5.5
USSR	VEPP-4	proposed		7				14	(?)
	UNK	proposed	2000	20	4000	4000	400		18.0
International	VBA (fixed target)	studies in progress	>10 000		>20 000	>20 000			30-60
	VBA $e^+ e^-$	studies in progress		>100				>200	>50.0

* Abbreviations: p=protons, \bar{p} = antiprotons, e^+ = positrons, e^- = electrons, l.s. = laboratory system, c.m.s. = center-of-mass system.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF PHYSICS
CAMBRIDGE, MASSACHUSETTS 02139

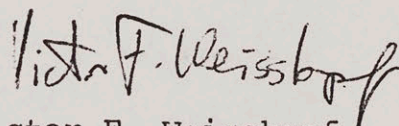
October 4, 1976

Mr. George Macpherson
U.S. Energy Research and
Development Administration
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439

Dear Mr. Macpherson:

I am sorry about the mix-up with my trip report. I started my trip abroad and stayed abroad until now. This is why I did not have the detailed correspondence in hand and I did not know about your request for a trip report. I did write a report to Dr. Wallenmeyer but he probably considered this letter as a personal communication to him. Attached you will find my report.

Sincerely yours,



Victor F. Weisskopf

VFW:dle

encl. (8 copies)

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

DEPARTMENT OF PHYSICS

CAMBRIDGE, MASSACHUSETTS 02139

TRIP REPORT

October 4, 1976

Contract No.: E(11-1)-2959
Traveler: Dr. V. Weisskopf
Dates of Travel: July 16-21, 1976
Report Due Date: October 15, 1976 (extended)

The reason for my trip was to attend a meeting of the IUPAP Division for High Energy Physics which was supposed to discuss the decisions in regard to the VBA (Very Big Accelerator) which were taken at a Serpukhov meeting in May -- the official report of which I also include. The IUPAP Division Meeting coincided with the Tbilisi International Conference in High Energy Physics, of which I attended only a very few and scattered events. My report covers only the IUPAP Division Meeting.

The Serpukhov report contains a proposal to the IUPAP Division of Particles and Fields to appoint a subcommittee with the following three terms of reference.

1. To co-ordinate design and construction of new regional facilities around the world.
2. To encourage and support joint utilization of regional facilities by the world community.
3. To provide studies leading to the next generation of super-high facilities leading to the start of the design of international projects in about 10 years.

B. Gregory, the president of the IUPAP division, chaired a meeting of that division -- to which a number of additional people were invited. The American members are: F. Low and N. Goldwasser; I was invited to join. The European members were: G. Stafford and M. Conversi, and the following people were invited: Van Hove, von Dardel, A. Rousset, and Salam. There were, of course, a number of Russians and Easterners present, among them: Yarba, Chuvilo, Soloviev, Dzhlepov, Lanius, Bogoliubov; there was also a Polish and a Japanese representative.

.....

V. F. Weisskopf Trip Report (continued)--2

The group accepted the proposal of the Serpukhov meeting after a little discussion. No very critical remarks were uttered. People seemed to like the idea. The Russians did not oppose in any way statements to the effect that the most important task of the subcommittee would be No. 3. Gregory, who is strongly in favor of VBA led the meeting in an excellent manner.

The final decision was as follows: The appointment of the subcommittee was unanimously approved. The composition will be determined as follows: Gregory will write an explanatory letter to one man in each region: Drell in USA, Van Hove in Europe, Chuvilo (I think) in USSR, the director of KEK in Japan. He will also appoint one person from IUPAP, to represent the Non-machine countries. He will appoint A. Rousset as the executive secretary of the group.

The sub-committee should get together for the first time this fall. It is an organizing, not a working committee. It should initiate working groups, organize meetings and report from time to time to the community at some of the Rochester conferences.

Victor F. Weisskopf
Victor F. Weisskopf

UNIVERSITY OF TOKYO
3-1 HONGO 7-CHOME
BUNKYO-KU, TOKYO (POSTAL CODE 113)

DEPARTMENT OF PHYSICS
FACULTY OF SCIENCE

TELEPHONE (TOKYO 03) 812-2111
CABLE TOKUNIV RIGAKU

March 12, 1976

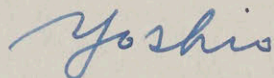
Professor V. F. Weisskopf
Department of Physics
Massachussetts Institute of Technology
Cambridge, Massachussetts 02139
U. S. A.

Dear Viki,

I have just heard from Suwa, the director of KEK, that you can not come to Japan. I have forseen this might happen, since it was such a hurry invitation. At the same time I was wondering that by chance you might be able to come even for a short period. Now I deeply regret to hear the answer from you.

I do hope that you could visit our country in another occasion.

Yours Sincerely,



Yoshio Yamaguchi

YY/ni

The Study Group came to the following agreement:

(Description of the present state of physics and statement of the needs of higher energy facilities of the various types)

Important contributions to these developments have come from international collaborations from different regions, such as:

It is important to extend this collaboration in several directions.

(A) It should include studies of new technology (superconductivity, developments of experimental technology, organization of wider international uses of facilities on the basis of present and future agreements, and also joint work in construction of sub-elements in regional projects.

(B) Ways should be found to help in co-ordinating the present regional planning of new facilities which are expected to be constructed in the next 10-15 years. Co-ordination of efforts and avoidance of unnecessary duplication should be encouraged by mutual information, discussion and advice.

(C) The establishment of international collaboration should include the study of rational ways and perspective directed towards the realization of the next generation of high energy facilities, following the presently planned regional projects. It is expected that these facilities will be so large that their realization will be possible only by pooling the resources of all regions into common projects.

In view of the need for those extensions of international collaboration, the Study Group suggests to the IUPAP Division of Particles and Fields to initiate these activities in the appropriate

form and to organize future meetings of study groups such as the present one in due time intervals.



Japanese Participant

Professor Y. Yamaguchi
Department of Physics
University of Tokyo
Hongo, Tokyo 113
JAPAN

U.S.S.R. Participants

A.A. Logunov
A.A. Vassilyev
M.A. Markov
V.A. Glukhikh
L.D. Soloviev
I.V. Tchuvalo
V.A. Yarba
A.TS. Amatuni
N.A. Monoszon
A.A. Naumov
A.N. Skrinsky
V.A. Vassilyev
N.E. Tjurin

Address for all U.S.S.R. participants
(excluding JINR members) :

c/o Institute for High Energy Physics
P. O. Box 35
Serpuukhov, Moscow Region, U.S.S.R.

JINR Participants

K. Lanisus
Joint Institute for Nuclear Research
Head Post Office
P.O. Box 79
Moscow, U.S.S.R.

V.P. Djelepov
Joint Institute for Nuclear Research
Head Post Office
P.O. Box 79
Moscow, U.S.S.R.

Additional Visitor:

Dr. A. Budker
Institute of Nuclear Physics
Novosibirsk 630090
Akademgorodok
U.S.S.R.

U. S. Participants

Dr. Mark Barton
Physics Section
Brookhaven National Laboratory
Upton, L.I., New York 11973

Dr. Robert E. Diebold
Argonne National Laboratory
9700 Cass Avenue
Argonne, Illinois 60439

Professor V. F. Weisskopf
Department of Physics
Massachusetts Inst. of Technology
Cambridge, Massachusetts 02139

Professor James D. Bjorken
Stanford Linear Acc. Center
P.O. Box 4349
Stanford, California 94305

Professor Leon Lederman
Director, Nevis Laboratories
Columbia University - Box 137
Irvington, New York 10533

Dr. Robert Wilson
Fermi National Accelerator Ctr.
P. O. Box 500
Batavia, Illinois 60510

CERN Member States Participants

Dr. U. Amaldi
c/o CERN
1211 Geneva 23
Switzerland

Dr. Kjell Johnsen
c/o CERN
1211 Geneva 23
Switzerland

Dr. D. B. Thomas
Rutherford High Energy Laboratory
Chilton, Didcot, Berkshire OX11 0QX
United Kingdom

Dr. D. Husmann
Physikalisches Institute
University of Bonn
Nussallee 12
Bonn, Germany

Dr. A. Rosset
35 rue Saint Dominique
75007 Paris
France

Dr. G. von Dardel
Dept. of Physics
University of Lund
Solvegatan 14
Lund, Sweden

ПРОГРАММА

Май 20

четверг

Утро

9.30-13.00

I. Посещение лабораторий ИФВЭ

13.00-15.00

- Обед.

Вечер

Председатель: А. Руссе

15.00-17.30

II. Продолжение заседания:

"Состояние в физике".

17.30

III. Поездка в Заповедник

(если позволит погода).

Май 21

пятница

Утреннее заседание.

Председатель: Л. Соловьев

10.00-14.00

I. Обсуждение рабочих принципов
Международной рабочей группы.

II. Обзор ситуации:

I. В. Вайскопф

14.00-16.00

- Совместный обед.

Вечер.

Председатель: В. Джелепов

16.00-18.00

III. Продолжение дискуссии.

19.00

IV. "Концерт хора им. Пятницкого" -
- Дом культуры.

ПРОГРАММА

Май 19.

Физические проекты.

Утреннее заседание.

Председатель: Ямагучи.

I). Общая Философия

- | | |
|-----------|-----|
| 1. Марков | 15 |
| 2. Бёркен | 50. |

II). Физика к 1980 г. — "существующие" машины.

- | | | |
|-------------|----|---------|
| 3. Лидерман | pp | 10 мин. |
| 4. Россей | | 10 " |
| 5. Амальди | | 15 " |

III). Физика к 1985 — Следующее поколение (региональный) ускоритель

- | | | |
|---------------|--|---------|
| 6. Амальди | | 20 мин. |
| 7. Прокошкин | | 20 " |
| 8. Герштейн | | 15 " |
| 9. Фон Дардел | | 15 " |

Вечернее заседание.

Председатель: Л. Лидерман

IV). Физика после 1985:

- | | | |
|------------------------------|--------|----|
| 10. Россей | при 10 | 25 |
| 11. Ф. Дардел: адроны при 10 | | 15 |

V). Инструменты для физики высоких энергий.

Дискуссия. докл. Р. Диболд 30 мин.

VI). Общая дискуссия: (если позволит время).

Что нужно изучать, чтобы выбрать между e^+e^- и p -мишень. 10

С О В Е Щ А Н И Е

международной рабочей группы по сверх-
высоким ускорителям.

Программа заседаний

17 мая. Утреннее заседание.

Председатель: В. Вайскофф

I) Тема I: Физические проекты, основанные на существующих и вероятных национальных и региональных машинах в ближайшем будущем.

I. *PETRA, PER*

докл. Г.А. Восс

2. ВЭП-4

докл. А.Н. Скринский

3. Удвоитель энергии

докл. Р. Вильсон

Вечернее заседание

Председатель: Г.Фон.Дардел

II) Тема 2: Представление научных и технических аспектов больших ускорителей.

I. Изабель

докл. М.Бартон

2. *POPAE*

докл. Р.Дибольд

3. *LSR*

докл. К.Ёнсен

18 мая. Утреннее заседание.

Председатель: А.А. Логунов

Продолжение темы 2.

4. УНК

докл. В.А. Ярба

5. Встречные $p\bar{p}$ -кольца

докл. А.М. Будкер

6. Тристан

докл. И. Ямагучи

Ш) Тема 3: Представление общих научных и технических аспектов в области создания и использования систем сверхвысоких энергий.

I. 10 ТэВ протонный, с неподвижной мишенью

докл. Д. Томас

Р. Вильсон

Вечернее заседание.

Председатель К. Ланиус

Продолжение темы 3.

2. 100 x 100 ТэВ электронные накопительные кольца

докл. К. Ёнсен

IV) Дискуссия по проблемам сверхпроводимости.

19 мая. Утреннее заседание.

Председатель

У) Физические проблемы в области сверхвысоких энергий

докл. Дж. Бёркен

М. А. Марков

С. С. Герштейн

Вечернее заседание.

Председатель

VI) Инструменты для физики сверхвысоких энергий

докл. Г.Фон Дардел

У.Амальди

А.Руссе

Б.Виик

P R O G R A M

for the meeting of the VBA study group
Serpukhov, May, 17-21, Moscow May 22-26

List of participants:

USSR

1. A.A. Logunov
2. A.A. Vassilyev
3. M.A. Markov
4. V.A. Glukhikh
5. L.D. Soloviev
6. I.V. Tchuvilo
7. V.A. Yarba

as experts:

8. A. Ts. Amatuni
9. N.A. Monoszon
10. A.A. Naumov
11. A.N. Skrinsky
12. V.A. Vassiliev
13. N.E. Tyurin
14. V.F. Kuleshov

JINR

1. K. Lanus
2. V.P. Djelepov

Japan

1. Y. Yamaguchi

USA

1. V.F. Weisskopf
2. R.R. Wilson
3. L. Lederman
4. M. Barton
5. R. Diebold
6. J. Bjorken
7. D. Eulian

CERN

1. Gu. V. Dardel
2. U. Amaldi
3. D. Husmann
4. K. Johnsen
5. A. Rousset
6. D. B. Thomas

as experts:

7. G. Barbellini
8. G. A. Voss
9. B. Wiik
10. Ch. Llewellyn-Smith
11. W. Willis

Serpukhov, IHEP, May 16 - 21

1. May 16 Arrival in Moscow, Sheremetievo airport,
Departure for Protvino
21.00-24.00 Accomodation. Supper at the café of the Scientists' Club
2. May 17
10.00-12.00 Meeting of the participants in the Scientists' Club
Word of welcome by academician A.A. Logunov
Approval of the agenda
12.30-14.00 Lunch at the café of the Scientists' Club
14.30-18.00 Start of the VBA meeting. Scientists' Club.
Topic 1. Physics projections on the basis of existing
and probable national and regional facilities in the
near future.
3. May 18
9.00-13.00 Topic 1. (Continued)
13.00-15.00 Lunch break
15.00-18.00 Topic 2. Presentation of scientific and technical
aspects for large projects now under consideration
on a regional basis and their impact on physics.
4. May 19.
9.00-13.00 Topic 2. (Continued)
13.00-15.00 Lunch break
15.00-17.00 Visit to the accelerator
5. May 20
9.00 -17.00 A bus trip to Yasnaya Polyana - Lev Tolstoy
Museum or "Polenovo" (an art museum place
named after the well known Russian painter).

6. May 21

9.00-13.00	Topic 3.:	Presentation of general scientific
13.00-15.00	Lunch break	and technical aspects in the const-
15.00-18.00	Discussions	truction and utilization of super-
		-high energy systems.

7. May 22

8.00-9.00	Breakfast
9.00	Departure for Moscow

Some points to note:

- a) Meals will be served free of charge at the Scientists' Club café.
Breakfast - 8.00-9.00
Lunch - 13.00-15.00
Dinner - 20.00-22.00
Drinks and caviar to be paid extra.
- b) Your telephone hotel number see on your own apparatus.
- c) Reference numbers:
International dept. 27-32, 21-03
Reception clerk 26-12, 43-22
Scientists' Club 56-34

Moscow, May 22 - 26

8. May 22

11.30 Arrival in Moscow. Accomodation at the Academy of Sciences' hotel.
Sightseeing around Moscow.

9. May 23

11.00	Sightseeing (continued)
19.00	Visit to a theatre

10. May 24

11.00-14.00	Free time
14.00-18.00	Discussions

Discussions on working principles of the international working group on large accelerators (Conference hall of the USSR Academy of Sciences Presidium).

11. May 25

Continuation of the work of the VBA study group.

9.00-13.00 Preparation of report

13.00-15.00 Lunch break

15.00-18.00 Preparation of report (continued)

19.00 Visit to a theatre

12. May 26

9.00-14.00 Preparation of report (conclusion)

Closing session at the Conference Hall.

15.00-17.00 Lunch break

13. May 26,27 Departure

Meeting of the International Study Group
on the VBA

AGENDA

17 May Morning Session Chairman: V. Weisskopf

I. Topic 1: Physics projections on the basis of existing and probable national and regional facilities in the near future.

1) PETRA, PEP
Speaker: G. Voss

2) PEP-4
Speaker: A. Skrinsky

3) Energy Doubler
Speaker: R. Wilson

Afternoon Session Chairman: G. von Dardel

II. Topic 2: Presentation of scientific and technical aspects of big accelerators.

1) POPAE
Speaker: R. Diebold

2) LSR
Speaker: K. Johnsen

18 May Morning Session Chairman: A.A. Logunov

3) Continuation of Topic II.

