

Originally Processed With FOIA(s):
2005-0336-F

FOIA Number:
2005-0336-F

FOIA MARKER

**This is not a textual record. This is used as an
administrative marker by the George Bush Presidential
Library Staff.**

Record Group/Collection: George H.W. Bush Presidential Records
Collection/Office of Origin: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files

OA/ID Number: 62004
Folder ID Number: 62004-008

Folder Title:
D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Stack:

Row:

Section:

Shelf:

Position:

0

0

0

0

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
01. Letter	To: John Wheeler From: Allan Bromley Re: Response to 6/21/89 letter (1 pp.)	7/3/89	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Date Closed:	2/9/2010	OA/ID Number:	62004-008
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
Re-review Case #:		Appeal Disposition:	
P-2/P-5 Review Case #:		Disposition Date:	
AR Case #:		MR Case #:	
AR Disposition:		MR Disposition:	
AR Disposition Date:		MR Disposition Date:	

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
 P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
 P-3 Release would violate a Federal statute [(a)(3) of the PRA]
 P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
 P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]
 P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

(b)(1) National security classified information [(b)(1) of the FOIA]
 (b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
 (b)(3) Release would violate a Federal statute [(b)(3) of the FOIA]
 (b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
 (b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
 (b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
 (b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
 (b)(9) Release would disclose geological or geophysical information

Princeton University

Joan Wheeler
Department of Physics: Joseph Henry Laboratories
Jadwin Hall
Post Office Box 708
Princeton, New Jersey 08544

21 June 1989
at High Island
S. Bristol ME 04568
207-644-8138

Dear Allan,

You have done so much
for physics--and for the larger
community--for so long, and
have such a combination of good
sense and responsibility, that
in appreciation of your merits you
have been assigned an even larger
sphere of responsibility. Bravo!
And congratulations! The real
winner is the U.S.A.!

By way of keeping you
in touch with one side of one very
hot item I enclose a letter to the
President about Tang, just going off.

Warmest good wishes!

Sincerely,

Prof. D. Allan Bromley

Joan

Princeton University

Department of Physics: Joseph Henry Laboratories

Jadwin Hall

Post Office Box 708

Princeton, New Jersey 08544-0708

21st of June 1989

President George H. W. Bush
White House
Washington, D.C.

CONTINUE TO FLY THE FLAG
FOR FANG AND FREEDOM!

Dear Mr. President:

Congratulations on raising our flag so nobly at our Beijing Embassy in protection of Fang Li-zhi and Li Shu-xian. They are respected members of the world wide community of physics. We know both well. They are sensible and reliable, not fanatics.

Messages from colleagues here and abroad report that this U. S. action gives heart to supporters of democracy everywhere. Scientists especially applaud your defense of men and women who risk their lives to search out the truth and carry it across all borders. Bravo!

Faithfully yours,

M. L. Goldberger
per JW

M. L. Goldberger
Director,
Institute for Advanced Study
Past President,
California Institute
of Technology

John Archibald Wheeler

John Archibald Wheeler
Past President,
American Physical Society
Professor Emeritus,
Princeton University and
University of Texas, Austin

cc. Hon. James Baker, Dr. Frank Press, Dr. Allan Bromley

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
02a. Memorandum	To: James Watkins From: Allan Bromley Re: Nominations for Membership on the Fusion Policy Advisory Committee [personal information redacted] (4 pp.)	11/3/89	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

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"CORRESPONDENCE TRACKING"

DOCUMENT NUMBER: 8920150

TYPE: Action Item

DATE OF CORRESPONDENCE: 10/16/89

FROM: JAMES D. WATKINS
THE SECRETARY OF ENERGY

TO: BROMLEY

SUBJECT: SUGGESTIONS FOR INDIVIDUALS TO SERVE ON FUSION
POLICY ADVISORY COMMITTEE.

ASSIGNED TO: D. Allan Bromley

ACTION REQUIRED: SUGGESTIONS
WRITTEN
ACKNOWLEDGEMENT

SENDER'S DUE DATE: 11/03/89

OSTP DUE DATE: 11/03/89

DATE COMPLETED: -----

COPIES TO: JUDY BOSTOCK
BOB POST
NEOB files

FILE: EOB

DATE RECEIVED: 10/19/89

REMARKS: COPY TO THE ASSOCIATE DIRECTOR FOR PHYSICAL SCIENCE

*Ask Judy to
provide draft
for your*

signature

*to the
Admiral?*

Judy to discuss

**OSTP
ROUTING SLIP FOR TRACKING**

CORRESPONDENCE X STAFF MEMO _____

_____ Information X Action _____ Files Only.

Action Assigned to: Brown

Action Required: Suggestions
written acknowledgment
OSTP Due Date: _____

Copies To:

_____ International Science/Social Sciences
_____ Life Sciences
_____ Industrial Technology
X Physical and Engineering Science
X Critical Materials
_____ Editorial/Liaison/Public Affairs
_____ Industrial Technology
_____ Defense/Security
_____ Administration/Personnel/Facilities
_____ Hearings and Testimony Coordination
_____ PCAST
_____ FCCSET/Subcommittees
_____ Legislative Referrals
X NEOB

Special Instructions:

File EOB

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
02b. Letter	To: Allan Bromely From: James Watkins Re: Fusion Policy Advisory Committee (2 pp.)	10/16/89	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Date Closed:	2/9/2010	OA/ID Number:	62004-008
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
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Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
02c. Letter	To: James Watkins From: Allan Bromley Re: Nominations for Membership on the Fusion Policy Advisory Committee [personal information redacted] (2 pp.)		(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Date Closed:	2/9/2010	OA/ID Number:	62004-008
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
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AR Case #:		MR Case #:	
AR Disposition:		MR Disposition:	
AR Disposition Date:		MR Disposition Date:	

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
 P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
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 (b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
 (b)(9) Release would disclose geological or geophysical information

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
03a. Letter	To: James Watkins From: Allan Bromley Re: 9/8/89 letter to Senator Wirth (2 pp.)	9/22/89	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Date Closed:	2/9/2010	OA/ID Number:	62004-008
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
Re-review Case #:		Appeal Disposition:	
P-2/P-5 Review Case #:		Disposition Date:	
AR Case #:		MR Case #:	
AR Disposition:		MR Disposition:	
AR Disposition Date:		MR Disposition Date:	

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

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P-3 Release would violate a Federal statute [(a)(3) of the PRA]
P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
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(b)(9) Release would disclose geological or geophysical information

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
03b. Letter	To: Allan Bromley From: James Watkins Re: Superconducting Super Collider (1 pp.)	9/13/89	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Date Closed:	2/9/2010	OA/ID Number:	62004-008
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
Re-review Case #:		Appeal Disposition:	
P-2/P-5 Review Case #:		Disposition Date:	
AR Case #:		MR Case #:	
AR Disposition:		MR Disposition:	
AR Disposition Date:		MR Disposition Date:	

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
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Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
03c. Memorandum	To: Robert Hunter From: James Watkins Re: SSC Management Plan (2 pp.)	9/7/89	(b)(1) (b)(2)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Date Closed:	2/9/2010	OA/ID Number:	62004-008
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RESTRICTION CODES

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Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
03d. Letter	To: Senator Wirth From: James Watkins Re: Global Warming Bill (2 pp.)	9/8/89	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Date Closed:	2/9/2010	OA/ID Number:	62004-008
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RESTRICTION CODES

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THE WHITE HOUSE
WASHINGTON

August 24, 1989

Dear Dr. Wilson:

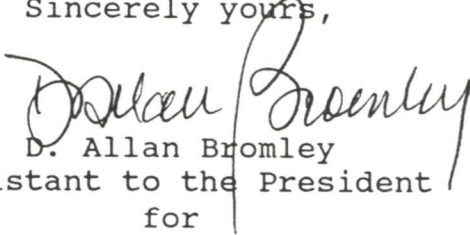
Many thanks for your letter of August 7th which arrived while I was out of the country. I would look forward, a little later in the year, to taking you up on your offer of a tour of the National Archives.

My wife, as it happens, is a professional archivist who was Chief Archivist for the last ten years at the New Haven Colony Historical Society's Whitney Library, where she was fortunate in having a treasure trove of unexplored original documents from the early days of the New Haven and Connecticut settlements.

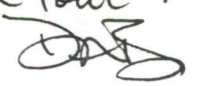
Many thanks for your letter and its invitation. At the moment I am very heavily engaged in assembling the Office of Science and Technology staff, but in a month or two I hope to have that in hand and would then look forward to taking you up on your invitation.

With warmest best wishes,

Sincerely yours,


D. Allan Bromley
Assistant to the President
for
Science and Technology

Dr. Don W. Wilson
Archivist of the United States
National Archives
Washington, D.C. 20408

P.S.: Spoke to Mrs. Bromley
about your note and if
possible she would very
much appreciate being
included in the tour!


National Archives



Washington, DC 20408

AUG 7 1989

Honorable D. Allan Bromley
Director Designate
Office of Science and Technology Policy
Old Executive Office Building
Washington, DC 20506

Dear Mr. Bromley:

As Archivist of the United States one of my primary obligations is to assist Federal agencies in identifying and preserving their historically valuable records. In time, these records will be added to the permanent archives of the United States. As you might expect, the identification and preservation of such records is best achieved when the staff of the National Archives and Records Administration have the opportunity to work with your agency's records creators and managers.

Recently I began a program to acquaint agency heads with the activities of the National Archives, with particular focus on how we can be of service to agencies in records management, in the identification and care of their substantive documents, and in the timely transfer of historically valuable records to the National Archives. To that end, it would be my pleasure to have you and your staff visit the National Archives for a tour. It is always a privilege for me to show off the range and richness of our Nation's documentary heritage. In addition, we might talk about ways and means of working together to assure that the significant records of your agency become part of our incomparable national historical collection.

I look forward to hearing from you.

Sincerely,

DON W. WILSON
Archivist of the United States

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
04. Letter	To: Stephen Willett From: Allan Bromley Re: Response to 8/3/89 letter (1 pp.)	8/24/89	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

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(b)(1) National security classified information [(b)(1) of the FOIA]
 (b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
 (b)(3) Release would violate a Federal statute [(b)(3) of the FOIA]
 (b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
 (b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
 (b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
 (b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
 (b)(9) Release would disclose geological or geophysical information

SUMITOMO 3M LIMITED

33-1, Tamagawadai 2-chome
Setagaya-ku, Tokyo 158, Japan
Tel 03-709-8111
C.P.O. Box 490 Tokyo



August 3, 1989

Dr. D. Allan Bromley
Director
Office of Science and Technology Policy
The White House
1600 Pennsylvania Avenue
Washington, DC

Dear Dr. Bromley:

My congratulations on your nomination as the President's science advisor and OSTP director. Creative policies are needed to keep the U.S. a technical leader both in academia and in industry. I wish you every success in this challenging assignment.

I am currently on temporary assignment to 3M's joint venture company in Japan, Sumitomo 3M Ltd. You may have learned of this from Mary Ann Schulz, who kindly helped me overcome visa difficulties earlier this year. My job here includes working with Japanese manufacturers of high resolution hardcopy and display devices. Hence, I have become keenly aware of the differences between Japan and the U.S. in attitudes and action toward science, technology and manufacturing.

If your travel schedule brings you to Tokyo before the end of 1990, please feel free to contact me. My business card is enclosed.

Again, Omedetoo gozaimasu and Ganbatte.

Sincerely,

Stephen J. Willett

Physicists refute cold fusion claim

BALTIMORE, Md., (Reuters-Kyodo) A cascade of negative reviews from some of the world's most eminent physicists has seriously undercut — perhaps fatally — two chemists' claims to have achieved nuclear fusion at room temperature in a glass jar.

Physicists at the spring meeting of the American Physical Society have literally been lining up at special conference sessions to attack the work of Stanley Pons of the University of Utah and Martin Fleischmann of the University of Southampton, who announced in Utah last month they had achieved nuclear fusion in a simple tabletop experiment.

In contrast to earlier follow-up studies, which generally shied away from firm stands, most of the latest findings seemed unequivocal.

"Our results exclude without any doubt the Pons and Fleischmann results," said Yale University physicist Moshe Gai, referring to a joint study by Yale and the Brookhaven National Laboratory.

"Nobody has been able to reproduce it and there is no theoretical basis for the results," said California Institute of Technology physicist Steven Koonin of the Pons-Fleischmann work.

Many physicists expressed the hope scientists could now drop further attempts to reproduce the Pons-Fleischmann experiments and return to research on other pressing matters.

But non-physicists are unlikely to be so easily diverted, and attention is now expected to turn to a meeting of the Electrochemical Society, set for next week in Los Angeles.

THE WHITE HOUSE
WASHINGTON

August 29, 1989

Dear Paul:

Many thanks for sending me a copy of Frank Press's letter concerning the establishment of a new study to be chaired by Dan Evans.

It is already clear that this entire question of global change will occupy a very large fraction of my time over the next several years and this study will be a very important input to us. I am particularly pleased that you will be part of it because I am learning that there are not all that many people who share your balanced view of the global situation. I have, in fact, been astonished by the number of people who are prepared to accept very hazy scientific evidence and mount major greenhouse amelioration programs on them.

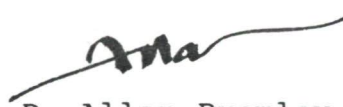
As I think you know, the Federal Coordinating Council has a Committee on Earth Sciences chaired by Dallas Peck of the Department of the Interior and co-chaired by Bob Corell of the National Science Foundation. In my opinion, they have done an outstanding job in pulling together the overall U.S. plan for research on global change, and I am forwarding to you, under separate cover, a copy of their detailed report that will be issued formally during this coming week. I arranged for President Bush to take copies of this report with him to the last Economic Summit in Paris where he distributed it to good effect, and used it, I think, with great effectiveness to block rather obvious efforts on the part of President Mitterrand and Prime Minister Thatcher to take world leadership in this field. As you know very well, the U.S. has been a leader for decades.

I must say that I miss the NBI Board meetings; that was and is an outstanding board and, quite apart from its activities on behalf of the bank, was a very pleasant social group as well.

I am still in the process of putting together my staff and coming to grips with some of the major issues facing OSTP but it is already clear that there are some enormous challenges and opportunities, and I have been highly gratified by the quality of the people who have been prepared to join with me thus far.

Pat joins me in sending you and Barbara our warmest best wishes,

Sincerely yours,

A handwritten signature in dark ink, appearing to read "D. Bromley", with a long, sweeping horizontal line extending to the right.

D. Allan Bromley
Assistant to the President
for
Science and Technology

Dr. Paul E. Waggoner
The Connecticut Agricultural Experiment Station
123 Huntington Street
New Haven, Connecticut 06504

Handwritten: All info. QW.

American
Association
for the Advancement of
Science

DR. PAUL E. WAGGONER

Chairman, AAAS Panel on
"Climatic Variability, Climate Change, and the
Planning and Management of U.S. Water Resources"

The Connecticut Agricultural Experiment Station
123 Huntington Street, New Haven, CT 06504; U.S.A.
Telephone: (203) 789-7826

Document Originally
Attached to
Following Page

NATIONAL ACADEMY OF SCIENCES

2101 CONSTITUTION AVENUE, NW

WASHINGTON, D. C. 20418

OFFICE OF THE PRESIDENT

July 18, 1989

Paul E. Waggoner
CT Agricultural Experiment Station
P.O. Box 1106
New Haven, CT 06504-1106

Dear Paul:

I believe the National Academies are in a position to provide significant leadership in addressing one of today's most challenging problems--global warming--and I'd like to enlist your participation in our effort.

The Congress has asked the Academies to conduct a comprehensive review of the policy implications of worldwide "greenhouse" effects. The appropriations language that directs EPA to proceed specifies that attention be paid both to policies that might mitigate greenhouse effects and those that would be needed to accommodate greenhouse impacts. The international community has recognized this as a pressing issue, taking the extraordinary step of organizing the Intergovernmental Panel on Climate Change in anticipation of an international diplomatic framework convention. Key Congressmen have talked with me about it and appear ready to help provide national leadership. I thus believe the time is right for clarifying the national and international debate about global warming by means of a careful, technically-sound review of the range of potential policy actions that governments now have before them. It will not be productive to have protracted public dispute about the nature or feasibility of various policy alternatives.

The study will be chaired by the Honorable Daniel J. Evans, U.S. Senator from Washington State from 1983-88, Governor from 1964-77, registered civil engineer, and former college president. I invite you to serve as a member of this new panel. The study will be conducted under the auspices of our Committee on Science, Engineering, and Public Policy--a unique group drawn from current or former members of the councils of the Academy of Sciences, the Academy of Engineering, or the Institute of Medicine. As you can see from the attached memorandum of guidance from that group, the study panel is charged with reviewing research, analysis, and expertise and with providing advice as to effective and practical actions to mitigate or adapt to greenhouse effects.

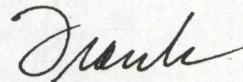
Although I know that you have a busy schedule, I hope that it will be possible for you to make time available for a public service effort of this kind. Members of Academy panels serve on an unpaid basis, but all travel expenses incurred while attending panel meetings are fully

reimbursed. Most studies of this magnitude require six or seven one-day or two-day committee meetings over the life of the project. Few other special trips would be required, although you would need to be regularly accessible to staff by telephone and other electronic means.

The panel will draw upon the full range of expertise needed for a careful review. You were nominated for this assignment after an exhaustive internal review. Your experience and reputation places you among a select group of people who would be viewed as credible members for such a panel. We also intend to obtain commitment to the panel from others whose background and expertise appropriately complement your own.

Bob White, President of the Academy of Engineering, and I hope that you will be able to accept this important new responsibility. Your participation will help produce a balanced, thoughtful, and practical report that will be of use to the Congress, the Executive branch, and the international community as well. If you have any questions, please call Dr. Rob Coppock, Staff Director for the panel (202/334-1637), or myself. Otherwise, we will contact you shortly after you have received this letter to discuss the matter further.

Yours sincerely,



Frank Press
President

Attachment

OFFICE OF THE
DIRECTOR

89 AUG 19 4 19:41

RECEIVED

"DOCUMENT TRACKING"

DOCUMENT NO: 64

TYPE: Information

DATE OF DOCUMENT: 7/18/89

FROM: National Academy of Sciences
Frank Press

TO: Copy from Dr. Paul E. Waggoner, AAAS, to Dr. Bromley

SUBJECT: Global Warming (greenhouse effect)

ASSIGNED TO:

ACTION REQUIRED:

SENDER'S DUE DATE:

OSTP DUE DATE:

DATE COMPLETED: _____

COPIES TO: Ratchford
Wyngaarden
Post
NEOB

FILE: NEOB

DATE RECEIVED: 8/19/89

REMARKS:

THE WHITE HOUSE
WASHINGTON

August 29, 1989

Dear Doug:

Many thanks for your letter of August 16th in which you endorse the request that I speak to the American Ceramic Society.