4) UNK
Speaker: V. Yarba

5) Colliding $p\bar{p}$ - rings
Speaker: A. Budker

6) TRISTAN
Speaker: Y. Yamaguchi

III. Topic 3: Presentation of general scientific and technical aspects in the construction and utilization of high-energy systems.

1) 10 TeV, proton accelerator with a fixed target
Speakers: D.B. Thomas
R. Wilson

Afternoon Session Chairman: K. Lanius

Continuation of Topic 3

2) 100x100 GeV electron storage ring
Speaker: K. Johnsen

IV. Discussion of superconducting problems.

19 May

Physics Projections

Morning Session

Chairman: Y. Yamaguchi

I. General Philosophy

Speakers: M.A. Markov - 15 min.
J. Bjorken - 50 min.

II. Physics to 1980 - "Existing" Facilities

(FNAL, Doubler, SPS, ISR,...)

Speakers: L. Lederman-FNAL pp 10 min.
A. Rousset γ, μ 10 min.
U. Amaldi - ISR 15 min.

III. Physics to 1985 - Next Generation
(Regional) Accelerator

Speakers: U. Amaldi 20 min.
Y. Prokoshkin 20 min.
S. Gerstein 15 min.
G. von Dardel 15 min.

Afternoon Session

Chairman: L. Lederman

IV. Physics Beyond 1985: VBA

Speakers: A. Rousset - ν at 10 TeV 25 min.
G. von Dardel - Hadrons at 10 TeV 15 min.

V. Instrumental Advances
Discussion

Leader: R. Diebold 30 min.

VI. General Discussion (if time permits)

What must we study in order to be able to choose
between e^+e^- and ≥ 10 TeV p-target?

20 May Morning

9:30 - 13.00 Visit to the IHEP Laboratories

Afternoon Session Chairman: A. Rousset

15.00 - 17.30 II. Physics Projections

17.30 A trip to the Oka Preserve (if weather permits).

21 May Morning Session

Chairman: L. Soloviev

10.00 - 14.00 I. Review of situation - V. Weisskopf

II. Discussions of working principles of
the international working group on large
accelerators.

14.00 - 16.00 Lunch

16.00 - 18.00 Discussions Chairman: V. Djelepov

19.00 Theatre --
The Russian folk song and dance ensemble.
The Pyatniksky choir.

Serpukhov, IHEP, May 16 - 21

- Sunday*
1. May 16 Arrival in Moscow, Sheremetievo airport,
Departure for Protvino
21.00-24.00 Accomodation. Supper at the café of the Scientists' Club
- Monday*
2. May 17
10.00-12.00 Meeting of the participants in the Scientists' Club
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14.30-18.00 Start of the VBA meeting. Scientists' Club.
Topic 1. Physics projections on the basis of existing
and probable national and regional facilities in the
near future.
- Tues.*
3. May 18
9.00-13.00 Topic 1. (Continued) *Voss*
13.00-15.00 Lunch break
15.00-18.00 Topic 2. Presentation of scientific and technical
aspects for large projects now under consideration
on a regional basis and their impact on physics.
- Wed.*
4. May 19.
9.00-13.00 Topic 2. (Continued) *Skrimshy*
13.00-15.00 Lunch break
15.00-17.00 Visit to the accelerator
- Thurs.*
5. May 20
9.00 -17.00 A bus trip to Yasnaya Polyana - Lev Tolstoy
Museum or "Polenovo" (an art museum place
named after the well known Russian painter).

6. May 21

9.00-13.00 Topic 3.: Presentation of general scientific
 13.00-15.00 Lunch break and technical aspects in the const-
 15.00-18.00 Discussions ruction and utilization of super-
 -high energy systems.

7. May 22

8.00-9.00 Breakfast
 9.00 Departure for Moscow

Some points to note:

- a) Meals will be served free of charge at the Scientists' Club café.
 Breakfast - 8.00-9.00
 Lunch - 13.00-15.00
 Dinner - 20.00-22.00
 Drinks and caviar to be paid extra.
- b) Your telephone hotel number see on your own apparatus.
- c) Reference numbers:
 International dept. 27-32, 21-03
 Reception clerk 26-12, 43-22
 Scientists' Club 56-34

Moscow, May 22 - 26

8. May 22

11.30 Arrival in Moscow. Accomodation at the Academy of
 Sciences' hotel.
 Sightseeing around Moscow.

9. May 23

11.00 Sightseeing (continued)
 19.00 Visit to a theatre

10. May 24

11.00-14.00 Free time
 14.00-18.00 Discussions

Friday Moscow Energy Doubler Wilson

*ISA BELLE - Barton
POPAE - Dubold*

UNKA

*CERN - K Johnson
Japan - Yamaguchi*

Discussions on working principles of the international working group on large accelerators (Conference hall of the USSR Academy of Sciences Presidium).

11. May 25 - *Tuesday*
Continuation of the work of the VBA study group.
9.00-13.00 Preparation of report
13.00-15.00 Lunch break
15.00-18.00 Preparation of report (continued)
19.00 Visit to a theatre
12. May 26 - *Wednesday*
9.00-14.00 Preparation of report (conclusion)
Closing session at the Conference Hall.
15.00-17.00 Lunch break
13. May 26,27 Departure

P R O G R A M

for the meeting of the VBA study group
Serpuukhov, May, 17-21, Moscow May 22-26

List of participants:

USSR

1. A.A. Logunov
2. A.A. Vassilyev
3. M.A. Markov
4. V.A. Glukhikh
5. L.D. Soloviev
6. I.V. Tchuvilo
7. V.A. Yarba

as experts:

8. A. Ts. Amatuni
9. N.A. Monoszon
10. A.A. Naumov
11. A.N. Skrinsky
12. V.A. Vassiliev
13. N.E. Tyurin
14. V.F. Kuleshov

JINR

1. K. Lanjus
2. V.P. Djelepov

Japan

1. Y. Yamaguchi

USA

1. V.F. Weisskopf
2. R.R. Wilson
3. L. Lederman
4. M. Barton
5. R. Diebold
6. J. Bjorken
7. D. Eulian

CERN

1. Gu. V. Dardel
2. U. Amaldi
3. D. Husmann
4. K. Johnsen
5. A. Rousset
6. D. B. Thomas

as experts:

7. G. Barbellini
8. G. A. Voss
9. B. Wiik
10. Ch. Llewellyn-Smith
11. W. Willis

Serpukhov, IHEP, May 16 - 21

1. May 16 .Arrival in Moscow, Sheremetievo airport,
Departure for Protvino
21.00-24.00 Accomodation. Supper at the café of the Scientists' Club
2. May 17
10.00-12.00 Meeting of the participants in the Scientists' Club
Word of welcome by academician A.A.Logunov
Approval of the agenda
12.30-14.00 Lunch at the café of the Scientists' Club
14.30-18.00 Start of the VBA meeting. Scientists' Club.
Topic 1. Physics projections on the basis of existing
and probable national and regional facilities in the
near future.
3. May 18
9.00-13.00 Topic 1. (Continued)
13.00-15.00 Lunch break
15.00-18.00 Topic 2. Presentation of scientific and technical
aspects for large projects now under consideration
on a regional basis and their impact on physics.
4. May 19.
9.00-13.00 Topic 2. (Continued)
13.00-15.00 Lunch break
15.00-17.00 Visit to the accelerator
5. May 20
9.00 -17.00 A bus trip to Yasnaya Polyana - Lev Tolstoy
Museum or "Polenovo" (an art museum place
named after the well known Russian painter).

6. May 21

9.00-13.00	Topic 3.:	Presentation of general scientific
13.00-15.00	Lunch break	and technical aspects in the const-
15.00-18.00	Discussions	truction and utilization of super-
		-high energy systems.

7. May 22

8.00-9.00	Breakfast
9.00	Departure for Moscow

Some points to note:

- a) Meals will be served free of charge at the Scientists' Club café.
- | | |
|-------------|-------------|
| Breakfast - | 8.00-9.00 |
| Lunch - | 13.00-15.00 |
| Dinner - | 20.00-22.00 |
- Drinks and caviar to be paid extra.
- b) Your telephone hotel number see on your own apparatus.
- c) Reference numbers:
- | | |
|---------------------|--------------|
| International dept. | 27-32, 21-03 |
| Reception clerk | 26-12, 43-22 |
| Scientists' Club | 56-34 |

Moscow, May 22 - 26

8. May 22

11.30	Arrival in Moscow. Accomodation at the Academy of Sciences' hotel.
	Sightseeing around Moscow.

9. May 23

11.00	Sightseeing (continued)
19.00	Visit to a theatre

10. May 24

11.00-14.00	Free time
14.00-18.00	Discussions

Discussions on working principles of the international working group on large accelerators (Conference hall of the USSR Academy of Sciences Presidium).

11. May 25

Continuation of the work of the VBA study group.

9.00-13.00 Preparation of report

13.00-15.00 Lunch break

15.00-18.00 Preparation of report (continued)

19.00 Visit to a theatre

12. May 26

9.00-14.00 Preparation of report (conclusion)

Closing session at the Conference Hall.

15.00-17.00 Lunch break

13. May 26,27 Departure

Meeting of the International Study Group
on the VBA

AGENDA

17 May Morning Session

Chairman: V. Weisskopf

I. Topic 1: Physics projections on the basis of existing and probable national and regional facilities in the near future.

1) PETRA, PEP

Speaker: G. Voss

2) PEP-4

Speaker: A. Skrinsky

3) Energy Doubler

Speaker: R. Wilson

Afternoon Session

Chairman: G. von Dardel

II. Topic 2: Presentation of scientific and technical aspects of big accelerators.

1) POPAE

Speaker: R. Diebold

2) LSR

Speaker: K. Johnsen

18 May Morning Session

Chairman: A.A. Logunov

3) Continuation of Topic II.

4) UNK

Speaker: V. Yarba

5) Colliding $p\bar{p}$ - rings

Speaker: A. Budker

6) TRISTAN

Speaker: Y. Yamaguchi

III. Topic 3: Presentation of general scientific and technical aspects in the construction and utilization of high-energy systems.

1) 10 TeV, proton accelerator with a fixed target

Speakers: D.B. Thomas
R. Wilson

Afternoon Session

Chairman: K. Lanius

Continuation of Topic 3

2) 100x100 GeV electron storage ring

Speaker: K. Johnsen

IV. Discussion of superconducting problems.

19 May

Physics Projections

Morning Session

Chairman: Y. Yamaguchi

I. General Philosophy

Speakers: M.A. Markov - 15 min.
J. Bjorken - 50 min.

II. Physics to 1980 - "Existing" Facilities

(FNAL, Doubler, SPS, ISR,...)

Speakers: L. Lederman-FNAL pp 10 min.
A. Rousset γ, μ 10 min.
U. Amaldi - ISR 15 min.

III. Physics to 1985 - Next Generation
(Regional) Accelerator

Speakers: U. Amaldi 20 min.
Y. Prokoshkin 20 min.
S. Gerstein 15 min.
G. von Dardel 15 min.

Afternoon Session

Chairman: L. Lederman

IV. Physics Beyond 1985: VBA

Speakers: A. Rousset - ν at 10 TeV 25 min.
G. von Dardel - Hadrons at 10 TeV 15 min.

V. Instrumental Advances
Discussion

Leader: R. Diebold 30 min.

VI. General Discussion (if time permits)

What must we study in order to be able to choose
between e^+e^- and ≥ 10 TeV p-target?

20 May Morning

9:30 - 13.00 Visit to the IHEP Laboratories

Afternoon Session Chairman: A. Rousset

15.00 - 17.30 II. Physics Projections

17.30 A trip to the Oka Preserve (if weather permits).

21 May Morning Session

Chairman: L. Soloviev

10.00 - 14.00 I. Review of situation - V. Weisskopf

II. Discussions of working principles of
the international working group on large
accelerators.

14.00 - 16.00 Lunch

16.00 - 18.00 Discussions Chairman: V. Djelepov

19.00 Theatre --
The Russian folk song and dance ensemble.
The Pyatniksky choir.

NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550

MAY 4 1976

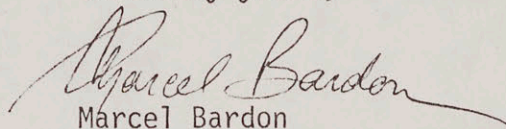
Dr. Herman Feshbach
Department of Physics
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

Dear Dr. Feshbach:-

I am pleased to learn that the Foundation has issued the official letter awarding Massachusetts Institute of Technology an NSF grant to support the International Study Group on the Very Big Accelerator, for a duration of thirty-six months. I enclose a copy of the official award letter.

I look forward to being kept informed of the progress of this Study Group and will be glad to provide such assistance as may be appropriate in any matter connected with this Study. The efforts of this group show considerable promise for the long term future in elementary particle physics. My associates at the National Science Foundation join me in wishing you all possible success.

Sincerely yours,


Marcel Bardon
Deputy Division Director
for Physics

Enclosures

Copy to:
See Enclosed List

Copy to:

Dr. James Kane
Director, Division of Physical Research
Energy Research and Development Administration
Washington, D.C. 20545

Dr. Victor F. Weisskopf
Department of Physics
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139

Dr. James D. Bjorken
Stanford Linear Accelerator Center
Stanford, California 94305

Dr. Robert Diebold
Argonne National Laboratory
Argonne, Illinois 60439

Dr. Leon Lederman
Department of Physics
Columbia University
New York, New York 10027

Dr. Wolfgang K. H. Panofsky
Stanford Linear Accelerator Center
Stanford, California 94305

Dr. Robert Wilson
Fermi National Accelerator Laboratory
Post Office Box 500
Batavia, Illinois 60510

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

DEPARTMENT OF PHYSICS

CAMBRIDGE, MASSACHUSETTS 02139

Sent to:

Bjorken

Diebold

Lederman

Panofsky

Wilson

April 9, 1976

M.I.T. has been asked to provide the administrative and logistic support for the U.S. participation in the International VBA Study Group, both for the Serpukhov meeting, and for later meetings.

We will have a budget that will cover your travel costs to the Serpukhov meeting. We can handle this in a variety of ways:

- A. We can purchase your ticket for you.
- B. You can purchase your own ticket and bill us.
- C. Get a travel advance from us and make your own arrangements.

After the trip, a simple statement of your expenses over your signature will be sufficient for us to reimburse you. Receipts are always helpful, particularly airline ticket stubs.

Foreign travel forms have to be submitted for each of you. To do this, we will need for you to fill in Items 1 and 2 and your signature on page 2 of the attached form. The remainder of the form will be standard for all U.S. participants and can be completed here at M.I.T.

Any inquiries on these or other administrative matters should be referred to:

D. H. Gould
Executive Officer
Department of Physics
Room 6-113, M.I.T.
Cambridge, Massachusetts 02139
(617) 253-4803

With best regards,

Sincerely,

V. F. Weisskopf

VFW:dle
encl.

For Visa help:

Mr. William Penkowsky
East-West Affairs Branch
Office of International Program Implementation (202) 376-4303
U.S. ERDA
20 Massachusetts Avenue, Washington 20545

or

Ms. Dorothy Morgret
ERDA (301) 353-3624

Two accounts:

ERDA Contract:

US Meetings -- ERDA Acct. # 83858

E(11-1)-2959

Other Meetings- NSF Acct. # 83857

Paul Powell x. 3856 E19-721

Fred Bentley x. 3862 E19-781

John Hynes x. 3867 E19-766

Claudia (Travel) x. 2756

Laurel

Typewriter Repair: Hotel National, Room 265 203-5132
-0131

Kuehne & Nagel, Inc. branch office: Kutuzovskij Prospekt
Hotel Ukraina, Rm. 828
Moscow
(Mr. Gollmick)

DATE: March 29, 1976

TO : Memorandum to Files

FROM : W. K. H. Panofsky *W K H P*

SUBJECT: Discussions Concerning Agenda for VBA Meeting at Serpukhov
Starting May 17, 1976

Viki Weisskopf and I discussed the VBA meeting on March 28. We used the draft agenda for the Serpukhov meeting as developed by Lock on November 24, 1975, during the meeting at CERN, together with USA-USSR-JINR and CERN representatives.