As I told Dr. Fisher, however, in a letter dated May 24th, I will be out of the country on the dates of his conference and therefore am unable to accept his invitation.

Clearly this is an important area of modern technology and one that I shall certainly keep an eye on as part of our general monitoring of the U.S. posture in materials science.

Now that I have been confirmed as Director of the Office of Science and Technology Policy, I shall look forward to the pleasure of working with you and once I get more firmly established and get some more of my staff in place, I shall call your office to find a mutually convenient time when I can come up and talk with you about many of our shared interests.

With warmest best wishes,

Sincerely yours,



D. Allan Bromley
Assistant to the President
for
Science and Technology

The Honorable Doug Walgren, Chairman
Subcommittee on Science, Research and Technology
U.S. House of Representatives
Suite 2321 Rayburn House Office Building
Washington, D.C. 20515

ROBERT A. ROE, New Jersey, CHAIRMAN

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U.S. HOUSE OF REPRESENTATIVES
**COMMITTEE ON SCIENCE, SPACE,
AND TECHNOLOGY**

SUITE 2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-6371

August 16, 1989

ROBERT S. WALKER, Pennsylvania
F. JAMES SENSENBRENNER, Jr., Wisconsin
CLAUDINE SCHNEIDER, Rhode Island
SHERWOOD L. BOEHLERT, New York
TOM LEWIS, Florida
DON RITTER, Pennsylvania
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DANA ROHRBACHER, California
STEVEN H. SCHIFF, New Mexico
TOM CAMPBELL, California

HAROLD P. HANSON
Executive Director
ROBERT C. KETCHAM
General Counsel
DAVID D. CLEMENT
Republican Chief of Staff

*Dr. D. Allen Bromley, Director
Office of Science and Technology Policy
Executive Office of the President
Washington, D.C. 20506*

Dear Dr. Bromley:

I am writing to endorse the request you have received from the American Ceramic Society to speak at the "Unified International Conference on Refractories" (UNITECR). A copy of the material I received from the Society regarding the conference is enclosed.

As I am sure you will agree, UNITECR focuses on a technical field of great importance for US basic industry. Your discussion of international technology exchange and cooperation would be a major contribution to the conference. I realize your schedule is very full, but I hope you will be able to accept the invitation to this international meeting.

Thank you for your attention to this request.

Sincerely,

Doug Walgren
DOUG WALGREN, Chairman
Subcommittee on Science,
Research and Technology

DW/Wmk

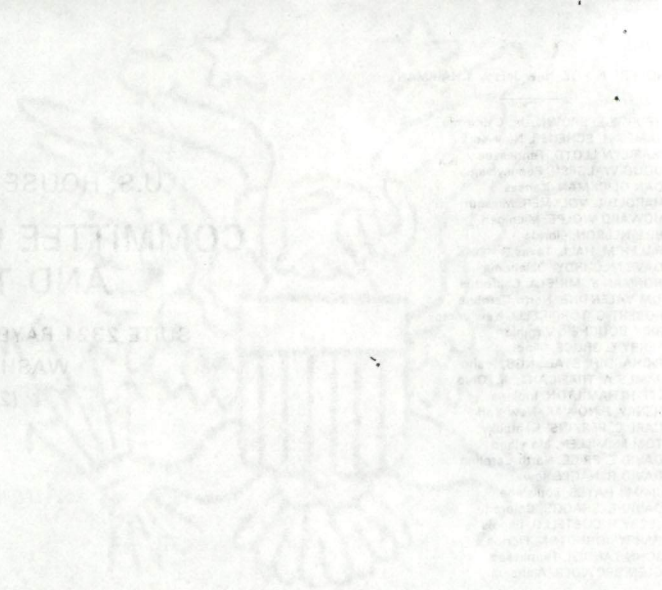
*When was this great
event scheduled?*

Nov. 3

RECEIVED

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE
AND TECHNOLOGY

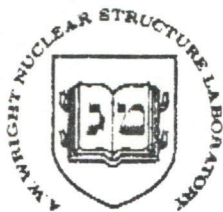
STATE 2321 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
TELEPHONE (202) 225-8321



OFFICE OF THE
DIRECTOR

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RECEIVED



Yale University

A. W. Wright Nuclear Structure Laboratory

272 Whitney Avenue, P.O. Box 6666, New Haven, Connecticut 06511

D. Allan Bromley
Henry Ford II Professor
and Director
203-432-3082

May 24, 1989

Dr. Robert E. Fisher
Plibrico Company
1800 N. Kingsbury Street
Chicago, IL 60614

Dear Dr. Fisher:

Many thanks for your letter of May 11 which has just been forwarded to me from OSTP in which you invite me to present a keynote address on the evening of November 3 at your meeting on **Global Advances in Refractories**.

I regret to tell you that I already know that I must be out of the country on the date in question and so I am unable to accept your invitation. I regret that this is so because, obviously, your field is a very important one and perhaps in a later year I will have the pleasure in joining you.

With all best wishes.

Sincerely yours,

DAB:rb

UNITECR '89

International Executive Board

President	George MacZura (ACerS)
Past-President	Dr. T. Hayashi (TAR-J)
Incoming President	Dr. W. Ehlert (GRA)
Vice President	R.E. Fisher (ACerS)

Charter Organizations

ALAFAR	GRA
ACerS	TAR-J

Secretariat

The American Ceramic Society

Reply to writer at: Plibrico Company
Address: 1800 N. Kingsbury St.
Chicago, IL 60614

May 11, 1989

Fax No.: 312-549-0424

Dr. D. Allen Bromley
Science Advisor to the President
Office of Science and Technology Policy
Old Executive Office Building
17th & Pennsylvania Ave., N.W.
Washington, D.C. 20506

Dear Dr. Bromley:

On behalf of the sponsoring organizations and executive council of the Unified International Conference on Refractories (UNITECR), you are cordially invited to present a keynote address on the subject of "Technology Exchange & International Cooperation," the evening of November 3, 1989 at the Disneyland Hotel, Anaheim, CA, during UNITECR '89 (which is being held November 1-4, 1989, hosted by the American Ceramic Society's Refractory Ceramics Division).

The Conference theme "GLOBAL ADVANCES IN REFRACTORIES," will focus on the latest advances and applications of refractories from around the world. More than 1000 high temperature scientists and engineers from over 30 different countries are expected at this First International Conference to attend technical sessions encompassing 150-170 technical papers. Attendees will include the Minister of Ferrous Metallurgy and a delegation of five from the USSR.

A brochure announcement providing additional details about this meeting is enclosed for your information.

Much media attention has been given in recent years to the role advanced ceramics will play in the future. Those familiar with refractories technology know that refractories represent the largest and most commercially important subgroup of advanced ceramics. Refractories are the "glue", without which most major industries could not operate. Heat containment materials are essential to power generation, metallurgy, minerals and chemicals processing and the like -- the building blocks that support our industrial base. The need of technical

Advancing Refractories Technology — Around the World
Avanzando Tecnología Refractaria — En Todo el Mundo
Fortschreitende Ofenausmauerungstechnologie — Weltweit
世界に広がる優れたリフラクトリー・テクノロジー

UNITECR '89

May 11, 1989
Page 2

advances in refractories must accelerate in response to the demands for increasing performance by those who use heat in their industrial processes - making exchange of technical information a crucial activity.

The creation of this important international organization on refractories represents a 3 year effort on the part of the 4 charter organizations to bring together refractories technologists from every major industrial area around the globe so they may exchange information and ideas on this vital area of technology. The USA members of the UNITECR Executive Council are proud we have been selected to host this first UNITECR Conference, which will be the largest and most "international" conference on refractories ever held. UNITECR '89 will provide a unique opportunity to tell scientists and engineers from around the world about President Bush's policies concerning International High Technology Issues.

We truly hope that your schedule will permit you to participate in this most important event. An early reply will be greatly appreciated.

Sincerely yours,



Robert E. Fisher, V.P.
UNITECR '89

REF:bk

cc: Mr. George MacZura, President UNITECR '89
Mr. Paul Holbrook, Executive Director American Ceramic Society

bcc: Steve Hellem
Chuck Marvin



UNITED 1989 CONGRESS

Unified International Technical Conference on Refractories
First Biennial Worldwide Conference on Refractories

Global Advances in Refractories

Meeting Registration

Hosted by

The American Ceramic
Society Refractories Div.
Disneyland Hotel
Anaheim, CA U.S.A.
November 1-4, 1989

In conjunction with The
American Ceramic
Society's First
International Ceramic
Science and
Technology Congress
and The 42nd Pacific
Coast Regional
Meeting

UNITECR '89

UNITECR '89 Congress
November 1-4, 1989
Disneyland Hotel
Anaheim, CA U.S.A.

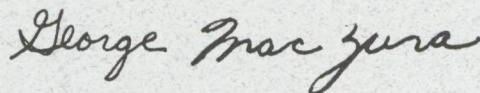
Dear Colleagues:

The first Unified International Technical Conference on Refractories will be held November 1-4, 1989 in Anaheim, CA, U.S.A. The meeting, entitled "Global Advances in Refractories", will focus on the latest advances and applications of refractories from around the world. This brochure provides you information about the program, conference registration, hotel accommodations and reservations and other activities.

It is hoped this information will assist you in planning to attend this most important conference. It is my sincere hope that all conference attendees will actively participate in the discussions.

I extend a cordial invitation to you to attend this first Unified International Technical Conference on Refractories and look forward to seeing you in Anaheim in November 1989.

Sincerely,



George MacZura
President
UNITECR'89

Session Topics

Refractories for Iron & Steel
Refractories for Glass
Refractories for Nonferrous Metallurgy
Refractories for Hydrocarbon, Cement and Waste Management Industries
Refractory Applications of Advanced Ceramics
Monolithics
New Tests and Testing Developments
Refractory Engineering Systems and Design
Advances in Refractory Processing, Manufacture and Control
Refractory Raw Materials; Properties, Selection and Application
Advances in Refractory Basic Science

Official Language: The official language of the conference is English. The English-Japanese interpretation service will be provided only for question and answer period of presentations. Interpreters will be available to answer questions of a general nature. Consult the UNITECR registration desk for assistance.

Proceedings: All lectures and presentations will be published in a book of proceedings for distribution to all participants upon registration at the conference. Additional copies of the proceedings will be available for purchase from The American Ceramic Society.

Meeting Registration: UNITECR will use a simplified registration system. This system will facilitate registration of meeting attendees and reduce registration lines. Persons who prepay will receive substantial fee reductions over registration costs paid on site. U.S. attendees who prepay by October 1 will receive all registration materials in the mail. These registration materials include name badge, payment receipt, event tickets, and companion registration.

Preregistered attendees who do not prepay will have registration packets prepared in advance and will receive acknowledgement that they are preregistered.

On-site registration also will be available, but attendees can avoid long lines and higher fees by preregistering and prepaying.

One-day attendee and companion registrations are not available.

The Registration Form may be photocopied.

All registration fees must be paid in U.S. dollars. Registration fees are \$325 in advance and \$375 on site.

Registration Desk Schedule:

October 31	4:00 - 8:00 p.m.
November 1	9:00 a.m. - 7:00 p.m.
November 2	7:30 a.m. - 5:00 p.m.
November 3	7:30 a.m. - 5:00 p.m.
November 4	7:30 a.m. - 12:00 noon

Prepaid and Preregistered Deadline: The deadline for prepayment and preregistration is October 1, 1989. Make a photocopy of the registration form for yourself. Mail the registration form to:

UNITECR '89 Registration
George E. Fern Co.
1100 Gest Street
Cincinnati, OH 45203-1198

Foreign attendees may send their registration forms to the George E. Fern Co. by facsimile. Their fax number is 01-513-621-4330. This number is in operation 24 hours a day.

Refund Policy: Full refunds minus a \$30 administrative fee will be made ONLY on cancellations received by October 15. Cancellations must be in writing to ACerS Headquarters. No refunds will be made on cancellations received after October 15.

Hotel Accommodations: Special rates have been obtained for meeting attendees at the Disneyland Hotel. To guarantee a room under the special rate, complete and return the accompanying hotel reservation form to the hotel by September 30, 1989.

Hotel reservations will be handled by the Disneyland Hotel. Any changes or cancellations must be submitted in writing to the Disneyland Hotel. UNITECR will not make reservations for any attendees, including invited speakers.



Disneyland Hotel

Message/Hot Line Information Center: A message information center will be in operation in the registration area during registration hours. Also, any staff member - all will be wearing identifying name badges and ribbons - will be able to assist with most concerns arising during the UNITECR meeting.

Individuals arriving at local airports and requiring information may call the Disneyland Hotel at 714/778-6600 and ask for the UNITECR registration desk. This desk will be open during registration hours. For assistance at other times, call the hotel and ask for the Guest Services Manager.

Airline Information: USAIR, in cooperation with The American Ceramic Society, is offering special rates that afford a 5% bonus off USAir's published round-trip jet service on all flights in their system, excluding Canada, providing all rules and regulations of the air fares are met.

If special fares don't coincide with your travel dates, a 45% discount off full coach flights will be offered.

To take advantage of these discounts, follow these simple steps:

1. Call **USAIR**, or have your travel agent call, at 1-800-428-4322, for your reservations 8:00 a.m. - 8:00 p.m., EST.
2. Refer to file number AC087J.

These discounts are available only through USAir's toll-free number.

Car Rental:  **National Car Rental**SM is offering a discount to attendees of the UNITECR '89 meeting. The rates listed below will be in effect from October 24 - November 11, 1989. For additional information and to take advantage of the special meeting rates, you or your travel agent may call National's Convention Desk at 1-800-328-7949. Be sure to mention Recap - 6302128 to identify yourself as a meeting attendee.

Car Class	Rate		Mileage
	Daily	Weekly	Daily / Weekly
E-Economy	\$33.95	\$144.95	100/700
M-Midsize	\$36.95	\$159.95	100/700
F-Fullsize	\$39.95	\$174.95	100/700

Mileage exceeding the above allowance will be assessed at \$.25 per mile. Car must be returned to renting location unless prior arrangements have been made to return vehicle to another Southern California location. Rate does not include refueling service charge, tax, the Collision Damage Waiver Option or Personal Accident Insurance. Rates may be higher for renters under 25. Rates are subject to availability of vehicles at time of rental.

Exposition Visitation Opportunity: Those registered for the UNITECR '89 conference may visit the exposition held in conjunction with the First International Ceramic Science and Technology Congress. This event will be held in the Anaheim Convention Center. Only a short walk from the Disneyland Hotel, this show will feature over 150 exhibitors displaying the latest products and services to the ceramic and related industries. Expo hours are:

Wednesday, November 1	9:00 a.m. - 5:00 p.m.
Thursday, November 2	9:00 a.m. - 5:00 p.m.
Friday, November 3	9:00 a.m. - 12:00 noon

Social Events: The UNITECR '89 meeting will be highlighted by several social events, all of which are included in the registration fee. All attendees and companions are invited to attend the Welcome Reception on Wednesday, November 1 from 6:00 - 8:00 p.m. at the Disneyland Hotel. Informal luncheons will be held on Thursday and Friday. There will be no formal program during these luncheons to allow attendees an opportunity to interact in a relaxed atmosphere. The closing banquet will be on Friday evening. The final program will have more details on these events.

Companion Program: Companions will register at the Disneyland Hotel. The location of the Companion Headquarters and hours of operation will be detailed in the "Official Program".

The Anaheim area has a variety of places of interest. Disneyland, Knotts Berry Farm and others are within minutes of the hotel. No formal program for companions will be planned. The Disneyland Hotel visitors desk will have special tours and programs for groups of visitors who wish to tour the Anaheim area.

Foreign Attendees: It is suggested that foreign attendees make arrangements for passports, visas and vaccinations prior to making meeting arrangements. The exchange of foreign currency and cashing of travelers cheques may be done through the Disneyland Hotel front desk.

Public Transportation:

Amtrak: Major railway transportation. Closest station located at Anaheim Stadium only one mile from the Anaheim Convention Center. For information and reservations call 800/USA-RAIL from any place in the U.S.

Public Transit: The Orange County Transit District (OCTD) operates buses throughout Orange County. Buses run daily. Fares are \$.75- and transfers are free. You must have exact change. Dial-a-Ride (door-to-door service \$1.50 per zone) and Dial-a-Lift (for the handicapped) services are also available. Call 714/636-RIDE.

Southern California Rapid Transit District (RTD) serves Los Angeles County and some areas of Orange County. Call 213/626-4455.

Sightseeing Companies: Tours offered.

FUNBUS: Phone: 714/778-3141.

San Diego Sea World; San Diego Zoo/Old Town-Historical Park; Tijuana, Mexico; Deluxe Las Vegas Tour (includes stewardess, meals, beverages, movies and bingo en route); Los Angeles/Hollywood/Beverly Hills/Farmers Market; Universal Studios; Grand Combination Tour.

The Gray Line: Phone 714/778-2770

Deluxe Universal Studios/Hollywood/Farmers Market; Universal Studios; Tijuana Shopping Spree; Sea World; San Diego; the Galaxy Tour; Catalina Island Cruise; Queen Mary/Spruce Goose/Ports O'Call Village/Harbor Cruise; and Six Flags Magic Mountain.

Transportation from Airports:

Super Shuttle: In Orange County: 714/973-1100
Outside California: 800/554-6458

Fare - LAX to Anaheim and John Wayne/Orange County to Anaheim - \$10.00 per person, one way; children 2 and under ride free. Transportation from Ontario and Long Beach airports also provided. Reservations suggested, but not mandatory.

Scheduled Shuttles: The following companies provide transportation from the major airports to hotels in the Anaheim area on a daily basis.

Airlink Airport Service: Phone 714/778-3141

Fare (one way)

LAX	\$9.75 Adults
John Wayne	\$4.50 Adults
Long Beach	\$6.50 Adults

Children Ages 3-11, reduced fare; under 3 free. Airlink operates air-conditioned coaches between airports to Anaheim, every half hour during peak times. Service begins at 4:30 a.m. and ends at 1:00 a.m.

Lounge Car Tours/Airport Lounge Cruiser: Phone: 714/385-1634

Fare (one way)

LAX	\$10.00 Adults	\$5.00 Children
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These fully-equipped coaches include all Anaheim area hotels on their route.