The Lock agenda specified May 17 through 26 and if necessary up to 31 May for the meeting. However the actual agenda as outlined occupies only 7½ working days. Weisskopf stated that it was his understanding that the Sabbath would not be honored. I felt in general that, considering the limited amount that could be accomplished, one should try to shorten the meeting if at all possible. The following schedule details may be practical:

Friday, May 14 - Travel to CERN

Saturday, May 15 - Meet at CERN with West European contingent

Sunday, May 16 - Travel to Moscow and then to Serpukhov

Monday, May 17 - A.M.: Opening of meeting and discussion of agenda

P.M.: Report on machines currently under construction
in each region as follows:

- A. Doubler (R. R. Wilson)
- B. PETRA (Kjell Johnson)
- C. PEP (W. Panofsky)
- D. VEPP-IV (A. Skrinskii)

Discussions should include estimates of calendar, costs and effort, and provisions of facilities for users. There should not be discussion at that point on the subject of physics program or technical details.

Tuesday, May 18 - A.M.: Discussion of regional projects not as yet
& P.M.: authorized for construction:

- A. POPAE (Diebold)
- B. Isabelle (Diebold)
- C. UNK (Naumov)
- D. LSR (K. Johnson)
- E. E-P Rings (K. Johnson and W. Panofsky)
- F. Tristan (Yamaguchi)

Time permitting there might also be a discussion on novel technologies such as P-P rings (Kjell Johnson, Bob Wilson and Skrinskii), electron cooling in general (Skrinskii), e^+e^- colliding beams with superconducting linacs (Amaldi), collective accelerators (Skrinskii, Panofsky).

Wednesday,

May 19 - A.M. Survey of physics objectives of a VBA (Bjorken to prepare discussion paper)

- P.M.
- A. The technology of a 10 TeV proton accelerator (K. Johnson to prepare discussion paper)
 - B. Technology of a 100 GeV e^+e^- ring (Panofsky to lead discussion).

Thursday,

May 20 - A.M. A. Discussion of theoretical need for VBA
B. Discussion of desirable machine type.

- P.M.
- A. Discussion of facilities needed for proper utilization of machines discussed in the A.M.
 - B. Discussion of the magnitude of effort which might be involved in construction project.

Friday,

May 21 - A.M. General examination of existing consensus with discussion led by Weisskopf

- P.M. Discussion of working principles of the follow-on work subsequent to conference.

Saturday,

Sunday,

May 22-23 - Preparation of report.

The above outline for the Serpukhov discussions is, of course, optimistic and may slip due to insertion of events planned by the Soviet hosts, or lack of progress during the discussions. However one should try to keep it at the length in question if possible.

The following additional items were discussed:

- A. If possible Bjorken should be persuaded to pre-distribute a technical discussion paper.
- B. Other speakers appearing on the schedule should be encouraged also to distribute papers early.
- C. No specific member of the delegation would officially be the "conference secretary" but Weisskopf will be accompanied by a recording angel complete with Xerox machine and typewriter.
- D. Panofsky will make tentative arrangements to go to Novosibirsk starting with the May 22-23 weekend and return after a two day visit at Novosibirsk directly to Moscow and then home rather than going back to Serpukhov.
- E. We had a brief discussion of the possible outcome of the meeting. Quite apart from technical consensus, it appears clear that unless things go very badly there will be agreement to continue joint planning. A promising proposal appeared to be to establish a permanent secretariat consisting of one person full-time or almost full-time, each from the U.S., Western Europe, and the Soviet Union to be stationed at CERN. This group would compile economic and performance data on existing accelerator projects in the various regions to give a yardstick for future, more detailed discussions, and would lay the groundwork for a more extensive meeting, possibly 1-2 months in length, at which further details would be developed next year. By the symmetry of the situation it might well be more desirable that this more extensive meeting should be held in the United States.

DATE: March 24, 1976

To : Distribution

FROM : Bill Kirk

SUBJECT: Very Big Accelerator preview meeting at Stanford, March 30

At Panofsky's request, I have made some arrangements for this meeting, as follows: The meeting will be at the Stanford Faculty Club on the Stanford campus on Tuesday evening, March 30, starting at about 7:00 PM. It is expected that the group will have supper and then stay on at the Faculty Club for discussion. A room has been reserved at the Faculty Club in Panofsky's name for this purpose. I am assuming that the following persons will participate:

US VBA Group Members

Weisskopf	Drell (HEPAP)
Wilson	Wallenmeyer (ERDA)
Bjorken	Kinney (ERDA)
Panofsky	Charleton (ERDA)
Diebold (possibly)	

The other VBA Group member, Lederman, does not plan to attend this meeting, owing to other commitments, but he would like to be informed about the discussions after the fact. Wilson will be arriving from Chicago at the SF airport at about 6:00 PM. He has a room reserved for him at the Faculty Club and thus should be able to make, barely, the 7:00 PM starting time. As of this date Diebold was uncertain whether he could attend the meeting.

Distribution:

Weisskopf	Neal
Bjorken	Ballam
Panofsky	Rees
Drell	Fuendeling

ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

SIÈGE: GENÈVE/SUISSE

CERN LABORATOIRE I

Adresse postale / Postal address:
1211 GENÈVE 23
SUISSE / SWITZERLAND

Votre référence
Your reference

Notre référence
Our reference WOL/eak

Prof. V.F. Weisskopf
Dept. of Physics
Massachusetts Inst. of
Technology
Cambridge 02139
Etats-Unis

Geneva 9 April 1976

Dear Viki,

Thank you for your letter of 31 March and for your telex. I have circulated the new draft agenda to the European participants and hope to be able to let you have some comments before our next meeting on 5 and 6 May. Concerning the lack of a theorist in the group, it is probably not possible now to change the composition, since it was the Scientific Policy Committee who decided on the names of the participants. However, L. Van Hove is informing W. Paul, Chairman of the SPC, of your position on this question.

The Directorate here has discussed the question of secretarial and administrative help for the meeting in Serpukhov and has decided that it should be limited to the assistance which will be provided by Mr. Koulberg. I will remind Yarba by telex of the importance of a xerox or equivalent machine being provided by them. Of course, I think it could be very useful for Diane to have her own typewriter with her.

About the possible very informal meeting suggested for 15 May von Dardel will contact you directly.

All best wishes,

Wol

W.O. Lock

STANFORD UNIVERSITY

STANFORD LINEAR ACCELERATOR CENTER

Mail Address

SLAC, P. O. Box 4349
Stanford, California 94305

March 31, 1976

Dr. Owen Lock
CERN
1211 Geneva 23
Switzerland

Dear Owen:

Thank you very much for your telex which I received here at SLAC, and for the letter that Diane read to me over the phone this morning. I think that things are developing quite nicely. I am still somewhat concerned about the lack of a theorist in the European group. I hoped that Llewellyn-Smith would be among them; I still strongly recommend it because he is just the kind of theorist whom we would need under these circumstances.

Yesterday we had a meeting of our group here at SLAC which everybody attended except Lederman. We studied the draft agenda decided upon in Geneva and found that, without changing its spirit, one could streamline it somewhat in order to save time for the most important issues. A proposed amended agenda is included and I would wish that it could be discussed at your next meeting on May 8. Of course we do not insist upon our proposals, but we thought that the meeting should be as short as possible and that it should come to the essential problems - namely the new machines - without too much delay.

As far as the practical arrangements are concerned, we would be very happy if there were a xerox or its equivalent available at the conference. We first thought of bringing one along from Europe or from here, but it seems from your letter that one will be made available by the Russians. We still intend to take Diane Eulian along since we definitely think we should have an able English speaking and writing secretary with us. I suppose that she would have to take a typewriter along. Please advise. I am sending you a telex with the names of birthdays of our delegation and place of visa. I probably will call you again before your meeting.

We also talked about having a discussion on Saturday, May 15 at CERN with the West European group. We were somewhat worried about it because it would perhaps not look well to the Russians if we have

Dr. O. Lock

-2-

March 31, 1976

such an official "Western Bloc." This is why we would suggest that this meeting on Saturday be very informal. Indeed, some of our participants may not have the time and would have to go directly to Moscow. I myself and Pief will be at CERN on that Saturday and I would suggest that we keep this meeting on a very low key. I will probably call you again before the meeting in order to discuss some more details about these problems.

With best regards,

Viki

V. F. Weisskopf

P.S. From now on I will be back in Cambridge.

March 30, 1976

AGENDA SUGGESTED BY THE AMERICAN GROUP

The American group attending the forthcoming Serpukhov meeting proposes the following amendments to the draft agenda which was submitted at the November meeting at CERN, and suggests a number of speakers for the different items. The amendments are made in the spirit of avoiding duplications and streamlining the discussion. Changes we propose are only the following ones:

- A. Under Item 1 leave out the discussion of presently running machines since everybody knows about them.
- B. Put all physics discussions into one unified discussion in order to avoid repetition of the same arguments.

We therefore propose for your consideration the following agenda:

Monday, May 17

A.M. Opening of meeting and discussion of agenda.

P.M. A report on machines currently under construction in each region:

- A. Fermilab Saver-Doubler (R. R. Wilson)
- B. PETRA (G. Von Dardel or K. Johnson)
- C. PEP (W. Panofsky)
- D. VEPP-4 (Skrinsky)

Discussions should include estimates of time scale, costs, effort and provision of facilities for users. There should not be discussion at that point of physics program or technical details.

Tuesday, May 18

A.M. & P.M. Discussion of regional projects not as yet authorized for construction:

- A. POPAE (Diebold)
- B. Isabelle (Diebold)
- C. UNK (Naumov)
- D. ISR (K. Johnson)
- E. E-P Rings (K. Johnson and W. Panofsky)
- F. Tristan (Yamaguchi)

Here again the discussion should be restricted to estimates of time scale, costs and efforts and facilities for users and not the physics program. Time permitting there might also be a discussion of novel technologies such as:

March 30, 1976

Suggested Agenda by
American Group

-2-

$p\bar{p}$ rings (Johnson, Wilson and Skrinsky)
Electron cooling in general (Skrinsky)
 e^+e^- colliding beams with superconducting
linacs (Amaldi)
Collective accelerators (Skrinsky, Panofsky)

Wednesday, May 19

This day should be devoted to discussion of the physics situation in respect to new plans, regional or international. We propose an introductory talk by Bjorken, followed by talks by Soloviev, Von Dardel, Rousset, Logunov, Lederman, etc. This discussion should concentrate on the problems to be solved with the new instruments and, in particular, the presently visible need for going to very high energies both in stationary target proton beams and colliding beams.

Thursday, May 20

A.M. (a) The technology of a 10 TeV proton accelerator (Johnson, Wilson, Naumov and others)
(b) Technology of a 100 GeV e^+e^- ring (Johnson, Panofsky and others).

P.M. (a) Discussion of facilities needed for proper utilization of machines discussed in the a.m.
(b) Discussion of magnitude of effort, and other problems connected with the international collaboration.

Friday, May 21

A.M. General examination of existing consensus (discussion led by Weisskopf).

P.M. Discussion of working principles of the follow-on work subsequent to the conference.

Saturday, Sunday
May 22-23

Preparation of report.

The agenda suggested above is a very optimistic one and the different items may take more time than anticipated. There also may be social events which will take some time. It is hoped, however, that the conference may end in the early days of the week following Sunday, May 23.

ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

SIÈGE: GENÈVE/SUISSE

CERN LABORATOIRE I

Adresse postale / Postal address:

1211 GENÈVE 23
SUISSE / SWITZERLAND

Votre référence
Your reference

Notre référence
Our reference: SIS/PU/BS/mf

Professor V.F. WEISSKOPF

MASSACHUSETTS INSTITUTE OF
TECHNOLOGY

Department of Physics

CAMBRIDGE / Mass. 02139 / USA

31 March 1976

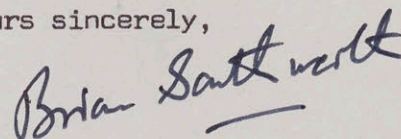
Dear Professor Weisskopf,

I have written this piece, leading up to the Serpukhov Meeting, for the April issue of CERN COURIER. Since you have played a leading role in this exercise, I think you might like to read it over. We are also informing our Soviet colleagues.

I go to press on 7 April and I should be grateful if you would please let me have any comments by then.

With best wishes.

Yours sincerely,



Brian SOUTHWORTH

Enclosure

VBA - Very Big Accelerator

Perhaps because it is Spring, and our spirits are coming back to life in harmony with Nature's renovating cycle, we find ourselves in this issue with several topics where we lift our eyes from present difficulties and look into the future.

In our report of the March Meeting of the European Committee for Future Accelerators, ECFA, we record that the European community of high energy physics is to set up a Steering Group which will examine the possibilities concerning any next generation of accelerators or storage rings in Western Europe. On the shorter term, we present the Cornell proposal for an electron-positron storage ring. ~~And~~ Our April issue concludes with a clarion call from Bob Wilson, Director of Fermilab, for the construction of a "World Machine". It is the preliminary thinking about such a machine which we cover in this opening article.

The idea of building a machine with world-wide participation in its financing,

construction and exploitation has been talked about at intervals for many years. Whether such an idea is coloured more by idealism than by realism will always be difficult to judge until it is finally ~~tried~~ *examined in detail*. It does reflect the international nature of the research, the close contacts between scientists of many nations and the overall satisfaction with the way international collaborations have succeeded at high energy physics Laboratories. CERN is the world's finest example of international collaboration in science. USA-Western Europe relations in high energy physics operate so smoothly *that* we take them completely for granted. CERN-Dubna, CERN-Serpukhov and the more recent USA-USSR collaborations have all gone well. A new phase of CERN-USSR relations opened last year. No other field of activity can claim such a fine track record, *in international cooperation.*

It was at the "Topical Seminar on Perspectives in High Energy Physics" held in New Orleans in March 1975 (see April issue of last year) that the subject of a very big accelerator and the possibility of its being a world machine was raised again. Major

protagonists were Leon Lederman (Columbia University), Pief Panofsky (Director, SLAC) and Bob Wilson (Director, FERMILAB). The discussion involved representatives of the high energy physics communities in North America, Western Europe, CERN, Soviet Union, Dubna and Japan.

To carry the discussions further a study meeting attended by scientists from all the regions mentioned above will be held at the Institute of High Energy Physics, Serpukhov on 26 May 1977. A meeting will first survey the presently operating machines, the machines under construction and the projects for future accelerators or storage rings which are already on the tables. It will then turn to a study of the physics case and the technical aspects of the construction and utilization of a Very Big accelerator. As usual, accelerator builders ~~will~~ are unable to discuss a machine without abbreviating it to some set of initials and the Very Big Accelerator has become VBA.

1. protagonists
replace Pief by me

What the VBA might be is not defined at this stage, except that the scale is set by giving as examples a 10 000 GeV (10 TeV) proton synchrotron or a 100 GeV electron-positron storage ring. Anything on this scale would absorb a sizeable piece of pure science budgets and of accelerator expertise even thinking of some ten or more years ahead. This lines up naturally with the suggestion that such a machine would be constructed and exploited by broader international collaborations than have been the case so far. Hence the second title of "World Machine".

While we are struggling with severe economic ^{and} political problems, we can not anticipate such a project going ahead for years to come. (We have to recognize that, at present, it is difficult to sustain existing research programmes let alone launch new ones.) It would in any case take years to develop from the ideas stage to a ~~real~~ realistic project.

Nevertheless, it is the responsibility of the high energy physics community to attempt to predict the needs of their research for the future and it is the responsibility of the accelerator physics community to investigate how far their techniques can be extended. **Also**
And it is the responsibility of everyone to continue to promote the high energy physics contribution to international **cooperation** +

~~spirit~~ wherever it is reasonable to do

so. What could be more reasonable than
 a world collaboration upon a large enterprise devoted to the increase of human knowledge

To plan for the

Ats

clearly a very large accelerator

It is ~~only~~ natural that

~~It would be only fitting to plan such ~~very~~ big enterprise~~
 such a large enterprise devoted to the increase of human knowledge ought to be supported by ~~is~~ ^{will be} supported by a broad ~~international~~ ^{world} collaboration and not by a single nation or region

STANFORD UNIVERSITY

STANFORD LINEAR ACCELERATOR CENTER

Mail Address
SLAC, P. O. Box 4349
Stanford, California 94305

March 31, 1976

Professor Leon M. Lederman
c/o Fermi National Accelerator Laboratory
P. O. Box 500
Batavia, Illinois 60510

Dear Leon:

In exchange for running time at Fermilab R. R. Wilson volunteered your services during the meeting last night to write a paper on the potential administrative and organizational problems involved in building the VBA. To soften the blow, Viki suggested I should write down a list of some questions which come to mind on this particular topic. Here it goes -

1. Location - Should we agree early in the discussion that the only location for the VBA we are talking about is neither in the United States nor the U.S.S.R., and probably not in a Warsaw Pact or NATO country?