Airportcoach: Phone: 714/527-1992

Fare (one way)

LAX	\$10.00 Adults	\$5.00 Children
John Wayne	\$4.00 Adults	\$2.00 Children
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Airports: Los Angeles International Airport is the major international gateway into Southern California. It is located 35 miles (65km) and approximately 75 minutes from Anaheim. All major and international carriers fly into LAX at scheduled times.

John Wayne/Orange County Airport is located 14 miles (23km) and approximately 20 minutes from Anaheim. The John Wayne/Orange County airport has approximately 175 arrivals and departures daily and is serviced by Alaska, America West, American, Continental, Delta, Jet America, Northwest, PSA, TWA, United and four commuter airlines.

Ontario Airport is approximately 45 minutes from the Anaheim area and is serviced by Alaska, America West, American, Continental, Delta, PSA, Southwest, Sun World, TWA, United and four commuter airlines.

Long Beach Airport is approximately 20 minutes from Anaheim and is serviced by Alaska, America West, American, Delta, PSA, TWA and United.

Fullerton Municipal Airport is one of California's busiest general aviation airports. Located just minutes from Anaheim.

For Further Information:

The "Official Program" will contain titles and authors of papers; their times; dates, and locations of presentations; and other UNITECR details and information. The "Official Program" will be mailed in August.

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757 Brooksedge Plaza Drive
Westerville, OH 43081
Telephone: (614) 890-4700
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UNITECR '89 Congress
November 1-4, 1989
Anaheim, CA

Meeting Registration Form

Name _____
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**Prepayment Rates (Must be received by
October 1, 1989)**

☐ Attendee \$325.00
☐ Companion \$ 50.00
Total enclosed \$ _____

☐ Check Enclosed (Payable to
American Ceramic Society)

If prepaying by bank card, please complete
the following:

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Cincinnati, OH 45203-1198
Fax: 01-513-621-4330

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Date Received _____ Received by _____
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On-site amount received _____
AX Cash Check MC VISA TRAV CHECK DC
Reference No. _____

Unified International
Technical Conference on Refractories
November 1-4, 1989
Disneyland Hotel
Anaheim, CA

Hotel Reservation Form

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Arrival Date _____ Time _____
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THE WHITE HOUSE
WASHINGTON

August 30, 1989

Dear Sheila:

Many thanks for your note concerning the symposium. As you gathered, it was great good fun, although as always with these events, the speakers were over generous concerning my activities.

Although life here is certainly exciting, I must say that I will very much miss the opportunity of teaching this fall since it has become very much a part of my life, and the opportunity to do research with our new ESTU, which I am happy to learn has been behaving beautifully and very much as we had hoped when we were being particularly optimistic. I believe that it will keep Yale at the forefront of the nuclear sciences for at least the next decade and am looking forward to getting back to using it when my tour of duty here is completed.

With warmest best wishes,

Sincerely yours,



D. Allan Bromley
Assistant to the President
for
Science and Technology

Ms. Sheila W. Wellington
Secretary
Yale University
Post Office Box 1303A
Yale Station
New Haven, Connecticut 06511

THE WHITE HOUSE
WASHINGTON

August 31, 1989

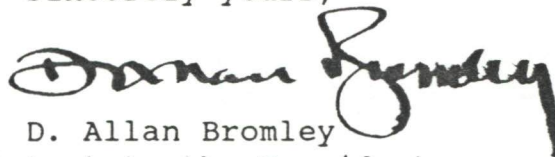
Dear Dr. Wilkerson:

Many thanks for your note of congratulations of August 23rd and for the copy of your review article on the Neutrino. I found it to be an excellent article and enjoyed reading it.

I must say that it is with some regret that I give up my editorial responsibilities associated with the McGraw-Hill Encyclopedia of Science and Technology because, over the years, I have been much impressed by the outstanding job that Sybil Parker has done in making that encyclopedia into what I consider a unique one worldwide.

Again, my thanks for your help and your congratulations.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "D. Allan Bromley", written in a cursive style.

D. Allan Bromley
Assistant to the President
for
Science and Technology

Dr. John F. Wilkerson
Los Alamos National Laboratory
P-3, MSD 449
Los Alamos, New Mexico 87545

INTERNATIONAL SYMPOSIUM

23-27 October 1989 - Palais des Congrès - Paris (France)



FIRST RESULTS OF THE PHOBOS-MARS MISSION AND FUTURE SPACE EXPLORATION OF MARS



THIRD ANNOUNCEMENT

An international symposium organized by both the Centre National d'Etudes Spatiales (CNES) and Intercosmos is to be held at the Palais des Congrès (Porte Maillot) in Paris (France). The meeting will start at 2 p.m. on the 23rd of October, 1989, and will end at around 1 p.m., on the 27th. This meeting is sponsored by the Committee on Space Research (COSPAR).

PRELIMINARY PROGRAM

October 23, 1989, Monday afternoon

- Opening of the meeting
- Scientific objectives and technical design of the PHOBOS project (R. S. Sagdeev, V. M. Kovtunencko)
- Implementation of the PHOBOS project, overview of the results (R. S. Kremnev, A. A. Galeev)

SESSION 1 : STUDIES OF THE SUN AND INTERPLANETARY MEDIUM

- Solar X and EUV imaging on PHOBOS 1 with the TEREK experiment (Zhitnik et al.)
- Solar X-ray registration during the flight of PHOBOS 2 with the RF-15 experiment (B. Valnicek et al.)
- X and gamma-ray characteristics of solar flares observed with the APEX and LILAS experiments (R. Talon et al.)
- **Review** : Acceleration processes in solar flares (N. F. Pisarenko)
- **Review** : High energy particles associated with solar flares (G. Trotter)

October 24, Tuesday

SESSION 1 : STUDIES OF THE SUN AND INTERPLANETARY MEDIUM

- **Review** : Helioseismology during the PHOBOS mission (C. Frohlich et al.)
- Interplanetary variability recorded by the SLED instrument aboard the PHOBOS spacecraft during that period of solar cycle 22 characterised by a transition from solar minimum to solar maximum dominated conditions (S. McKenna-Lawlor et al.)
- Solar and interplanetary energetic particle events during the cruise phase of PHOBOS 2 : LET observations (R.G. Marsden et al.)

SESSION 2 : X-AND GAMMA-RAY GALACTIC OBSERVATIONS

- Observation of SCO X-1 with the LILAS experiment (R. Sunyaev et al.)
- Evidence for absorption features in cosmic gamma-ray burst spectra recorded by the LILAS device (C. Barat et al.)
- New insights on cosmic gamma-ray bursts from the APEX experiment (I. G. Mitrofanov et al.)
- **Review** on gamma-ray bursts (R. W. Klebesadel)

- POSTER SESSION

SESSION 3 : STUDIES OF THE MARTIAN MAGNETOSPHERE AND OF THE SOLAR WIND INTERACTION WITH MARS

- **Review** : What we had known on the Martian magnetosphere before the PHOBOS mission (K. I. Gringauz)

- Interaction of the solar wind with the planet Mars : PHOBOS 2 magnetic field observations (W. Riedler et al.)
- The question of an internal Martian magnetic field (D. Mohlmann et al.)
- Plasma and waves in the Martian environment (APV-F experiment) (R. Grard et al.)
- Results on the ion escape from the Martian ionosphere with the ASPERA experiment (R. Lundin et al.)
- Characteristics of the plasma composition in the Martian magnetosphere (ASPERA experiment) (A. Zakharov et al.)
- The solar wind, the Martian bow shock and the magnetosheath between February 1 and March 26, 1986 (TAUS experiment) (S. Livi et al.)
- Ions of planetary origin in the Martian magnetosphere (TAUS experiment) (M. Vengín et al.)

- POSTER SESSION

- HARP plasma experiment aboard the PHOBOS 2 spacecraft : preliminary results (Kiraly et al.)
- Energy distribution of electrons with energy less than 800 eV in Mars aeromagnetosphere (N. Shutte et al.)
- Energetic (30-350 keV) ions in the Martian magnetosphere as observed by the SLED experiment aboard the PHOBOS spacecraft (V. Afonin et al.)
- **Review** : the magnetosphere of Mars after the PHOBOS 2 mission (W. I. Axford)

SPECIAL SESSION ON THE RESULTS OF THE VOYAGER 2 - NEPTUNE ENCOUNTER

October 25, 1989, Wednesday

SESSION 4 : STUDIES OF THE ATMOSPHERE OF MARS

- Results on the Martian atmosphere obtained with solar occultations in the UV and visible ranges (AUGUST experiment) (J.E. Blamont et al.)
- Results of the Martian atmosphere study with the spectroscopic method of solar occultations in the infrared range (AUGUST experiment) (V. A. Krasnopolsky et al.)
- Martian atmosphere studies from the ISM experiment (M. Combes et al.)
- Characteristics of aerosols in the Martian atmosphere from the KRFM experiment (Petrova et al.)

- POSTER SESSION

- **Review** : Composition of the Martian atmosphere (V.I. Moroz)
- **Review** : The Martian upper atmosphere (S. Atreya)

SESSION 5 : STUDIES OF THE SURFACE OF MARS

- Results on the composition of the Martian surface from the ISM experiment (J.P. Bibring et al.)
- Topographic studies in the Martian tropical zone with ISM (T. Encrenaz et al.)
- Mars : results of the surface studies with the KRFM experiment (L.V. Ksanfomalit et al.)
- Results from the TERMOSKAN experiment (Selivanov et al.)