As a practical matter it appears impossible to me to reach agreement to put the machine into either the U.S. or the USSR, and it is also improbable that a country of one of the alliances would be acceptable. In addition, if this matter were agreed on early, then any Soviet moves to use the VBA as a means of securing a Western participation in the expansion of Serpukhov would be ruled out.

2. Staff Origin - Should one stipulate that an agreement to establish a VBA should not set quotas for the national origin of the directorate or other senior posts?

At CERN it is assumed that posts will be filled in accordance with the availability and suitability of the various candidates wherever they come from. Of course, as a practical matter there is a reasonable spread in nationality of the various division heads, etc. The Russians, in turn, are more apt to insist on writing everything down and they may propose to freeze representation within a VBA organization.

3. Distribution of Economic Benefits - Should we propose that no agreement should be incorporated in the basic Convention establishing VBA which would propose a distribution of contributions of resources contributing to the VBA construction?

At CERN goods are procured competitively from all member states, or other countries, as far as that goes. Again, in practice, it would, of course, be resented if the economic benefits from CERN were to flow disproportionately into one country only, but no specific allocation is made beforehand. This problem may be a particularly difficult one in arriving at an agreement between Socialist and Capitalist countries because it may prove impossible to arrive at a formula under which meaningful competition between East and West for a specified piece of gear would be resolved. Again I surmise that the Soviets would insist they supply certain pre-specified items.

4. Staff Status - What is the status of the staff of the VBA? Are they international civil servants like UN employees, or are they delegates or people on leave of absence from their home countries?

As a practical matter any unified administration of the VBA appears extremely difficult unless the staff has primary allegiance to the administration of the laboratory.

5. User Participation - Shall user participation be judged only on scientific merit of proposal and demonstrated ability of the proposing group to do the work?

Again the Soviets may insist on available running time being distributed in accordance with some agreed formula rather than following the current custom prevailing in Western laboratories.

6. Financial Contributions - How shall financial contributions be divided?

This may be a knotty question since exchange rates between Eastern and Western Countries are artificially fixed at totally unrealistic values. Presumably a formula must be negotiated relating to the GNP of each member country but incorporating an upper cutoff of percentage contribution by any one country.

7. In-House Staff - Should the proposed VBA laboratory be purely a service organization or, considering the complexity of required instrumentation, is one proposing to build a major laboratory with a strong in-house contingent of physicists, both experimental and theoretical?

This question can only be answered quantitatively by establishing some kind of guidelines for a fraction of in-house work and placing limits on the total number of scientific individuals who hold permanent posts in the laboratory.

Prof. Leon Lederman

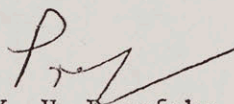
-3-

March 31, 1976

8. The Nature of the Laboratory - Is it proposed to create a laboratory which will be sized and organized specifically to fit whatever the VBA is intended to be, or shall one create an institution permitting future growth? If there is future growth, shall it be restricted to growth specifically associated with the original VBA or should activities more loosely associated be permitted in the future?

These are the kinds of question which come to mind which might be raised either directly or peripherally during the discussions. If Bob Wilson's predictions are correct you will be able to write a totally definitive paper giving all these answers without any problem.

With best regards,


W. K. H. Panofsky

cc: V. F. Weisskopf
R. R. Wilson

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF PHYSICS
CAMBRIDGE, MASSACHUSETTS 02139

April 22, 1976

Drs. Bjorken
Diebold
Lederman
Panofsky
Wilson

Dear Friends:

The following developments have taken place in regard to the VBA Meeting at Serpukhov. The Russian's have added to the number so-called "experts" to their delegation. A copy of a Telex to Lock with these names is enclosed. In addition, this increase of Russian participants has induced the Europeans also to add a few names to their delegation, a list of which I have also enclosed. I have tried to convince von Dardel (the chairman of the European group) to reduce that number as much as possible.

After some conversations with Washington and a few of you, we thought it not advisable to increase our delegation with one exception. I have asked Mark Barton to join us. The reasons are essentially two-fold. We should have some Brookhaven representative, and there is a danger that Pief will not come. I hope he will come anyway since we will need him badly.

I also send you a contribution by Richter on electron-positron colliding beams.

So far we have not received any official invitations and visas, but I believe we will get them in time.

Hoping to see you on Saturday, the 15th at CERN, or Sunday evening, the 16th in Serpukhov,

Best regards,

Viki

V. F. Weisskopf

VFW:dle

March 30, 1976

AGENDA SUGGESTED BY THE AMERICAN GROUP

The American group attending the forthcoming Serpukhov meeting proposes the following amendments to the draft agenda which was submitted at the November meeting at CERN, and suggests a number of speakers for the different items. The amendments are made in the spirit of avoiding duplications and streamlining the discussion. Changes we propose are only the following ones:

- A. Under Item 1 leave out the discussion of presently running machines since everybody knows about them.
- B. Put all physics discussions into one unified discussion in order to avoid repetition of the same arguments.

We therefore propose for your consideration the following agenda:

Monday, May 17

A.M. Opening of meeting and discussion of agenda.

P.M. A report on machines currently under construction in each region:

- A. Fermilab Saver-Doubler (R. R. Wilson)
- B. PETRA (G. Von Dardel or K. Johnson)
- C. PEP (W. Panofsky)
- D. VEPP-4 (Skrinsky)

Discussions should include estimates of time scale, costs, effort and provision of facilities for users. There should not be discussion at that point of physics program or technical details.

Tuesday, May 18

A.M. & P.M. Discussion of regional projects not as yet authorized for construction:

- A. POPAE (Diebold)
- B. Isabelle (Diebold)
- C. UNK (Naumov)
- D. ISR (K. Johnson)
- E. E-P Rings (K. Johnson and W. Panofsky)
- F. Tristan (Yamaguchi)

Here again the discussion should be restricted to estimates of time scale, costs and efforts and facilities for users and not the physics program. Time permitting there might also be a discussion of novel technologies such as:

March 30, 1976

Suggested Agenda by
American Group

-2-

$p\bar{p}$ rings (Johnson, Wilson and Skrinsky)
Electron cooling in general (Skrinsky)
 e^+e^- colliding beams with superconducting
linacs (Amaldi)
Collective accelerators (Skrinsky, Panofsky)

Wednesday, May 19

This day should be devoted to discussion of the physics situation in respect to new plans, regional or international. We propose an introductory talk by Bjorken, followed by talks by Soloviev, Von Dardel, Rousset, Logunov, etc. This discussion should concentrate upon the problems to be solved with the new instruments and, in particular, the presently visible need for going to very high energies both in stationary target proton beams and colliding beams.

Thursday, May 20

A.M. (a) The technology of a 10 TeV proton accelerator (Johnson, Wilson, Naumov and others)
(b) Technology of a 100 GeV e^+e^- ring (Johnson, Panofsky and others).

P.M. (a) Discussion of facilities needed for proper utilization of machines discussed in the a.m.
(b) Discussion of magnitude of effort, and other problems connected with the international collaboration.

Friday, May 21

A.M. General examination of existing consensus (discussion led by Weisskopf).

P.M. Discussion of working principles of the follow-on work subsequent to the conference.

Saturday, Sunday
May 22-23

Preparation of report.

The agenda suggested above is a very optimistic one and the different items may take more time than anticipated. There also may be social events which will take some time. It is hoped, however, that the conference may end in the early days of the week following Sunday, May 23.

March 17, 1976

Dr. Sidney Drell
Stanford Linear Accelerator
Stanford University
Stanford, California 94305

Dear Sid:

Here enclosed you find a copy of the statement regarding the VBA for publication in the May issue of Physics Today. If there is anything serious you want to change, please call me Saturday evening at Max Delbruck's home. If you don't get the letter in time for this, I believe it will be time enough to talk about it when I arrive in Stanford on Monday afternoon.

With best regards,

Sincerely yours,

Victor F. Weisskopf

VFW:dle

encl.

ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE
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SIÈGE: GENÈVE/SUISSE

CERN LABORATOIRE I

Adresse postale / Postal address:
1211 GENÈVE 23
SUISSE / SWITZERLAND

Professor V.F. Weisskopf
Department of Physics
Massachusetts Institute of Technology
Cambridge, Mass. 02139

Votre référence
Your reference

Notre référence
Our reference

PE/ED/UR/2774

24 March 1976

Dear Viki,

Thank you very much for your two letters of 9 and 15 March. First, for the summer student lectures for you to start in the week of July 19 is fine by us. We have not yet heard from Telegdi but assume that he will be here by the end of July.

Next, to answer your different questions about the VBA Study Group. The leader of the European Delegation is formally Guy von Dardel. He called a meeting last week of the European delegates and they drew up a first list of who should prepare to speak and/or write a report on different topics. They propose to meet again on May 5 and 6 here at CERN. Von Dardel has asked me to act as Secretary to the group and has already asked me to distribute some of the New Orleans papers as background material for those who were not at New Orleans. By the way, it is not yet clear to me if the participant from Germany will be Hussmann or Jentschke; neither was at the meeting mentioned above but the remaining five people were and myself for part of the time.

I have sent a telex to Yarba a few days ago asking what they intend to do about invitations, visas etc. I have also asked him for the official list of their participants in the Study Group.

It is probably a good idea for the USA and European participants to meet here at CERN on say 15 May with a view to travelling to Moscow on 16 May, but I will confirm this to you later.

The general question of administrative help will be discussed by the Directorate next week. Provisionally, it is felt that the Serpukhov laboratory should supply photocopying and typing facilities. Our administrator in Serpukhov Mr. N. Koulberg, who speaks fluent Russian, will be there during the period of the Study Group meeting and will be glad to help with interpretation, translation or administrative matters.

With all best wishes,

Over
W.O. Lock

March 12, 1976

Dr. Eugene Feinberg
TH Division
CERN
1211 Geneva 23

SWITZERLAND

Dear Eugene:

I was delighted when I received your letter and when I learned that you are spending some time in Switzerland. I am deeply sorry that I cannot be there during the period of your visit.

I was very interested in your critical comments in regard to the M.I.T. Bag. I understand your worries and I would like to consider the M.I.T. Bag as a provisional attempt to express some still miraculous relations by some overall law, like an energy term proportional to the volume. Let me add that the proportionality also results from some of the non-linear theories that are now in great fashion, such as the one by Lee and Wick using spontaneous broken symmetries.

I also would like you to know that I am going to be in the Soviet Union during the second half of May. There will be a discussion at Serpukhov about a possible international accelerators of extremely high energy. I hope to be able to spend a day or two in Moscow after that meeting. Maybe I can see you and our mutual friend at that time. I would be very grateful if you could write me your telephone number and the new one of our friend. If you prefer, you can also give this information to Mr. Owen Lock in the Personnel Department at CERN who is a good friend of mine and a most reliable person.

I hope that you and your wife are both in Switzerland. Enjoy your stay as much as possible and I am looking forward to seeing you perhaps in Moscow.

With best regards,

Victor F. Weisskopf

VFW:dle

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SIÈGE: GENÈVE/SUISSE

CERN LABORATOIRE I

Adresse postale / Postal address:

1211 GENÈVE 23
SUISSE / SWITZERLAND

Votre référence
Your reference

Notre référence
Our reference

March, 5, 1976

Dear Vicry,

I cannot withstand a temptation to write to you from CERN where I am staying for a month, up to approximately 28-31 of March; to write without correcting my English by my wife and other usual controls. I am sorry very much for not seeing you here. Anyway, please accept best regards from my wife and our mutual friend.

I am meditating over your MIT bag and in particular over your enthusiasm expressed in ~~your~~ your Erice lecture (September, 1975) ^{By} introducing a continuous medium people do a very good thing, according to my belief. Exactly now I am again doing something with hydrodynamics. If I am permitted to

~~mention~~ ^{make} a ^{critical} remark, this is for the bag volume increasing with the bag energy. This is ~~too~~ classical and against what is known for quantum mechanical particles: some 10 years ago I succeeded in showing in the quantum electrodynamics that a "semibare" electron, having smaller dimensions^{*)} of proper field than the normal electron, decays into a normally dressed electron and ~~a~~ a γ -quantum. Thus an excited electron has smaller dimensions (Sov. Phys. JETP 23 (N1), July 1966, p.132). ~~Similarly~~ Similarly, a diffractively and coherently excited pion (the same for K...) ~~is~~ in the nucleus has a smaller $\sigma_{\pi N}$ cross section than ~~normal~~ ^{a regular} ~~normal~~ ^{**)}

π , ~~or~~ πN , although it decays afterwards into 3π , or 5π , or 7π ... ^{**)}

~~Remember~~ This is written first of all to show that I am spending the CERN paper, envelop and money not only for personal letter but ^{for} a scientific discussion as well.

With kindest wishes

Feynberg
(Eugene)

*) and correspondingly smaller cross section for the subsequent ~~collision~~ and bremsstrahlung

**) And there are some reasons to believe that the larger the number of final π 's (the higher the excitation) - the smaller is $\sigma_{\pi N}$. But this are my speculations (in Russian - final pages in the paper in the Tamm memorial volume, where your article is also placed.

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Adresse postale / Postal address:

1211 GENÈVE 23
SUISSE / SWITZERLAND

Professor V.F. Weisskopf
Department of Physics
Massachusetts Institute of Technology
Cambridge, Mass. 02139

Votre référence
Your reference

Notre référence
Our reference

PE/ED/UR/2774

24 March 1976

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It is probably a good idea for the USA and European participants to meet here at CERN on say 15 May with a view to travelling to Moscow on 16 May, but I will confirm this to you later.

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With all best wishes,

Over
W.O. Lock

March 15, 1976

Dr. W. O. Lock
Personnel Department
c/o CERN
1211 Geneva 23

SWITZERLAND

Dear Owen:

We are trying to get ready for the Serpukhov Study Group Meeting and I am asking the participants to write working papers. I hope that the European participants will also try to get together and present some material on which the discussions can be based.

Is there any among the European delegates who can be considered as the "leader".

So far we did not hear anything from Serpukhov. We expect an official invitation and I hope that this invitation will come soon so that we can get through the necessary motions in respect to visas, etc. Perhaps you could get some informal message to Serpukhov saying that they should send invitations as soon as possible.

I think it would be a good idea if we all could assemble in Geneva the day before we leave for Moscow and have a few discussions. I will suggest this to my American colleagues.

Another problem is the administrative help that we should take along. I am sure we will need a few people and a Xerox machine, if not Western typewriters. As you know, we are planning to take Diane Eulian with us who you know from New Orleans. We are counting on somebody from CERN who would provide help and the previous mentioned instruments.

With best regards,

Sincerely yours,

Victor F. Weisskopf

VFW:dle

March 9, 1976

Dr. W. O. Lock
Head, Education Services
CERN
1211 Geneva 23
SWITZERLAND

Dear Owen:

Thank you for your letter of March 2. I definitely would like to have Telegdi give part of the lectures. I believe that the best time for me to start would be the week of July 19th. I suppose that I start out and Telegdi will come in in the second part of the series.

Thanks very much for the names of the prospective Russian Study Group members. I find the list quite impressive and I hope that Skrinsky will stay on the list until the end.

With best regards,

Sincerely yours,

V. F. Weisskopf

VFW:dle

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SIÈGE: GENÈVE/SUISSE

████████████████████
Adresse postale / Postal address:

1211 GENÈVE 23
SUISSE / SWITZERLAND

Votre référence
Your reference

Notre référence
Our reference PE/ED/FA/401

Professor V.F. WEISSKOPF
Massachusetts Institute
of Technology
Department of Physics
CAMBRIDGE
Massachusetts 02139
Etats-Unis

Geneva, March 2, 1976

Dear Viki,

We were very pleased to learn from Van Hove that you would be prepared to give 6 - 10 lectures in the summer student programme this year. If you want to give part of the lectures to Telegdi, in principle he will also be here for the summer, but we do not know exactly when.

For planning the programme, could you let me know in due course when you expect to be here and when you would prefer to lecture. As you know we would like you to start off the series if this is possible, i.e. around the middle of July.

Concerning the VBA meeting in Serpukhov we have no official news of the Soviet/Dubna participants. However, according to a recent conversation between Victor Yarba and Fidecaro (who has replaced Yves Goldschmidt-Clermont as the Chairman of our CERN - Serpukhov Committee), it will be some or all of: Logunov, Soloviev, Vassiliev (State Committee, in charge of the Accelerator Department if I remember correctly), Chuvilo, Lanus, Naumov, Skrinsky and Yarba. When I have more specific news I will let you know.

All best wishes,

Yours sincerely,

Over

W.O. Lock
Head, Education Services

February 27, 1976

Dr. Karl Strauch
CERN I
1211 Geneva 23
SWITZERLAND

Dear Karl:

Thanks for sending me the letter you have received from Mr. Kane in regard to the collaboration with Novosibirsk. Your handwritten remarks are very much to the point, namely that the Novosibirsk people should report about their progress at Western meetings. Also, I think that one should not base the collaboration on the Weinstein/Novosibirsk plans.

I hope you have written this to Mr. Kane since it is more important that he should know it than I. This doesn't mean that I am reproaching you for sending me copies of this letter; on the contrary, I am very grateful that you keep me informed.

I also thank you very much for transmitting Koulberg's comments to me. I will tell my friends about it in a careful way. I still am worried about the widespread lack of enthusiasm among Americans to attend the Tbilisi Conference. Some of the feelings come from the traditional bad organization of Russian Conferences, but a good deal comes also from the negative attitude towards Russian politics. I still believe that our principle should be: "The worse the politics, the more important it is to collaborate with the scientists". Anything you could do about this would be appreciated.

I hope that you enjoy your stay at CERN as much as possible. With best regards to both of you,

Sincerely yours,

V. F. Weisskopf

VFW:dle

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SIÈGE: GENÈVE/SUISSE

CERN LABORATOIRE I

Adresse postale / Postal address:

1211 GENÈVE 23
SUISSE / SWITZERLAND

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Your reference

Notre référence
Our reference

Febr. 15, 1976

Dear Vicki:

Koullberg has just returned from a short stay in the USSR and reports the following impressions:

- (1) A private word to an individual concerning the possible reaction of American physicists to a Sakharov mistreatment is wrong and impractical - it puts the individual in a very bad position. This would possibly work only at a level that no physicist will reach.
- (2) If it becomes advisable to do something,

an official petition sent through the embassy and signed by as many individuals as possible is the best way - This petition will be read by many channels of the ~~the~~ bureaucracy and that is what counts.

(3) During the forthcoming 25th Congress there will be great pressure to keep dissidents in Moscow quiet - perhaps even to move some out of Moscow to prevent incidents.

All of this seems very sensible to me. Probably the best you can do is to keep a list of americans who are scheduled to go to Tbilisi and to be able to contact them on short notice - hopefully it will not be necessary. And of course you can smell the wind further at the VBA meeting!

Hope you and yours are well

Best regards

Karl

For your information.

K.S.



UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
WASHINGTON, D.C. 20545

FEB 3 1976

Professor Karl Strauch
1211 Geneve 23
Suisse/Switzerland

Dear Professor Strauch:

This is in response to your letter of January 7 to John Teem concerning the proposed international seminar on the use of the VEPP-4 e^+e^- colliding beam facility at Novosibirsk. As you may know, John has left ERDA and Bob Hirsch is now Acting ASGA. The picture I will present here is based on information provided to me by Jim Coleman and Bernie Hildebrand.

Your view is quite reasonable that if Novosibirsk can succeed with the VEPP-4 operation in attaining 6-7 GeV with both an electron and a positron beam within about the next "two years or so," a cooperative program would be attractive to outside users.

The USSR proposed program, considered at the December 4, 5, 1975, Fundamental Properties of Matter working meeting, was for a US-USSR seminar on possible joint experiments on the VEPP-2 and VEPP-4 devices. One of our concerns was that success of such a seminar was strongly dependent upon a realistic demonstration by Novosibirsk that VEPP-4 would, in fact, become operational in the not too distant future. It was felt that this concern could be eased greatly by reports on the VEPP-4 status at Western meetings and via visits to and correspondence with active and interested individuals. On this basis, we modified the proposed activity to include such visits first. Another concern was associated with the status of the Roy Weinstein (Northeastern) proposed experiment on VEPP-2 which has been in limbo for a number of years now. In addition to the technical shortcomings of VEPP-2, Novosibirsk had a "quid pro quo" point of view which has been disturbing to both the NSF, Northeastern's source of federal research support, and ERDA. For example, payment for beam time was a factor at one time. Such a point of view, of course, is completely unacceptable. It was felt that one of the best backgrounds for alerting the U.S. community to the physics possibilities at Novosibirsk is a successful Northeastern/Novosibirsk collaboration.

This is sensible



↑
This is unfortunate - Roy when I talked to him last had lost interest because a combination of insufficient luminosity and delay!

Professor Karl Strauch

2

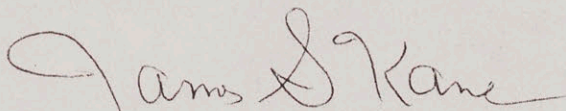
FEB 3 1975

In the process of paring down the listing of 36 proposed joint U.S./USSR activities, the Northeastern/Novosibirsk activity and another involving accelerator expert exchange visits to and from Novosibirsk, were included, and the Novosibirsk seminar excluded in the CY 1976 U.S./USSR cooperative program. It has been planned that the Joint Coordinating Committee for Research in the Fundamental Properties of Matter will look at both the approved CY 1976 program and those proposals deleted in December, at the next meeting this summer.

This is my best understanding of the Novosibirsk considerations of this past December. I am enclosing copies of the principal documents resulting from the December meeting.

With best regards.

Sincerely,



James S. Kane
Deputy Assistant Administrator
for Physical Research

Enclosure

ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH


1211 GENÈVE 23
SUISSE / SWITZERLAND

Téléphone: (022) 41 98 11
Telex: GENÈVE - 2 36 98
Télégramme: CERNLAB-GENÈVE

Votre référence
Your reference

Notre référence
Our reference

DGR/5-76

 A rappeler dans la réponse
Please quote in your reply

Professor V.F. Weisskopf
MIT
Department of Physics

CAMBRIDGE, Massachusetts 02139

Genève, 16 January, 1976.

Dear Viki,

Thank you for your letter of 29 December 1975, also for your nice "Chinese" Christmas card, and all best wishes from us to Helen and you.

Let me answer successively the three points raised in your letter.

1. On VBA, it was agreed by the special SPC meeting of 15 December that the list of European participants in the Serpukhov Workshop will be sent off after the next SPC meeting on 24 February. We realize that this is a bit later than foreseen, but it is obviously impossible to short-circuit the SPC on the matter. From the CERN side, it is clear that Kjell Johnsen will be on the list.
2. Concerning K.S. Wohlrab, I received many requests from him for support toward publication of various papers. These papers involve mysterious applications of the master equation technique to particle physics, mysterious at least to me, although Wohlrab often refers to my own master equation work of the 50s. In the beginning, I asked unsuccessfully for clarifications. In recent years I did not react any more.
3. Concerning China, Willi Jentschke had also heard from Ting the impressions he gathered when he was there (Ting passed through CERN soon after his China trip). I had also a further interesting conversation with Luke Yuan. Our way of inviting the Chinese to CERN in our discussions with them, stressing the wide flexibility on our side, of course also covers what they seem to be interested in. Nevertheless, we might think of more attractive ways of inviting them, for example using the argument that we are interested

in hearing from them how they approach high energy physics research. I do not feel that this should be done in the near future, but it may be worth trying at a later date.

With best regards,

Yours sincerely,

A handwritten signature in black ink, appearing to read 'L. Van Hove', with a stylized flourish at the end.

L. Van Hove

PS: Could you tell your secretary to correct her record: my family name is Van Hove and not von Hove.

April 3, 1975

Dr. Willibald Jentschke
c/o CERN
1211 Geneva 23
SWITZERLAND

Dear Willie:

It was nice talking to you this morning and I am very pleased by the fact that the SPC has been in favor of the Study Group of the Very Big Accelerator. I suppose that the committee of Council will go along with it.

In thinking over our conversation I could not quite remember what the objections of Adams have been. I would be very grateful to you if you could tell me in a few words what worried him.

I was extremely interested in hearing about the invitation of the Chinese to CERN. Isn't it funny that two of the invitees are Americans? I would appreciate it very much if you could also send me a copy of the invitation. Can we take our wives along?

With best regards,

Sincerely yours,

V. F. Weisskopf

VFW:dle

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

DEPARTMENT OF PHYSICS

CAMBRIDGE, MASSACHUSETTS 02139

March 9, 1976

MEMORANDUM

To: Drs. Bjorken
Diebold
Lederman
Panofsky
Wilson

From: V. F. Weisskopf

Dear Friends:

I just have received an unofficial report from W.O. Lock at CERN who tells me that the probable participants in the VBA Meeting will be (some or all of): Logunov, Soloviev, Vassiliev (State Committee in charge of the Accelerator Department), Chuvilo, Lanius, Naumov, Skrinsky and Yarba. This news is an oral communication from V. Yarba to Fidecaro (who has replaced Yves Goldschmidt-Clermont as the Chairman of the CERN-Serpukhov Committee).

With best regards.

VFW:dle

cc: W. Wallenmeyer

March 1, 1976

Dr. W. Owen Lock
c/o CERN
1211 Geneva 23
SWITZERLAND

Dear Owen:

I am glad to have received the list of the European participants at the VBA meeting in Serpukhov. It seems alright, but I am somewhat disappointed that there are no theorists among the regular members. I would recommend that Llewellyn-Smith be a regular member of the delegation. I am also disappointed that Van Hove doesn't come, but I understand the situation.

Is there any way to find out who the Russian delegation will be? Maybe you and Karl Strauch could try to get some informal information about this via Yarba or the CERN man at Serpukhov. Let me know if you get any information.

With best regards,

Sincerely yours,

V. F. Weisskopf

VFW:dle

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF PHYSICS
CAMBRIDGE, MASSACHUSETTS 02139

April 22, 1976

Dr. V. Yarba
Institute of High Energy Physics
P.O. Box 35
Serpukhov, Moscow Region
U.S.S.R.

Dear Yarba:

We are all looking forward very much to coming to Serpukhov on May 17th. I have heard from CERN that there will be a number of experts participating at the Conference besides the delegates from the Soviet Union. I am glad that you have included some very good men among the experts but I am a little worried about the size of the meeting. It is always difficult to discuss matters when too many people are present.

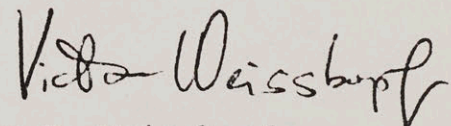
I hear that the Europeans also have added a few names to the list, and I am sure that you have received detailed information about this.

We in the U.S. would like to add only one person to our original list of names, namely Dr. Mark Barton from Brookhaven who, I am sure you know, is a great expert in accelerator building. He has been most active in the planning of ISABELLE. I hope that there is no objection on your part to include him in our delegation.

I would also like to remind you that we would like to take Miss Diane Eulian with us to Serpukhov as a secretary for the American delegation. You may remember her from the New Orleans Meeting where she had given us important help and support.

We are somewhat worried at this time that we did not yet get any official invitation from Serpukhov. I hope that we will get it soon and that the visas will be ready here at the Embassy in time. Some of us would like to leave for Europe a little earlier and we hope very much that visas will be available within a few days so that we can complete our preparations for the trip.

With best regards,



Victor F. Weisskopf

VFW:dle

April 22, 1976

Dr. V. Yarba
Institute of High Energy Physics
P.O. Box 35
Serpukhov, Moscow Region
U.S.S.R.

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With best regards,

Victor F. Weisskopf

SUMMARY OF MEETING HELD AT CERN ON 24 NOVEMBER 1975
TO DISCUSS THE AGENDA AND ORGANIZATION OF THE FIRST
MEETING OF THE VBA STUDY GROUP TO BE HELD AT SERPUKHOV, USSR

Present

USA	L. Lederman K. Strauch V.F. Weisskopf R.R. Wilson
USSR	V. Yarba
JINR	K. Lanius
CERN	J.B. Adams* M. Conversi W. Jentschke L. Van Hove*
Scientific Secretary	W.O. Lock (CERN)

* Part-time

1. AGENDA FOR SERPUKHOV MEETING

The draft agenda attached was agreed.

2. DATE

17 to 26 May 1976 but if necessary up to 31 May.

3. PARTICIPANTS

It was suggested that each of the three regions should send 4 to 6 participants to the meeting plus one or two from Japan. The names of the participants, including that of the leader of each delegation should be communicated to W.O. Lock at CERN by 31 January 1976. It was suggested that experimental and theoretical physicists, accelerator experts, specialists in superconductivity as well as some senior "wise men" should be amongst the participants.

4. CONTACT PEOPLE

(a) For the organization of the meeting at Serpukhov : V. Yarba (to be confirmed). A telephone and telex number for communication with IHEP will be given later.

(b) For the distribution of documents and other information prior to the meeting : W.O. Lock at CERN (Internal telephone 3207).

5. WORKING LANGUAGE

It was agreed that the working language of the meeting would be English with simultaneous translation being provided by IHEP as and when necessary.

5. FACILITIES AT IHEP FOR THE MEETING

Secretarial and administrative assistance would be provided by IHEP. Photo-copying facilities would be available.

W.O. Lock

DRAFT AGENDA FOR SERPUKHOV MEETING

1. Physics projections on the basis of existing and probable national and regional facilities in the near future.

For example : Presently running machines)
 PEP)
 PETRA) 1 day
 Energy Doubler)

2. Presentation of scientific and technical aspects for large projects now under consideration on a regional basis and their impact on physics,

for example : POPAE (FNAL))
 ISABELLE (BNAL))
 UNK (JHEP)) 1 day
 LSR) (CERN))
 e-p)
 TRISTAN (Tokyo)

3. Presentation of general scientific and technical aspects in the construction and utilisation of super-high energy systems centred around,

for example : (a) ~ 10 TeV proton, fixed target)
 (b) ~ 100 x 100 GeV electron storage ring) 1 day

4. Discussions - 2 days

Possible topics :

- (i) Physics aims of super-high energy systems and relations to the physics aims of other projects, considering various time scales.
- (ii) Technical problems of machines
- (iii) Technical problems of utilisation
- (iv) Magnitude of effort

5. Discussions of working principles of the international working group on large accelerators - ½ day.

6. Preparation of report - 2 days.

PRIVATE INFORMATION

In Confidence - Not for Publication.

INTERNATIONAL TOPICAL SEMINAR
ON PERSPECTIVES IN HIGH-ENERGY PHYSICS

Summary of the Chairman

The International Topical Seminar on Perspectives in High Energy Physics met in New Orleans in March 1975. As the chairman of this seminar I present here a short summary of the deliberations.

In the first part of the seminar a presentation was given by Professor M. Gell-Mann of the present state of our theoretical understanding of the fundamental structure of matter. The exciting discoveries made with high energy accelerators in the last decade have significantly advanced our understanding of the basic laws governing the behavior of matter. However many new and unexpected phenomena have been revealed which present us with still unsolved problems. It is most probable that the clarification of some of those problems, such as the connection between the basic forces of nature, will emerge from the investigation of matter at energies beyond those attainable with existing accelerators. Furthermore a discussion at the seminar of the recent discoveries of new particles showed that it is more likely than ever that a further extension of the energy frontier on a broad front - electron and proton storage rings and fixed-target accelerators - will give us most valuable and needed information.

The second part of the seminar was devoted to a presentation of the plans, ideas and designs regarding new high energy facilities in

the different parts of the world. Reports were given about the plans of the Soviet Union, of the countries collaborating at Dubna, of Western Europe, of Japan and of the USA. Many projects were discussed. Most of these projects were not officially approved by the authorities for construction yet, but many were in an advanced state of design. They span a wide range of possibilities, including fixed target accelerators and clashing beam devices with electron, proton and ion beams up to the TeV range. In some cases, several similar projects were presented by the same region as possible alternatives. The presentation showed the technical feasibility of extending the energy frontier on a broad front, as it is necessary for the further exploration of the structure of matter. It became clear that the realization of strong and up-to-date national and regional research facilities remains of utmost importance for the progress of this science.

The third part of the seminar was devoted to the international collaboration in High Energy Physics. Accounts were given about the present state of this collaboration between the Dubna countries and the Soviet Union on one side and Western Europe or the United States on the other side. This collaboration is proceeding in an increasing level. In particular, the experiments by mixed groups from different regions at the most advanced accelerators (Serpuukhov, CERN, FERMILAB) were reported at which instrumentation was brought from one region to the other.