- POSTER SESSION

- Longitude dependence of gamma-ray lines from the Martian surface obtained with the APEX experiment (C. D'Uston et al.)
- Results from the GS-14 gamma-ray experiment (Yu. A. Surkov et al.)
- **Review** : Composition of the Martian soil (H. Wanke)
- **Review** : Geology of Mars (A.T. Basilevsky)

October 26, 1989, Thursday

SESSION 6 : STUDIES OF PHOBOS

- Results of TV imaging of Phobos (experiment VSK-Fregat) (G.A. Avanesov et al.)
- Mineralogy and surface hydration of Phobos from ISM results (J.P. Bibring et al.)
- Phobos : Spectrometry between 0.3 and 0.6 microns and infrared radiometry (L.V. Ksanfomality et al.)
- Studies in celestial mechanics (Akim et al.)

- POSTER SESSION

- **Review** : The Phobos surface structure (T.C. Duxbury)
- **Review** : A comparison between Phobos and other small bodies of the solar system (Y. Langevin)

SESSION 7 : FUTURE SPACE MISSIONS

- Mars Observer mission :
- Surface studies (P.R. Christensen)
- Atmospheric studies
- (A. Albee) :

- Implementation plans
- Studies of the interior of Mars
- Implementation of Mars Observer
- balloon relay link.

- POSTER SESSION

- Mars 94 mission
- (to be completed)

October 27, 1989, Friday morning

SESSION 7 : FUTURE SPACE MISSIONS

- Mars Rover Sample Return mission
- NASA strategy (G.A. Briggs)
- Geological science goals (M. Carr)
- Exobiological goals (C. McKay)
- Implementation options (D. Rea)
- Mars 96 - 98 missions :
- USSR strategy (R.Z. Sagdeev)
- (to be completed)

- CNES contributions to future Mars missions
- ESA contributions to future Mars missions

- POSTER SESSION

- Manned missions to Mars

PANEL DISCUSSION

SCIENTIFIC COMMITTEE

Chairmen : I. Revah (CNES, France), R.Z. Sagdeev (IKI, USSR)
Executive Secretary : A. Ammar (CNES, France)
(the full list of members is in the second announcement).

ORGANIZING COMMITTEE

A. Ammar (CNES, France)
C. de Bergh (Observatoire de Paris, France)
J. Bozec (CNES, France)
C. Cornecher-Massarani (CNES, France) Secretariat : (33) 61.27.40.18

GENERAL INFORMATION

• Registration

A registration form to complete and return to the following address as soon as possible is included in this leaflet.
The registration fees is FF. 1000.

• Working languages

The working languages will be French and English. Simultaneous translation from and into both languages will be provided.

• Publication

All participants will be given, upon arrival at the meeting, a booklet containing the abstracts of the invited presentations and of all the accepted posters contributions.
The editors of the "Planetary and Space Science" journal have agreed to publish in a special issue the invited oral talks and the posters contributions that will be given at the meeting. The papers will therefore be subjected to the normal referee's procedure.

• Hotel Accommodation

The registration form can be used for booking hotel accommodation

For any enquiries :

SOCFI
14, rue Mandar
75002 PARIS
(France)
Phone number : (33) (1) 42.33.89.94
Telex : 214403
Telefax number : (33) (1) 40.26.04.44

• Social Events

- A cocktail will be held by CNES for the participants on Monday 23 October at Tour de la Liberté in Jardins des Tuileries.
- An evening banquet will take place on Thursday October 26 for all participants and accompanying persons at Salon Opéra. Grand Hotel Intercontinental. Participation fees : 200 Frs
- Tours in Paris will be prepared for the accompanying persons.
- Before the Symposium a detailed programme will be mailed at each participant

COMITE SCIENTIFIQUE

Présidents : I. Revah (CNES, France), R.Z. Sagdeev (IKI, URSS)
Secrétaire : A. Ammar (CNES, France)
La liste complète des membres figure dans la deuxième annonce

COMITE D'ORGANISATION

A. Ammar (CNES, France)
C. de Bergh (Observatoire de Paris, France)
J. Bozec (CNES, France)
C. Cornecher-Massarani (CNES, France) Secrétariat : (33) 61.27.40.18

INFORMATIONS GENERALES

INSCRIPTIONS

Une fiche d'inscription à compléter et à retourner dès que possible à l'adresse indiquée est jointe à cette annonce.
Le droit d'inscription est de 1000 Francs.

LANGUES DE TRAVAIL

Les langues de travail du colloque seront le français et l'anglais.
La traduction simultanée français/anglais sera assurée.

PUBLICATION

A leur arrivée sur le lieu du colloque, les participants recevront un exemplaire de l'ouvrage regroupant les résumés des présentations invitées, ainsi que des contributions "posters" acceptées.

Les éditeurs de la revue "Planetary and Space Science" ont accepté de publier, dans un numéro spécial, les présentations orales et affichées données lors du colloque. Les manuscrits seront soumis à la procédure habituelle de l'expertise scientifique.

RESERVATION D'HOTEL

La fiche d'inscription permet également de faire la réservation hôtel. Pour tous les renseignements s'adresser à :

SOCFI
14, rue Mandar
75002 PARIS
Tél. : (33) 1.42.33.89.94
Télex : 214403
Télécopie : (33) 1.40.26.04.44

ANIMATION

Un cocktail sera offert par le CNES le lundi 23 octobre à la Tour de la Liberté aux Jardins des Tuileries
Une soirée de gala avec participation personnelle de 200 Frs aura lieu le jeudi 26 octobre au Salon Opéra du Grand Hôtel Intercontinental
Un programme de visites sera préparé pour les accompagnants
Un programme détaillé du colloque sera adressé à chaque participant.

- SESSION POSTERS

SESSION 3 : ETUDES DE LA MAGNETOSPHERE DE MARS ET DE L'INTERACTION DE MARS AVEC LE VENT SOLAIRE

- **Exposé introductif** : Ce que nous savions de la magnétosphère de Mars avant la mission PHOBOS (K. I. Gringauz)
- Interaction du vent solaire avec la planète Mars : observations du champ magnétique avec PHOBOS 2 (W. Riedler et al.)
- De l'existence d'un champ magnétique interne martien (D. Mohlmann et al.)
- Plasma et ondes dans l'environnement de Mars (expérience APV-E) (R. Grand et al.)
- Résultats sur l'échappement des ions de l'ionosphère de Mars avec l'expérience ASPERA (R. Lundin et al.)
- Caractéristiques de la composition du plasma dans la magnétosphère martienne (expérience ASPERA) (A. Zakharov et al.)
- Le vent solaire, l'onde de choc et la magnéto-gaine martiennes entre le 1^{er} février et le 26 mars 1986 (expérience TALUS) (S. Livi et al.)
- Ions d'origine planétaire dans la magnétosphère de Mars (expérience TALUS) (M. Verigín et al.)

- SESSION POSTERS

- Expérience HARP d'étude du plasma placée à bord de la sonde PHOBOS 2 : résultats préliminaires (Kitaly et al.)
- Distribution en énergie d'électrons d'énergie inférieure à 800 eV dans l'ionosphère martienne (N. Shutte et al.)
- Ions énergétiques (30 - 350 keV) dans la magnétosphère martienne observés avec l'expérience SLED placée à bord de la sonde PHOBOS (V. Alfom et al.)
- **Exposé de synthèse** : La magnétosphère de Mars après la mission PHOBOS

SESSION SPECIALE SUR LES RESULTATS DE LA RENCONTRE

VOYAGER 2 - NEPTUNE

Mercrèdi 25 octobre 1989

SESSION 4 : ETUDES SUR L'ATMOSPHERE DE MARS

- Résultats sur l'atmosphère de Mars obtenus à partir d'occultations Solaires dans les domaines de l'ultraviolet et du visible (expérience AUGUSTE) (J. E. Blamont et al.)
- Résultats sur l'atmosphère martienne obtenus par étude spectroscopique d'occultations solaires dans le domaine infrarouge (expérience AUGUSTE) (V. A. Krasnopolsky et al.)
- Etudes sur l'atmosphère de Mars avec l'expérience ISM (M. Combes et al.)
- Caractéristiques des aérosols martiens déduites de l'expérience KRFM (Petrova et al.)

- SESSION POSTERS

- **Exposé de synthèse** : Composition de l'atmosphère de Mars (V. I. Moroz et al.)
 - **Exposé de synthèse** : La haute atmosphère de Mars (S. Atreya)
- SESSION 5 : ETUDES SUR LA SURFACE DE MARS**
- Résultats sur la composition de la surface de Mars obtenus à partir de l'expérience ISM (J.P. Bibring et al.)

- Etudes topographiques dans la région tropicale de Mars avec ISM (T. Encenaz et al.)
- Mars : résultats des études sur la surface de Mars à l'aide de l'expérience KRFM (L. V. Ksanfomality et al.)
- Résultats de l'expérience TERMOSKAN (Selivanov et al.)

- SESSION POSTERS

- Dépendance en longitude des émissions gamma de la surface de Mars obtenue à partir de l'expérience APEX (C. D'Uston et al.)
- Résultats de l'expérience gamma GS-14 (Yu. A. Surkov et al.)
- **Exposé de synthèse** : Composition du sol de Mars (H. Wanke)
- **Exposé de synthèse** : Géologie de Mars (A. T. Basilevsky et al.)