The discussion was directed towards improving and strengthening this interregional collaboration at existing and at future facilities. A frank exchange of opinion took place regarding the problems and

shortcomings that occurred in this collaboration. Ways and means to make collaboration on all levels easier and more effective were discussed. A list is attached of some of the outstanding problems which were mentioned in the discussion. Furthermore, the possibilities of increased collaboration in the planning and design of new facilities was brought to discussion. One of the measures proposed was the repetition of the seminar about every two years in order to provide full information on the state of new ideas and projects that may come up in respect to new high energy facilities, and in order to review, improve and expand the state of inter-regional collaboration.

It was recognized during the discussion, that the realization of many important regional projects for new facilities will be of tremendous importance for the progress of science, especially if the new facilities are exploited in active collaboration between the different regions. Nevertheless it became increasingly clear to the participants that the feasibility within a given regional framework sets a certain limit to the size and scope of regional proposals. It was felt that the developments of High Energy Physics will eventually require the construction of accelerator facilities beyond this limit. The scientific requirements may force us to consider facilities so large that they may well be beyond the capabilities of the separate regions. In order to understand the problems which such large installations may pose the participants of the seminar found it appropriate to suggest a study of these problems along the lines contained in the attached note.

- I. The participants in the International Topical Seminar on Perspectives in High Energy Physics, meeting in New Orleans in March, 1975 recognize the possibility that our science may eventually require the construction of an accelerator facility, the scope of which would place it beyond the capabilities of any of the separate regions now active in the field. This appears to be the appropriate time to begin an investigation of the scientific, technical, economic and organizational problems connected with world-wide collaboration in the construction of such an accelerator. Here we will refer to this facility as simply: Very Big Accelerator (VBA).

- II. It is therefore suggested that the appropriate scientific authorities establish a Study Group with the following mission:
 1. It should inform itself on the present ideas, the scope of which fits the definition underlined above. It should study the scientific and technological considerations that bear on the parameters of a VBA, through extensive consultations with high energy physicists throughout the world. In particular the group should verify that the scientific needs justify so large a project and that the technological capabilities exist to carry it out successfully.
 2. Make a preliminary study of the costs and the organizational problems (planning, design, site selection, construction and operation) involved in establishing a VBA.
 3. Study the impact on the regional programs of a decision to proceed with VBA and make recommendations on whether or not to proceed towards the next step of a pre-proposal design study and if so, what would be the most appropriate time scale.

III. We recognize the following regions as having been active in the design, construction and operation of high-energy facilities:

- A. Member countries of JINR
- B. Japan
- C. USA
- D. USSR
- E. Member countries of CERN

It is suggested that appropriate scientific authorities in the above regions nominate scientists to participate in the Study Group. The final report of this Study Group will be made to the sponsoring scientific authorities.

IV. Some Practical Suggestions

- In establishing the Study Group a proper balance should be maintained between active experimental, theoretical and machine physicists. A possible allocation between regions might be the following:

JINR-2; Japan-1; USA-4; USSR-2; CERN-4

- A temporary headquarters could be set up at CERN in order to assist in coordinating the organization of the Study Group. It is also suggested that the first meeting be held at Serpukhov and the second meeting in Batavia.
- Travel expenses of the Study Group could be furnished by the respective home regions but, during visits, the host country should pay in-country expenses. We expect the Study Group to initiate its own procedures for obtaining staff funding, if necessary.

FACILITIES WITH FIXED TARGETS

(Under Study)

New Orleans

March, 1975

Name	Site	$E_{L.S.}$ TeV	Intensity per second	Design Ready	Desired Start-Finish	Announced Approx. Cost M\$
UNK	Serpukhov	2-5	$0,4 \times 10^{13}$	1978	1980-1985	---
	Batavia	1	10^{12-13}	1976	1975-1977	30-40
--1--	Dubna	0,2	10^{14}	1980	1980-1990	---
	Japan	0,5	$5 \cdot 10^{12}$	1978	1980-1983	100
Nuclotron	Dubna	0,5	$10^{12} \frac{1}{2}$	1977	1977-1981	15-20

Meson factories proposed or in construction
are not included in the list.

COLLIDING BEAM FACILITIES

(Under Study)

New Orleans

March, 1975

Name	Site	E L.S. (TeV)	Lum. $\text{cm}^{-2}\text{sec}^{-1}$	Design Ready	Desired Start-Fin.	Announced Approx. Cost M\$
UNK	Serpukhov	2x2½5pp	10 ³³	1978	1980-1985	?
		0,02x2-ep	10 ³²	1978	1980-1985	?
POPAE	Batavia	2x(0,4-1)pp	10 ³⁴	1977	1977-1979	250 included
		0,02x(0,4-1)ep	10 ³²	1977	1977-1979	
LSR	CERN	2x0,4pp	10 ³³	1978?	1979-1986?	(1,5-2)10 ³ M.S.F.
		0,02x0,4ep	10 ³²	?	?	?
ISA	BNL	2x0,2pp	~10 ³³	1977	1977-1982	150
		0,008x0,2ep	10 ³²	1977	1982-	pp + 10-20
TRIS- TAN	Japan	2x0,18pp	≤10 ³⁴		1978-1983	300 (incl. exp.)
		0.015x0,18ep	a few x10 ³¹	1978	(Phase I-'81)	
PETRA	DESY	2x0,0185ee	10 ³²	1974	1975-1979	100 MDM + 1000 manyears
PEP	Stanford	2x0,015ee	10 ³²	1975	1975-1979	53
		0.2x0,015pe	10 ³²	?	?	?
EPIC	RHEL	2x0,014ee	4x10 ³¹	1974	1975-1979	26M\$ + 2000 manyears
	Cornell	2x0,01ee	10 ³²	1977	1977-1979	15
VEPP-4	Novosib.	2x0,007	10 ³²	1972	1972-1977	?

ADMINISTRATIVE PROBLEMS

Travel

1. Limited foreign travel funds.
2. Delays of approval.
3. Difficulties connected with multiple entries.

Communications

1. Telex good, but access is sometimes restricted and there are delays in installation.
2. Letters frequently not answered; responses too slow.

Problems connected with the international sale and maintenance of computers or other special devices.

Invitations

1. Invitations frequently not answered.
2. Frequent substitutions, often last minute.

Experimental Collaboration

1. Teams do not meet before proposals; unilateral substitution of team members.
2. Slowness in responding to emergencies.
3. Not enough incentive for work in other regions.
4. Not enough concern for living conditions of families.
5. More local mobility for visitors.

Meetings

1. Non-appearance of prominent invitees.
2. Missing of deadlines.
3. International advisory committees cannot correspond.

List of Position Papers

Agenda Item Number II: Future Plans for New Major Facilities in Each Region.

- | | |
|--|--|
| A.M. Baldin | Perspectives of Investigations with Relativistic Nuclei. The Nuclotron as a Cryogenic Accelerator of Nuclei. |
| M.Q. Barton | The ISABELLE Project. |
| V.P. Dzhelepov,
V.P. Dmitrievsky,
V.V. Kolga | A Supercyclotron as a Perspective for the Development of High Current Accelerators - Meson Factories. |
| K. Johnsen | Some Ideas on Possible Future Storage Rings at CERN. |
| LBL-SLAC Joint Study Group | The PEP Electron-Positron Ring--An Update. |
| W.A. Wenzel | PEP Experimental Areas - Winter of 75. |
| B. McDaniel | Cornell Future Plans. |
| NAL (Collins et al.) | Summary Report on Phase I of the POPAE Design Study. |
| W. Panofsky | Future Plans of SLAC. |
| V.P. Sarantsev | Principle Conceptions on Creating High Energy Collective Accelerators in JINR. |
| H. Schopper | PETRA - An Extension of the Storage Ring Installations at DESY. |
| G.H. Stafford | EPIC. |
| T. Nishikawa | Present Status and Future Prospects of Japanese High-Energy Accelerator Plans. |
| V.F. Weisskopf | Future Plans for High Energy Facilities in the U.S.A. |

Agenda Item Number III: Strengthening and Expanding the Existing
Collaboration Among Different Regions.

- Y. Goldschmidt-Clermont and W.O. Lock Some Aspects of the Collaboration Between CERN, Its Member States, The Soviet Union and JINR, Dubna.
- JINR Exchange of Current Progress Reports and Preprints Between Dubna and Other Sides.
- JINR Joint Experiments and Construction of Apparatus By Teams of Scientists from Dubna and Other Sides.
- R. Ronald Rau U.S.-U.S.S.R. Cooperation in High Energy Physics: Some Practical Problems.
- E. L. Goldwasser Normalization of Inter-Regional Cooperations and Communications.
- J.C. Sens Data Communication Networks and Inter-Regional Collaboration.
- E.N. Shaw & B. Southworth International Communication in High Energy Physics.
- R. Sosnowski The Collaboration of Polish Institutes and Western High-energy Physics Laboratories.

Agenda Item Number IV: Collaboration and/or Co-ordination in Respect
to the Construction of New Regional Facilities.

- Argonne National Lab. Need for a Broadly-based Proton Accelerator Effort.
- W. Panofsky Collaboration and/or Co-ordination in Respect to the Construction of New Regional Facilities.

Agenda Item Number V: Exchange of Opinions in Regard to Inter-regional Facilities.

- L. Lederman A Proposal.
- R.R. Wilson An International Physics Laboratory Now!

INTERNATIONAL TOPICAL SEMINAR
ON PERSPECTIVES IN HIGH-ENERGY PHYSICS

March 3-7, 1975

New Orleans, Louisiana

Monday, March 3

- 10:30 a.m. Assembly in Lobby of Hotel Sonesta for those interested in Excursion on "Mark Twain" Riverboat. (Excursion ends about 4 p.m.).
- 6:30 p.m. Informal Reception for all participants at Royal Sonesta Hotel (ending about 8 p.m.).

Tuesday, March 4

- 9:00 a.m. Morning session - adjourning 12:30 p.m.
- 12:30 p.m. Sit-down luncheon served.
- 2:30 p.m. Afternoon session - adjourning 5:00 p.m.

Tuesday Agenda

- Welcome - Chairman of U.S. delegation.
- I. Current Challenges in High-Energy Physics.
- II. Future Plans for New Major Facilities in Each Region.
- A. Report from Soviet Union.
- B. Report from Eastern Europe and Dubna.
- C. Report from Japan.
- D. Report from Western Europe.
- E. Report from USA.

Wednesday, March 5

- 9:00 a.m. Morning session - adjourning 12:30 p.m.
- 12:30 p.m. Sit-down luncheon served.
- 2:30 p.m. Afternoon session - adjourning 5:00 p.m.

Wednesday Agenda

Continuation of future plans.

III. Strengthening and Expanding the Existing
Collaboration Among Different Regions.

Reports on Different Collaborations: Western
Europe - Serpukhov - Dubna - USA - Soviet Union.

Discussion of problems of collaboration and
of future expanded possibilities.

Thursday, March 6

9:00 a.m. Morning session - adjourning 12:30 p.m.

12:30 p.m. Sit-down luncheon served.

2:30 p.m. Afternoon session - adjourning 5:00 p.m.

Thursday Agenda

Continuation of discussion of Collaboration.

IV. Collaboration and/or Co-ordination in
Respect to the Construction of New Regional
and Interregional Facilities.

Proposal of study group to study the possibilities
and problems connected with an interregional
Very Big Accelerator.

6:15 p.m. Assemble in Lobby of Hotel for transportation to
Pontchartrain Hotel.

6:30 p.m. Social Hour at Pontchartrain Hotel.

7:30 p.m. Banquet - Pontchartrain Hotel for all participants
and their guests.

Friday, March 7

9:30 a.m. Morning session only.

12:30 p.m. Sit-down luncheon served.

Friday Agenda

A. Review of previous discussions.

B. Proposal of study group of Very Big Accelerator.

C. Scope and date of next meeting.

ADJOURN.

STANFORD UNIVERSITY

STANFORD LINEAR ACCELERATOR CENTER

Mail Address
SLAC, P. O. Box 4349
Stanford, California 94305

December 1, 1975

Dr. John Teem
Acting Deputy Assist. Administrator for
Solar, Geothermal and Advanced Energy
Systems
U. S. Energy Research and Development Admin.
Room 408, 7 th and D Streets, S. W.
Washington, D. C. 20545

Dear John:

This is a report of the meeting held at CERN on November 24, whose purpose it was to prepare an agenda for the forthcoming first meeting of the VBA study group. The following persons were present: USA, Leon Lederman, Karl Strauch, Bob Wilson, myself; Western Europe, Willy Jentschke, Marcello Conversi, L. Von Hove (morning), J. B. Adams (afternoon) ; USSR, V. Yarba, JINR, K. Lanus, W.O. Lock (CERN) - scientific secretary.

It was a good meeting. The discussions were most friendly and in good spirit. At no time did one feel that the eastern representatives wanted to divert the Serpukhov meeting away from the discussion of an international VBA to a discussion of technical help to the Serpukhov future plans.

At the beginning the Americans (VFW) and the Russians (VY) presented sketchy draft agendas of rather similar character. Yarba's was indeed a better one. After some discussions the enclosed draft agenda was unanimously accepted and a date was set for the Serpukhov meeting (May 17-27).

There was never a serious conflict in the discussions. The following new points came up during the discussions: (a) the inclusion of a very high energy e-e device among VBA possibilities; (b) the increase of the number of participants to 4-6 instead of the four established in New Orleans (1-2 for Japan). Point (a) is obvious, Point (b) was done in order to get more younger people and experts.

In the preliminary discussions, it was found advisable to group the national or regional high energy facilities to be discussed in connection with a VBA into two groups: The first group contains those available today and those reasonably expected in the immediate future. The second group contains national or regional projects under consideration and discussion for a somewhat later period.

The Serpukhov meeting should start with a presentation of the physics situation to be expected in five to ten years on the basis of results coming from group 1. On this basis the meeting should proceed to consider whether and how the many regional projects in group 2 fit the situation and are apt to lead to progress and how commensurate their promises are relative to the efforts involved.

Then one would be ready to consider the need for a VBA of the type of about 10 TeV fixed target, or of about 100 x 100 GeV electron colliding beam with (e-p) possibilities. The terms of "super-high-energy systems" is used for these facilities and for combinations of them.

The idea was to use the first three days for presentation of facts and problems, the next two days for discussions of these items. The discussions should center upon finding out which may be the best choice of facilities -- regional and international -- considering physics promise, amounts of effort, etc. This discussion should bring forward the problems which must be attacked in order to get rational answers to the questions to be raised. Political, organizational and location questions should be excluded at the forthcoming meeting. Problems of site sizes, however, may be included.

Finally an international working group should be organized for dealing with some of the outstanding problems. The how and where and who of this study group should be discussed and proposed. It was strongly felt that a written report should come out of the Serpukhov meeting and some time should be devoted at the meeting to writing it. At the end of the CERN meeting, Leon Lederman presented his position paper which you probably saw (copy enclosed). It emphasized the thesis that 2-4 TeV are not energies which will be worth a great effort when ISR and FNAL are fully exploited. He gave compelling reasons why > 10 TeV is the aim.

Enclosed you also find a short summary of the meeting written by W. O. Lock and the draft-agenda which we agreed upon. You will notice that the names of the members of the US delegation should be transmitted to Yarba before January 31. (All abbreviations are well known except "UNK" which are the initials of the Russian equivalent of "Accelerator-colliding beam-complex", and refers to the Serpukhov project of 2-5 TeV accelerator and ancillary storage rings)

It was a worthwhile trip.

Best regards,

Victor F. Weisskopf

Enclosures
VFW:beb

VERY Confidential

P. S. I also would like to report on some more private conversations I had with Yarba. When I expressed my pleasant surprize about the easy success of our meeting he said : "I think it was a good idea when I insisted that I should be the only Russian at this agenda meeting!" Indeed Yarba is a most intelligent and collaborative character and very easy to talk to. I hope that he will continue to play an important role.

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There is a world of difference between Yarba and Lanius on the one hand, and Chuvilo, Morozov and Company on the other. This is why my present letter (and my present mood) is a lot more optimistic in the long run than the letter which I wrote to you on July 14, 1975, of which I enclose a copy. It now is assured that Serpukhov will indeed take the initiative and Yarba will organize a meeting, the date is set and I sense even a certain enthusiasm for the whole idea with him and Lanius. At the end we might even get the Chinese in! Our own international idealism, spawned by Bob Wilson and Leon Lederman seems to be catching.

Of course the Chuvilo's and Morozov's are the ones who make the final decisions.

V. F. W.

April 3, 1975

Dr. Yves Goldschmidt-Clermont
c/o CERN
1211 Geneva 23
SWITZERLAND

Dear Yves:

I still am overwhelmed by the fact that we could get the Russians to agree to the proposal of a Study Group for a World Machine. So far the reaction of the American authorities has been very positive. I will soon have in my hands an official letter of approval of the idea.

I hear that the SPC has also approved it and that the committee of council is expected to react positively. I have received a positive letter from the Japanese. All that is left is the Russians.

The purpose of this letter is to ask you whether it would be possible to push the Russians in some way or other and to let us know their attitude toward the Study Group. I know that Jentschke is going to Russia at the end of May and he may be in a good position to find out how they react to this proposal. Are you or Lock going to Russia before that date? If so, it would be very good if you could try to get some information about this and about the time scale in which we could expect a Russian reaction.

I will be in Geneva for the next SPC meeting on May 12 and 13. Maybe you will be able to tell me some more about it at that time.

With best regards,

Sincerely yours,

V. F. Weisskopf

VFW:dle

Return to VBA file

in Weisskopf's office

d.

CONFIDENTIAL

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

DEPARTMENT OF PHYSICS

CAMBRIDGE, MASSACHUSETTS 02139

December 10, 1975

Dr. Edward Creutz
National Science Foundation
1800 G. Street, N.W.
Washington, D.C. 20550

Dear Ed:

This is a report of the meeting held at CERN on November 24, whose purpose it was to prepare an agenda for the forthcoming first meeting of the VBA study group. The following persons were present: USA, Leon Lederman, Karl Strauch, Bob Wilson, myself; Western Europe, Willy Jentschke, Marcello Conversi, L. von Hove (morning), J.B. Adams (afternoon); USSR, V. Yarba, JINR, K. Lanus, W.O. Lock (CERN) - scientific secretary.

It was a good meeting. The discussions were most friendly and in good spirit. At no time did one feel that the eastern representatives wanted to divert the Serpukhov meeting away from the discussion of an international VBA to a discussion of technical help to the Serpukhov future plans.

At the beginning the Americans (VFW) and the Russians (VY) presented sketchy draft agendas of rather similar character. Yarba's was indeed a better one. After some discussions the enclosed draft agenda was unanimously accepted and a date was set for the Serpukhov meeting (May 17-27).

There was never a serious conflict in the discussions. The following new points came up during the discussions: (a) the inclusion of a very high energy e-e device among VBA possibilities; (b) the increase of the number of participants to 4-6 instead of the four established in New Orleans (1-2 for Japan). Point (a) is obvious, Point (b) was done in order to get more younger people and experts.

In the preliminary discussions, it was found advisable to group the national or regional high energy facilities to be discussed in connection with a VBA into two groups: The first group contains those available today and those reasonably expected in the immediate future. The second group contains national or regional projects under consideration and discussion for a somewhat later period.

.....

December 10, 1975

The Serpukhov meeting should start with a presentation of the physics situation to be expected in five to ten years on the basis of results coming from group 1. On this basis the meeting should proceed to consider whether and how the many regional projects in group 2 fit the situation and are apt to lead to progress and how commensurate their promises are relative to the efforts involved.

Then one would be ready to consider the need for a VBA of the type of about 10 TeV fixed target, or of about 100 x 100 GeV electron colliding beam with (e-p) possibilities. The terms of "super-high-energy systems" is used for these facilities and for combinations of them.

The idea was to use the first three days for presentation of facts and problems, the next two days for discussions of these items. The discussions should center upon finding out which may be the best choice of facilities -- regional and international -- considering physics promise, amounts of effort, etc. This discussion should bring forward the problems which must be attacked in order to get rational answers to the questions to be raised. Political, organizational and location questions should be excluded at the forthcoming meeting. Problems of site sizes, however, may be included.

Finally an international working group should be organized for dealing with some of the outstanding problems. The how and where and who of this study group should be discussed and proposed. It was strongly felt that a written report should come out of the Serpukhov meeting and some time should be devoted at the meeting to writing it. At the end of the CERN meeting, Leon Lederman presented his position paper which you probably saw (copy enclosed). It emphasized the thesis that 2-4 TeV are not energies which will be worth a great effort when ISR and FNAL are fully exploited. He gave compelling reasons why >10 TeV is the aim.

Enclosed you also find a short summary of the meeting written by W. O. Lock and the draft-agenda which we agreed upon. You will notice that the names of the members of the US delegation should be transmitted to Yarba before January 31. (All abbreviations are well known except "UNK" which are the initials of the Russian equivalent of "Accelerator-colliding beam-complex", and refers to the Serpukhov project of 2-5 TeV accelerator and ancillary storage rings).

It was a worthwhile trip.

Best regards,

Viki

Victor F. Weisskopf

VFW:dle

Encl.

cc: Dr. Marcel Bardon

VERY Confidential

P.S. I also would like to report on some more private conversations I had with Yarba. When I expressed my pleasant surprise about the easy success of our meeting he said: "I think it was a good idea when I insisted that I should be the only Russian at this agenda meeting!" Indeed Yarba is a most intelligent and collaborative character and very easy to talk to. I hope that he will continue to play an important role.

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V.F.W.

U. S. ATOMIC ENERGY COMMISSION
REQUEST FOR APPROVAL OF OFFICIAL FOREIGN TRAVEL

TO: Geneva, Switzerland	FROM: Boston, Massachusetts, U.S.A.
--------------------------------	--

PART A—To be completed by traveler

1a. NAME OF TRAVELER Victor F. Weisskopf	c. DATE AND PLACE OF BIRTH Vienna, Austria 19 Sept. 1908
b. CITIZENSHIP American	d. PASSPORT NUMBER (if available) A935361
2a. HOME ADDRESS 36 Arlington Street Cambridge, Mass., USA	b. BUSINESS ADDRESS Dept. of Physics Massachusetts Inst. of Technology Cambridge, Mass. 02139
3a. EMPLOYER Massachusetts Institute of Technology, Cambridg, Mass., USA	c. CONTRACT NUMBER
b. ORGANIZATIONAL UNIT Laboratory for Nuclear Science	d. POSITION TITLE (including profession) Institute Professor of Physics

4. PURPOSE OF TRAVEL (In addition, specify nature and classification of information to be disclosed including titles of papers to be presented, nature of information to be obtained at each of the places to be visited and conferences to be attended and its relation to traveler's work. Travelers are responsible for obtaining clearances for papers or speeches when necessary. If more space is required, attach on a separate sheet. NOTE: IF THIS INFORMATION IS CLASSIFIED, BE SURE TO CLASSIFY THIS FORM APPROPRIATELY)

On March 4-7, 1975 an 'International Topical Seminar on Perspectives in High Energy Physics' took place in New Orleans, Louisiana and was attended by about forty-five Laboratory Directors and senior scientists from Western and Eastern Europe, Japan, the USSR and the USA. It was recognized at this conference that the realization of many important regional projects will be of tremendous importance for the progress of science, especially if the new facilities are exploited in active collaboration between the different regions. It was also felt that developments in high energy physics are likely, eventually, to require the construction of accelerator facilities beyond the size and scope of the present regional proposals. In an attempt to fulfill this realization, a follow-up meeting is being planned for Spring, 1976 in Surpukhov, USSR and to be attended by the same member nations as were present in New Orleans. However, in order to utilize this meeting time most effectively, it has been decided that a preliminary planning meeting be held in advance of the Surpukhov meeting to prepare and discuss the Agenda for the meeting. The purpose of this trip is for such a meeting which will be held at CERN, Geneva, Switzerland on November 24 and 25, 1975.

5. PROPOSED ITINERARY (Account for all time from beginning and ending dates of travel. NOTE: IF INFORMATION IS CLASSIFIED, CLASSIFY THIS FORM APPROPRIATELY.)

DATES	LOCATION (Installation, city, country)	INDIVIDUALS TO BE CONTACTED	SUBJECT OF DISCUSSION	(Check one)	
				CLASSI- FIED	UNCLAS- SIFIED
11-21-75	New York	(in transit)	Planning meeting for Serpukhov Meeting in Spring, 1976.		X
11-22-75	London	(in transit)			X
11-23-75	Geneva	W. Jentschke			X

6a. HAS FORM AEC-290 PURSUANT TO AEC CHAPTER 2502 BEEN SUBMITTED? (For visits to Soviet-bloc countries only)
 Yes No

b. IF NOT, WHY NOT?

7. ARTICLE OF AGREEMENT FOR COOPERATION UNDER WHICH DISCUSSIONS WILL FALL (Information on the article may be obtained from local AEC Field Office)

8a. ESTIMATED COST OF TRAVEL TO AEC

Transportation \$ _____
 Per Diem and
 Miscellaneous \$ _____
 TOTAL _____

b. IF PART OF COST OF TRAVEL IS TO BE PAID OR HAS BEEN REQUESTED FROM SOURCES OTHER THAN AEC, INDICATE SOURCE AND AMOUNT.

None.

9. SIGNATURE OF TRAVELER

PART B—To be completed as follows (a) For AEC employees, by the Traveler's supervisor; (b) For Contractor employees, by the official responsible for supervising the activities involved in the proposed foreign travel or other official responsible for approving foreign travel under the terms of the contract.

10a. TRAVELER'S "Q" CLEARANCE NUMBER AND DATE

b. ENDORSEMENT AND REMARKS

(Signature and Title of Supervisor)

Report of the
International Study Group
on Future Accelerators and High Energy Physics
Serpukhov, May 17-25 1976

Abstract

The Seminar "Perspectives in High Energy Physics" held in New Orleans, March 1975, established a Study Group to discuss the long-range requirements for facilities in High Energy Physics. A sub-group met in CERN, October 1975, and planned an Agenda for a meeting which was held in Serpukhov, U.S.S.R. in May, 1976. In this paper a summary of the work done in Serpukhov is given.

It begins with a review of the status of our present knowledge of the fundamental structure of matter and a statement of those future problems which can be clearly identified now and which will require new facilities for their solution. This is followed by a brief description of the status of today's accelerator technology and a review of projects that are now under active study as regional facilities. The study group has noted the need for close collaboration during the selection of the range of new regional facilities to ensure coverage of the broadest possible program of research. Included in this range may be a proton fixed target accelerator of up to several TeV, colliding beam facilities with a center-of-mass energy of up to several TeV for protons against protons, up to several hundred GeV for electrons against protons, and up to about 200 GeV for electrons against positrons. The participants have emphasized the importance of joint utilization of all such facilities by scientists of different countries.

The Study Group has stressed that the further progress of High Energy Physics will require in the future the development of an accelerator complex significantly more powerful than those planned for regional facilities. This complex is likely to be of such a cost as to be beyond the capabilities of any single region. Examples include facilities such as a proton accelerator of energy higher than 10 TeV and an electron-positron colliding beam facility of more than 200 GeV in the center-of-mass. In this connection several conceptual designs of that kind were presented and discussed.

In seeking to attain the more intensive international collaboration which is a fundamental prerequisite for progress toward the stated objectives, the Study Group recommends that the International Union of Pure and Applied Physics (Particles and Fields Division) be asked to initiate appropriate activities to this end.

I. Introduction

The historical development of science has made it especially appropriate that the physicists of all countries which are active in the exploration of the deepest aspects of atomic nature should be collaborating so intensely. It is gratifying that this collaboration has resulted in so much progress in our knowledge about the particles of which the world is made and of the laws that govern their behavior. It is equally gratifying that governments have provided the necessary framework within which the collaboration could take place. The fundamental knowledge being developed will become the basis of future technology and, equally important, will provide mankind with a greater insight into the nature of the universe.

The struggle for this knowledge is difficult, and although many concepts of nature have been deepened and new concepts have emerged, nevertheless, it is anticipated that vastly more extensive investigations will be required before our knowledge of the basic particles is as firm as is our understanding, for example, of electromagnetism.

The tools for investigating matter have become more complex and more expensive as we have penetrated deeper into the inner space of the atom. For this reason organizational collaborations have developed between groups of nations to allow them to participate in this exciting and necessary development. Thus the member nations of CERN and the member nations of JINR have established organizations which have enabled them to successfully develop

research in this field. Most importantly, the close collaboration between the regional laboratories has amplified their individual efforts.

As facilities that are now being planned on a regional basis are developed, ways should be found to help in coordinating that planning. Such mutual discussion and advice would ensure the coverage of the broadest possible program of research. Joint studies of new technology and organization of wider collaborative use of present facilities should occur. Joint construction of sub-elements of regional projects should be explored.

It can already be expected that the facilities needed to explore and clarify the next level beyond that available to facilities presently being contemplated will be so large that their realization will be greatly optimized -- and may only be possible -- by the pooling of the resources of all regions in a common effort.

We underline the statement of the countries participating in the "Helsinki Agreement on Security and Cooperation in Europe", which specifically mentions high-energy physics as a field for cooperation. It says that "scientific and technological cooperation constitutes an important contribution to the strengthening of security and cooperation among (the countries) in that it assists the effective solution of problems of common interest and the improvements of the conditions of human life".

II. Physics Projections

The development of high energy physics in the last two decades has led to a situation where there exist many facts, synthesized by theoretical ideas. These ideas have not yet reached a fundamental character similar to theories of electromagnetism and gravitation. Nevertheless, the present knowledge makes it possible to formulate long-standing fundamental questions of physics in rather detailed form. This makes it most probable that the discoveries made by the next generation of accelerators should provide us with new fundamental knowledge, first of all about the nature of weak interactions and their possible connection with electromagnetic interactions and also about the interior structure of hadrons and the range of validity of the quark hypothesis. Some of the most important unanswered questions are these:

Do quarks exist and, if so, how are they confined in hadrons, and what are the forces between them? The recent results about hadron collision products which possess high transverse momentum have shown how little we understand about the internal dynamics of hadrons.

Secondly,

Is the Weinberg-Salam gauge theory of weak interaction pointing towards the real solution or is it the wrong approach? The quantitative agreement of neutral current data with theory is strong encouragement for gauge-theories. Nevertheless, no deviations from a four-fermion structure of the weak force have yet been observed.

We believe that the energies of the planned regional facilities are indeed sufficient to begin attacking these problems. In the case of weak interactions there are definite energy ranges where we expect new phenomena to occur: At about 1000 GeV (center-of-mass) the simple four-fermion theory breaks down. It is vital to reach this energy in order to fully observe the structure of the weak force in its natural domain. The gauge theories suggest that there are new phenomena, such as intermediate bosons, already at about 100 GeV. This situation is analogous to what happened in the 1930's in electrodynamics: The natural limit was the classical electron radius (10^{-13} cm) corresponding to 100 MeV whereas new phenomena (pair creation) occur already at 1 MeV.

Our present knowledge of strong interactions does not indicate yet any definite critical energy range. The higher the energy, the more information we will get. We need to know whether further quantum numbers exist, such as charm, flavor, color etc., and at what energies they will appear. Some cosmic ray observations indicate that there are unexpected phenomena occurring at about 300-500 GeV (center-of-mass) which may point to new directions in strong interaction dynamics.

Also in the weak interactions the number of entities is still unknown. There may be a whole series of intermediate bosons, there may be Higgs-bosons of different kinds and a series of heavy leptons and neutrinos. The appearance of these seemingly unlimited number of entities of a given type, even in weak interactions, is reminiscent of the discoveries of elements in the 19th century. We have a few organizing principles,

analogous to Mendeleev's classification. But the need for further synthesis is clear. We have much more to discover about the behavior of matter at energies higher than those available today.

The accelerators and storage rings which have been proposed address these problems in different ways:

1. Proton-proton and proton-antiproton storage rings attain the highest practicable center-of-mass energies at the price of lower luminosity. But the luminosities appear adequate for finding the weak-interaction intermediate bosons, provided the Drell-Yan production model can be applied. Present data are of some support for this model but far from conclusive.

The high center-of-mass energy available in storage rings is also of special significance in the study of strong interactions. The nature of the increase in the total cross-sections and of the energy-dependence of particle production mechanisms will be probed in a significant way. These facilities are also very useful to study the production of hadrons at high transverse momentum.