Jeuèdi 26 octobre 1989

SESSION 6 : ETUDES DE PHOBOS

- Résultats de l'expérience d'imagerie de Phobos (expérience VSK-FREGAT) (G.A. Avanesov et al.)
- Minéralogie et hydratation de la surface de Phobos à partir des résultats d'ISM (J.P. Bibring et al.)
- Phobos : spectrométrie entre 0,3 et 0,6 microns et radiométrie infrarouge (L. V. Ksanfomality et al.)
- Etudes de mécanique céleste (Akin et al.)

- SESSION POSTERS

- **Exposé de synthèse** : La structure de la surface de Phobos (T. C. Duxbury)
- **Exposé de synthèse** : Comparaison entre Phobos et d'autres petits corps du système solaire (Y. Langevin)

SESSION 7 : MISSIONS SPATIALES FUTURES

- Mission Mars Observer :
 - Etudes de la surface (P. R. Christensen)
 - Etudes de l'atmosphère
- (A. Albee) :
 - Aspects techniques
 - Etudes de l'intérieur de Mars
 - Utilisation de Mars Observer comme relai-ballon

- SESSION POSTERS

- Mission Mars 94
- (à compléter)

Vendredì 27 octobre 1989 — Matin

SESSION 7 : MISSIONS SPATIALES FUTURES

- La mission Mars Rover Sample Return
- Stratégie de la NASA (G. A. Briggs)
- Buts des études géologiques (M. Carr)
- Buts des études en exobiologie (C. McKay)
- Les différentes options techniques (D. Rea)
- Les missions Mars 96-98 :
 - Stratégie soviétique (R. Z. Sagdeev)
 - (à compléter)

- Contributions du CNES aux futures missions spatiales
- Contributions de l'ASE aux futures missions spatiales

- SESSION POSTERS

- Les missions habitées vers Mars

TABLE RONDE

COMITE SCIENTIFIQUE

Présidents : I. Revah (CNES, France), R.Z. Sagdeev (IKI, URSS)
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- La liste complète des membres figure dans la deuxième annonce

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C. Corcher-Maassrati (CNES, France) Secrétaire : (33).61.27.40.18

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75002 PARIS
Tél. : (33) 1.42.33.89.94
Téléc. : 21.44.03
Télécopie : (33) 1.40.26.04.44

ANIMATION

- Un cocktail sera offert par le CNES le lundi 23 octobre à la Tour Liberté aux jardins des Tuileries
- Une soirée de gala avec participation personnelle de 200 Firs aura lieu le jeudi 26 octobre au Salon Opera du Grand Hôtel Intercontinental
- Un programme de visites sera préparé pour les accompagnants
- Un programme détaillé du colloque sera adressé à chaque participant.

INTERNATIONAL SYMPOSIUM

23-27 October 1989 - Palais des Congrès - Paris (France)



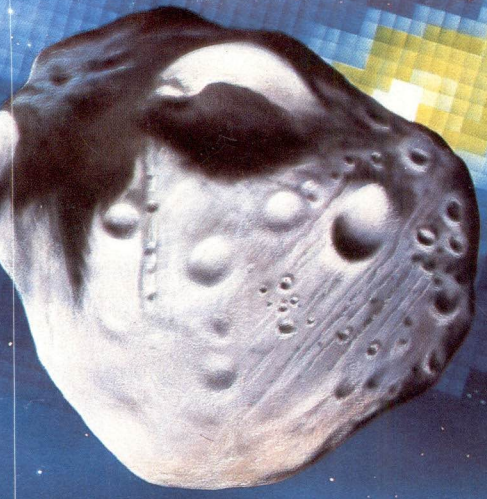
FIRST RESULTS OF THE PHOBOS-MARS MISSION AND FUTURE SPACE EXPLORATION OF MARS



THIRD ANNOUNCEMENT

COLLOQUE INTERNATIONAL

23-27 Octobre 1989 - Palais des Congrès - Paris (France)



PREMIERS RESULTATS DE LA MISSION PHOBOS-MARS ET FUTURES MISSIONS D'EXPLORATION DE MARS



TROISIEME ANNONCE

L

e Centre National d'Etudes Spatiales (CNES) et INTERCOSMOS organisent du 23 au 27 octobre 1989 à Paris (France), au Palais des Congrès (Porte Maillot) un colloque international parrainé par le Comité de la Recherche Spatiale (COSPAR).

Le colloque débutera le 23 octobre 1989 à 14 heures et se terminera aux environs de 13 heures le 27 octobre.

PROGRAMME PRELIMINAIRE

Lundi 23 octobre 1989 - Après-midi

- Séance d'ouverture
- Objectifs scientifiques et conception technique du projet PHOBOS (R. Z. Sagdeev, V. M. Kovtunenko)
- Déroulement de la mission PHOBOS, vue d'ensemble des résultats (R. S. Kremnev, A. A. Galeev)

SESSION 1 : ETUDES DU SOLEIL ET DU MILIEU INTERPLANETAIRE

- Imagerie X et UV lointain du soleil sur PHOBOS 1 avec l'expérience TEREK (Zhimnik et al.)
- Enregistrement du rayonnement X solaire pendant la phase de croisière de PHOBOS 2 avec l'expérience RF - 15 (B. Valnicsek et al.)
- Caractéristiques X et gamma des éruptions solaires observées avec les expériences APEX et LILAS (R. Talon et al.)
- **Exposé de synthèse** : Processus d'accélération dans les éruptions solaires (N. F. Pisarenko)
- **Exposé de synthèse** : Particules de hautes énergies associées aux éruptions solaires (G. Trotter)

Mardi 24 octobre 1989

SESSION 1 : ETUDES DU SOLEIL ET DU MILIEU INTERPLANETAIRE

- **Exposé de synthèse** : Héliosismologie pendant la mission PHOBOS (C. Frohlich et al.)
- Variabilité interplanétaire enregistrée par l'instrument SLED à bord de la sonde PHOBOS pendant la période du cycle solaire 22 caractérisée par des conditions dominantes de transition d'un minimum à un maximum solaire (S. McKenna-Lawlor et al.)
- Emissions de particules énergétiques solaires et interplanétaires observées pendant la phase de croisière de PHOBOS 2 par l'instrument LET (R. G. Marsden et al.)

SESSION 2 : OBSERVATIONS GALACTIQUES DANS LES DOMAINES X ET GAMMA

- Observation de SCO X-1 avec l'expérience LILAS (R. Sunyaev et al.)
- Mise en évidence d'absorptions dans des spectres de sursauts gamma solaires enregistrés avec l'instrument LILAS (C. Barat et al.)
- Apports de l'expérience APEX à l'étude des sursauts gamma cosmiques (I. G. Mitrofanov et al.)
- **Exposé de synthèse** les sursauts gamma (R. W. Klebesadel)

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

P-3, MS D449

August 23, 1989
Ref. P-3/89-260

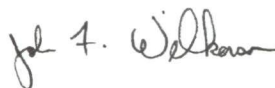
Professor D. Allen Bromley
Executive Office of the President
Office of Science and Technology Policy
Old Executive Office Building - Rm 360
17th & Pennsylvania Ave. N.W.
Washington, DC 20506

Dear Professor Bromley:

I would like to thank you for recommending me as a contributor to the 7th edition of the McGraw-Hill Encyclopedia of Science and Technology. I was certainly honored to be asked to write a review article on the neutrino and found it a genuine pleasure to prepare the submission. I have enclosed a copy of the article in case you would like to read it.

I would also like to take this opportunity to congratulate you on your appointment as the Science Advisor to the President. It is reassuring to have such capable leadership for US science in the 1990s.

Sincerely,



John F. Wilkerson

JFW/ns

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DIRECTOR

Title: NEUTRINO

Author(s): J. F. Wilkerson

Submitted to: The Seventh Edition of the McGraw-Hill Encyclopedia of Science and Technology



Neutrino

An elusive elementary particle that interacts with matter principally through the weak nuclear force. Neutrinos are electrically neutral spin-1/2 fermions with left-handed helicity. Many weak interaction processes (interactions that involve the weak force), such as radioactive nuclear beta decay and thermonuclear fusion, involve neutrinos. Present experimental knowledge is consistent with neutrinos being point particles that have no internal constituents. Neutrinos are classified as neutral leptons, where leptons are defined as elementary particles that interact with the electroweak (electromagnetic and weak nuclear) and gravitational forces, but not with the strong nuclear force.

Currently, three distinct flavors (or types) of neutrinos are known to exist: the electron neutrino (ν_e), the muon neutrino (ν_μ), and the tau neutrino (ν_τ). Each neutrino flavor is associated with a corresponding charged lepton, the electron (e), muon (μ), and tau (τ) particles. Based on present measurements, these lepton flavor families, which are comprised of the charged and neutral leptons and their antiparticles (e^- , ν_e , e^+ , $\bar{\nu}_e$; μ^- , ν_μ , μ^+ , $\bar{\nu}_\mu$; τ^- , ν_τ , τ^+ , $\bar{\nu}_\tau$), obey laws of conservation of lepton number. These empirical laws state that the number of leptons plus antileptons does not change, both within a flavor family and over all. The electron and muon neutrinos (or their antiparticles) have been observed in experiments. However, the tau neutrino has not been seen directly. Its existence is inferred from indirect experimental evidence.