2. Future conventional proton synchrotrons, which provide high-energy particle beams incident upon stationary targets, will most likely explore frontiers different from that of center-of-mass energy. Their importance lies in the much higher luminosity available, in the diversity of external beams available, (including $\mu, \nu, e, \gamma, \pi, K, \bar{p}, \Lambda, \Sigma, \Xi, \Omega$), and in the opportunity of using targets of various atomic nuclei in order to study the nature of the produced systems in "status nascendi". High luminosity and choice of hadron beams are properties of

special significance in studying the production of hadrons of high p_T . The lepton-beams, especially the neutrino beams, are expected to continue to play the important role that they presently do in exploration of weak and electromagnetic interactions.

3. Electron-positron colliding beams at energies beyond PEP and PETRA allow the clean study of not only quantum electrodynamics and electromagnetic production of hadrons, but of weak interactions as well. Also, any charged heavy leptons or other charged non-hadronic pairs (including possible intermediate bosons W^\pm) would be produced, at a measurable rate, if they exist. Such storage rings are extremely powerful tools for finding heavy resonances with an appreciable partial width into an electron-positron pair. As already exemplified by the J/ψ and ψ' , the decays of such resonances provide detailed, clean information, difficult to obtain by other means. For example, the Weinberg-Salam theory predicts the production of a neutral boson Z^0 , with mass ≈ 80 GeV, (at luminosity $\sim 10^{32} \text{ cm}^{-2} \text{ sec}^{-1}$) at a rate exceeding 10 per second. Thus e^+e^- rings of such energy may be an excellent way to study weak interactions. This may be the only method (or at least the best) to find and study Higgs bosons predicted by weak-electromagnetic gauge theories. If the mass of such a particle is less than 40 GeV, the branching ratio of Z^0 into it (plus a charged lepton pair) is estimated to exceed 10^{-4} .

4. Electron-proton rings allow the clean study of the behavior of strong-interactions at short distances. The present theoretical ideas of the weakening of strong interactions at small distances, and their growing at large ones (asymptotic freedom), as well as the ideas of point constituents of the proton, are best tested in electron-proton scattering at the energies attainable by these storage rings. The question of the nature of proton constituents, and how (or whether) they are confined may be elucidated by study of the way hadrons are emitted after such a constituent is struck by the incident electron. The e-p storage rings may be a good way to produce and study heavy leptons (especially neutral), if they exist. Finally, weak interactions of the electron with hadrons are accessible as well, and such information would be a valuable supplement to what is obtained by other means.

In summary, it is expected that the planned regional facilities will lead to the solution of many outstanding problems and to new important discoveries. For example, when the center-of-mass energy of a few hundred GeV is reached, it is most probable that the existence or non-existence of the intermediate boson will be known. We then will know much more about weak interactions and their connection with other forces. Moreover, the range of understanding of strong interactions will be considerably widened, and the internal structure of nucleons will be much better known. It is possible that free quarks or new unexpected particles may be produced. Some of the larger regional projects may even yield information regarding the region of 400-500 GeV in the center-of-mass, where there are indications from cosmic ray data of new phenomena.

In spite of the importance of the energy regions explored by the regional plans, the need of higher energies and more varied beams will remain. After all the energies necessary to get into the interesting regions are attainable only by colliding beams of protons or electrons, and their antiparticles; they need to be supplemented by beams of other particles and by beams of higher intensity. The ISR had to be supplemented by stationary target machines with comparable (though smaller) center-of-mass energy in order to experiment with particles other than protons at those energies.

We definitely expect that the regional facilities will make important discoveries in the next 15 years and that some of the problems will be solved. But it is probable that a good part will still remain unsolved. We therefore strongly believe that so-called VBA facilities will be needed such as a proton accelerator with $E > 10$ TeV and with the possibility of p-p colliding beams, and/or e^+e^- colliding beam facility of $E_{\text{cms}} > 200$ GeV.

III. Instrumentation Projections

While the experimental exploitation of a very high energy accelerator will in general require more sophisticated techniques, many experiments can use straightforward extensions of present methods. The initial exploratory experiments may well be less complicated than those which will be in progress at the lower-energy regional laboratories.

An active and vigorous experimental program could be carried out with present techniques, but improvements may be anticipated in many areas, such as

- a) electronics -- integrated circuits will drastically lower the cost of multiwire proportional chambers and drift chambers. Drift chambers are already capable of good precision, $\leq \pm 50 \mu\text{m}$, and will be very useful in the measurement of angles and momenta.
- b) calorimeters -- these devices are well suited to high energies, especially for the study of multiparticle processes over a wide range of angles, as for example, for measurement of jets at large transverse momentum. Recent work using liquid argon and uranium plates has resulted in improved resolution.
- c) Cerenkov counters -- techniques are being developed to achieve good velocity resolution with increased acceptance.
- d) transition radiation -- this technique will take over particle identification from Cerenkov counters in the TeV range.
- e) computers -- microprocessors seem destined to play a

large role in control, data acquisition, and initial analysis of future experiments. In addition, significant advances can be expected from large data processors.

- f) large magnets -- superconducting spectrometer magnets will provide more magnetic field at a fraction of the power cost of conventional magnets.
- g) data transmission between regional and/or national facilities -- this should be implemented in the most efficient way in order to optimize analyses of experimental data. In particular, data transmission at high rates utilizing satellites should be studied.

Other techniques, not yet conceived, may well play important roles in future experiments.

The development of experimental techniques is best accomplished through the work of individuals and small groups. Close communication between groups throughout the world is very important to the timely and efficient development of these techniques.

Although many experiments will become more difficult at high energies, others will become simpler. In many cases the techniques will be changed as the energy increases, so that the required precision and the cost do not become prohibitive. Some specific experiments were considered in the report of a CERN study group^{*}. We conclude that in general the experimental costs will not increase relative to machine costs, but may even decrease.

* A summary appears in VBA/CMS/1.

IV. Accelerator Projections

Having analyzed the design features presented at the meeting of the international study group on superhigh energy accelerators we have drawn the following conclusions.

The status of the various facilities with center-of-mass energies above 10 GeV can be divided into three groups:

Group 1: The facilities that are now operating successfully on a productive physics program (such as the FNAL accelerator of $E_{f.t.} = 500$ GeV and the proton-proton ISR at CERN with $E_{c.m.} = 2 \times 31$ GeV), as well as those in the running-in stage (such as the CERN SPS of $E_{f.t.} = 400$ GeV).

Group 2: Accelerator and storage rings under construction (such as the three e^+e^- colliding beam facilities under construction (PETRA in FRG with $E_{c.m.} = 2 \times (5-19)$ GeV, PEP in USA of $E_{c.m.} = 2 \times (5-18)$ GeV and VEPP-4 in USSR of $E_{c.m.} = 2 \times (5-7)$ GeV) together with planned projects and facilities under study. If these regional projects are realized they will form the basis for a vigorous experimental program of elementary particle physics until 1990.

The projects in this second group vary widely in cost and scope, but their construction is assumed to be within the resources of a single region.

The principal parameters of this group are presented in Table I. The proton facilities on the list assume superconducting magnets, and the recent advances of this technology have made this a very realistic assumption.

Group 3: Preliminary ideas concerning very big accelerators and storage rings with average orbit radii of 5-15 km and costs in the range of 3-6 times the cost of the FNAL accelerator or the CERN-SPS. Conceptual designs of examples of such facilities

were presented to the meeting, and they are listed in Table II. The presentations made might be considered as the initial stage of an accelerator complex to form the basis for the inter-regional program of experimental high-energy physics after 1990.

It is hoped that by the time such a project comes near to its realization, advantage can be taken of further progress in technology, and that, for instance, for the magnets for a fixed target accelerator superconducting materials of higher critical parameters can be used in magnet construction. For the r.f. systems for a possible large e^+e^- , it is hoped that the development of superconducting r.f. cavities can be further advanced. In both these fields, development work should be strongly encouraged.

In conclusion it is not easy to determine what ultimate limits will be imposed on new accelerator projects by technical considerations. It appears that the size and scope of projects presently envisaged will be limited by financial resources only. Technological developments over the next one or two decades may indeed result in more economical solutions being found for the construction of high energy accelerators.

It is recommended that a continuing study should be undertaken through an inter-regional collaboration to ensure that the technologies which are likely to influence future accelerator design are covered by adequate development programs with minimum needless duplication. It should be recognized however, that the potential industrial importance of such technologies adds a further dimension to the problem of international collaboration.

TABLE I

Region (Country)	Facility	p lab.s. GeV	e lab.s. GeV	pp c.m.s. GeV	$p\bar{p}$ c.m.s. GeV	pe c.m.s. GeV	e^-e^+ c.m.s. GeV	Circum- ference km
Japan	TRISTAN	180	17	360		~110	34	~2
FRG CERN	PETRA LSR LEP	400	19 20 <100	800	800	180	38 < 200	2.3 6.4 < 50
USA	PEP Doubler ISABELLE POPAE	200 1000 200 1000	18 20 20	400 2000	---	100 130 280	36 ---	2.2. ~6 ~3 5.5
USSR	VEPP-4 UNK	2000	7 20	4000	4000	400	14	18

TABLE II

Inter- national	VBA fixed target	>10.000		(>20.000)	(>20.000)			30-60
	VBA e^+e^-		>100				>200	>50

V. Conclusions

The foregoing survey leads us to the following conclusions:

A) The present status of the science of the structure of matter poses fundamental problems which require a new generation of facilities of the types listed in Table I. Such facilities are within the capabilities of the individual regions and are needed for continued progress of this field of research.

B) The success of regional and interregional collaboration in the past provides a good basis for extending and strengthening this collaboration in the new generation of regional facilities.

C) Looking beyond this new generation of regional accelerators we foresee the need for an accelerator complex (VBA) which will require international collaboration of all regions concerned.

VI. Recommendations

1) Efforts should be made to coordinate the design and construction of new regional facilities. Consultations and exchange of experiences should be encouraged in order to optimize the diversity of facilities and to enhance the efficiency of construction and operation. The Study Group also recommends joint studies of new technology (e.g. superconductivity, new detectors and other experimental apparatus) and joint design and/or construction of components of regional projects.

2) Joint utilization of regional facilities by scientists of different regions should be organized on the basis of present and future arrangements or agreements. The general availability of regional installations is essential to enable scientists of different regions to take advantage of facilities with complementary research poten-

tialities.

3) International collaboration should provide for studies leading towards the realization of a next generation of super-high energy facilities, following the regional projects referred to above (examples are given in Table II). It is expected that these facilities will be so large that their realization will be possible only by pooling the resources of all regions concerned into common international projects.

Creation of a super-high energy accelerator complex (VBA) involves especially complicated scientific, technical and organizational problems. These will require several years of continuing studies and discussions. The Study Group recommends that these discussions begin in the near future leading to the start of the design of the VBA in about 10 years.

4) In view of the need for these extensions of international collaboration, the Study Group suggests to the IUPAP Division of Particles and Fields to initiate these activities in an appropriate form, for example, by appointing a sub-committee for the purpose of organizing working groups and future meetings such as the present one.

Appendix 1

PARTICIPANTS

USSR

A.A. Logunov
A.A. Vassilyev
M.A. Markov
V.A. Glukhikh
L.D. Soloviev
I.V. Tchuvilo
V.A. Yarba

as experts:

A.Ts. Amatuni
A. Budker
N.A. Monoszon
A.A. Naumov
A.N. Skrinsky
V.A. Vassiliev
N.E. Tyurin
V.F. Kuleshov

JINR

K. Lanius
V.P. Djelepov

JAPAN

Y. Yamaguchi

USA

V.F. Weisskopf
R.R. Wilson
L. Lederman
M. Barton
R. Diebold
J. Bjorken
D. Eulian (secretary)

* CERN Member States

G. von Dardel
U. Amaldi
D. Husmann
K. Johnsen
A. Rousset
D.B. Thomas

as expert:

G.A. Voss

* The delegation from the CERN Member States was selected by the CERN Scientific Policy Committee and was under the leadership of the Chairman of the European Committee for Future Accelerators.

Appendix 2

AGENDA

17 May Morning Session

Chairman: V. Weisskopf

Topic I: Status of national and regional facilities.

- 1) PETRA, PEP
Speaker: G. Voss
- 2) VEPP-4
Speaker: A. Skrinsky
- 3) Energy Doubler
Speaker: R. Wilson

Afternoon Session

Chairman: G. von Dardel

Topic II: Presentation of scientific and technical aspects of big accelerators.

- 1) POPAE
Speaker: R. Diebold
- 2) ISABELLE
Speaker: M. Barton
- 3) LSR-pp
Speaker: K. Johnsen

18 May Morning Session

Chairman: A.A. Logunov

- 4) LSR-ep
Speaker: K. Johnsen
- 5) UNK
Speaker: V. Yarba
- 6) Colliding $p\bar{p}$ - rings
Speaker: A. Budker
- 7) TRISTAN
Speaker: Y. Yamaguchi

Afternoon Session

Chairman: K. Lanus

Topic III: Presentation of general scientific and technical aspects in the construction and utilization of high-energy systems.

- 1) 10 TeV proton accelerator with a fixed target
Speakers: D.B. Thomas
R. Wilson
- 2) 100x100 GeV electron storage ring
Speaker: K. Johnsen

19 May Morning Session

Chairman: Y. Yamaguchi

Topic IV: Physics Projections

1) Theoretical Considerations

Speakers: M.A. Markov
J. Bjorken

Afternoon Session

Chairman: L. Lederman

2) Physics to 1980 - Existing Facilities

Speakers: L. Lederman - FNAL pp
A. Rousset - SPS, ν and μ
U. Amaldi - ISR

3) Physics to 1985 - Next Generation of Regional Accelerators

Speakers: U. Amaldi - LSR
Y. Prokoshkin - UNK

20 May Morning

Visit to the IHEP Laboratories

Afternoon Session

Chairman: U. Amaldi

Continuation of previous session

Speakers: S. Gerstein - UNK
G. von Dardel - PETRA

Topic V: Physics Beyond 1985: VBA

Speakers: A. Rousset - ν at 10 TeV
G. von Dardel - hadrons at 10 TeV

Topic VI: Experimental techniques Beyond 1985

Speaker: R. Diebold

21 May Morning Session

Chairman: L. Soloviev

Topic VII: Concluding Discussions

1) Review of situation - V. Weisskopf
2) General discussion

Afternoon Session

Chairman: V. Djelepov

3) General discussion

24/25 May

Preparation of Final Report

Appendix 3

List of papers submitted at meeting:

From CERN Member States:

- VBA/CMS/1 W. Willis, "Summary of the 1976 CERN Study on the Use of a 10 TeV Proton Accelerator and of Electron-proton Colliding Beams", CERN-SD Note No. 1.
- VBA/CMS/2 W. Willis, "Future Trends in Detectors for Multi-TeV Accelerators", CERN-SD Note No. 2.
- VBA/CMS/3 G. Charpak, "Some Considerations on the Future of Proportional Chambers", CERN-SD Note No. 3.
- VBA/CMS/4 U. Amaldi and L. Di Lella, "Physics at the CERN LSR", CERN-SD Note No. 4.
- VBA/CMS/5 K. Johnsen, "Studies of New Large Storage Rings at CERN: pp, $\bar{p}p$ and ep", CERN-SD Note No. 5.
- VBA/CMS/6 R. Billinge, "VBA Fixed Target Parameter List".
- VBA/CMS/7 U. Amaldi and H. Lengeler, "Collinear Accelerators for High Energy e^+e^- Collisions", CERN-SD Note No. 7.
- VBA/CMS/8 G. von Dardel, "Hadronic Physics at a 10 TeV Fixed Target Machine".
- VBA/CMS/9 G. von Dardel, "The PETRA Physics Program".
- VBA/CMS/10 D.B. Thomas, "Superconducting Magnets for a 5 to 10 TeV Proton Synchrotron".
- VBA/CMS/11 "LEP Parameter List", Version 1, compiled by E. Keil.
- VBA/CMS/12 "Parameters for Superconducting LSR", Version 1, edited by K. Johnsen, CERN/ISR-LTD/75-39.
- VBA/CMS/13 M.G.N. Hine, "International Data Communications for European High Energy Physicists - and others".

From USA:

- Mark Barton/W.B. Sampson. "Impact of A-15 Superconductors on Future Machines"
- "A Proposal for Construction of a Proton-Proton Storage Accelerator Facility - ISABELLE 1976 (revised)
- "A 1000 GeV on 1000 GeV Proton-Proton Colliding Beam Facility", (POPAE).
- R. Wilson. "A Ten TeV World Accelerator," May 1976.
- J. Bjorken. "Physics Issues and the VBA," May 1976.