Because gravitational forces are negligible when considering nuclear and particle interactions and because neutrinos have zero electrical charge, neutrinos have the unique property that they interact almost completely via the weak nuclear force.

Consequently, neutrinos can be used as sensitive probes of the weak force. As such, neutrino beams at particle accelerators have been employed to study charge changing (charged current) and charge preserving (neutral current) weak interactions. However, the extreme weakness (compared to the electromagnetic and strong forces) and short range ($\sim 10^{-18}$ m) of the weak interaction have made determination of many neutrino properties extremely difficult. The masses of the three neutrinos are not known. At present, only upper limits on these masses have been established. However, these limits indicate that neutrino masses are orders of magnitude smaller than their charged lepton counterparts. It is also not known whether neutrinos have magnetic or electric dipole moments. Neutrinos also are unique among the fermions in that they may possibly be their own antiparticles. However, at present there is no experimental evidence for this.

Discovery. The neutrino was postulated by Wolfgang Pauli in 1930 as a "desperate remedy" to rescue the fundamental laws of conservation of energy and linear momentum that were seemingly being violated during radioactive beta decay. Pauli proposed that in beta decay a neutral particle of half-integer spin was emitted along with the electron (beta particle). He suggested that this particle was so elusive that it escaped direct experimental detection. The name "neutrino", meaning "little

neutral one", was coined by Enrico Fermi, who in 1934 incorporated Pauli's new neutral particle into his seminal and highly successful theory of nuclear beta decay. However, experimental confirmation of this theory through the definitive detection of the neutrino would not be accomplished until over a quarter century later.

Calculations based on Fermi's theory showed just how tiny the interactions of neutrinos with matter would be. The absorption cross-section for the inverse beta-decay process,

electron antineutrino + proton $\rightarrow$ neutron + positron

$$\bar{\nu}_e + p \rightarrow n + e^+, \quad (1)$$

for free antineutrinos of ~ 1 MeV energy scattering on protons is $\sim 10^{-43}$ cm². (The unit of energy is based on the electron volt. One million electron volts (MeV) = 1.6×10^{-13} joules.) This cross-section scattering value translates into a mean free path for the neutrino in water of 10^{20} cm (6.2×10^{14} miles). To put this length in perspective, recall that the diameter of the solar system is $\sim 10^{15}$ cm, so a neutrino on average will interact with a proton only after traveling through water a distance 100,000 times greater than the solar system's diameter. To compensate for the low probability of neutrinos interacting with matter, the first experiment to detect the neutrino directly was undertaken at a nuclear reactor. Reactors produce copious quantities of electron antineutrinos from the beta decay of fission fragments, $\sim 10^{18}$ neutrinos per second for a typical 1000 megawatt reactor.

Using the inverse beta decay reaction (1) and detecting in time coincidence the neutrons and positrons emitted from this process, Frederick Reines and Clyde Cowan confirmed the existence of the neutrino in 1956.

The discovery of the muon neutrino and the demonstration that the muon neutrino was distinguishable from the electron neutrino were established in an accelerator based experiment in 1962. This experiment utilized a beam of high-energy neutrinos (~500 MeV) created by pions decaying into muons and neutrinos. The neutrinos were observed in a spark chamber detector to produce the reaction

$$\nu + n \rightarrow p + \mu^- \quad (2)$$

but not the reaction

$$\nu + n \rightarrow p + e^-, \quad (3)$$

thus proving that different flavors of neutrinos must exist. In addition, the observation that electron neutrinos were associated with interactions involving electrons and muon neutrinos were associated with interactions involving muons gave rise to the empirical law of the conservation of lepton number for separate flavors.

The third neutrino flavor, the tau neutrino, has not yet been directly observed. However, since the discovery of the tau lepton in 1975, results from studies of pure leptonic tau decays have indicated the existence of the tau neutrino.

Neutrino Mass. In the particle physics minimal "Standard Model" the neutrino masses are chosen as zero, although there are no decisive theoretical arguments for why this should be so. In

fact, the existence of several flavors of zero mass fermions would be unexpected. Nevertheless, at present there is no firm experimental evidence that neutrino masses are not zero.

The consequences of neutrinos having nonzero rest masses would be quite profound, not only for the properties of neutrinos, but also for such diverse topics as astrophysics, cosmology, and physics beyond the Standard Model. For example, big bang cosmology predicts the existence of "relic" neutrinos analogous to the microwave photon background remnant left from the creation of the universe. These extremely low energy neutrinos are predicted to exist with a number density of $110 \text{ neutrinos/flavor/cm}^3$. At this density there would be about 10^{10} times as many neutrinos as baryons in the universe. Hence, a neutrino mass of order eV/c^2 would be sufficient not only to alter significantly the gravitational potential of the universe, but would be enough to close the universe gravitationally. Relic neutrinos with mass might also offer an explanation for the astronomically observed large amounts of nonluminous "dark" matter in galaxies and galactic clusters and help explain the large scale structure of the universe.

Neutrinos with nonzero masses would also clearly indicate new physics beyond the Standard Model. For example, it is possible that the physical neutrinos do not have pure flavors (quantum mechanical states), but contain mixtures of two or more neutrino states. (Conversely, zero rest mass neutrinos would be pure quantum mechanical states.) If in addition neutrinos have mass, then it might be possible to observe exotic phenomena such

as neutrino flavor oscillations, neutrino decays, and no-neutrino double beta decay. In fact, most new theoretical models attempting the unification of strong and electroweak interactions predict nonzero neutrino masses. Thus, the question of whether neutrinos have mass is one of the outstanding problems in particle physics today and is a topic of intense research activity.

Direct searches for neutrino mass rely on the kinematics of decay reactions. The present best limits for neutrino masses are derived from this type of measurement and are listed along with the corresponding flavor charged lepton masses in the table below.

LEPTON MASSES

Mass of $\nu_e < 13.4 \text{ eV}/c^2$	Mass of $e = 511000 \text{ eV}/c^2$
$\nu_\mu < .25 \text{ MeV}/c^2$	$\mu = 105.7 \text{ MeV}/c^2$
$\nu_\tau < 35 \text{ MeV}/c^2$	$\tau = 1784.2 \text{ MeV}/c^2$

The most sensitive mass limit has been set for ν_e . This value comes from a measurement of the shape of the beta decay energy spectrum for tritium (an isotope of hydrogen). Measurements of the electron energy spectrum are made in the energy region where the electron carries away the maximum possible energy (E_0). If the neutrino has a mass, then the number of decays in the region below E_0 will be less than

expected for the case of $m_\nu = 0$ (see figure 1). However, subtle effects such as instrumental resolution, energy loss of the electrons, and atomic physics excitations during the decay can cause shape effects that are of similar size to the effect of $m_\nu \neq 0$ but of opposite sign. Thus, precise measurement of a value or limit for m_ν requires complete understanding of all systematic effects.

An announcement in 1980 of $m_\nu = 35 \text{ eV}/c^2$ (6.23×10^{-32} grams) by a group from the USSR evoked worldwide excitement and anticipation that neutrinos might have a nonzero mass. The Soviet tritium beta decay measurement was made using a complicated amino acid based solid source and therefore had model dependent uncertainties. No group has confirmed the Soviet result. As of 1989 the result from the Soviet group was $m_\nu = 26 \text{ eV}/c^2$. Several groups have set limits on m_ν , but until 1989 none of these limits was in strong statistical disagreement with the Soviet value. However in 1989, an experiment using a gaseous molecular tritium source to eliminate systematic uncertainties set an essentially model independent limit of $m_\nu < 13.4 \text{ eV}/c^2$ in disagreement with the Soviet result. A schematic diagram of the apparatus used to make this gaseous molecular measurement is shown in figure 2.

Neutrino Oscillations. If at least one flavor of neutrino has mass, and if any conservation of lepton number is violated, then neutrino oscillations are possible. This can happen if the experimentally observed neutrino flavors (ν_e, ν_μ, ν_τ) are not pure quantum mechanical eigenstates but are in fact

superpositions of other mass eigenstate neutrinos ($\nu_1, \nu_2, \dots \nu_i$). As the flavor neutrinos travel, the admixture components ν_i , which have different masses, propagate with different frequencies. Hence, an initially pure beam of ν_e neutrinos could transform over time into a beam with ν_e and admixtures of ν_μ, ν_τ , or other more complicated non-observable (sterile) neutrinos.

Experiments searching for this oscillatory behavior have been performed both at nuclear reactors and at particle accelerators with null results. The accelerator-based experiments either look for the disappearance or appearance of neutrinos of a specific flavor, while the reactor experiments are limited to searches for the disappearance of $\bar{\nu}_e$ neutrinos. In the disappearance experiments, measurements are made at two distances from the neutrino source either with a single detector that can be repositioned or with two similar detectors. The ratio of events/detector efficiency from the two measurements is then examined to look for discrepancies from unity. In the accelerator-based appearance experiments, measurements are made at a single position using almost pure single-flavor neutrino beams. In these measurements the appearance of unexpected interactions involving the other two neutrino flavors are sought.

Double Beta Decay. In some radioactive nuclei, ordinary beta decay is energetically forbidden, but the decay

$$\text{Nucleus}(Z,A) \rightarrow \text{Nucleus}(Z+2,A) + 2e^- + 2\gamma \quad (4)$$

called two neutrino double beta decay is not. (Z is the atomic number and A the atomic mass.) This decay mode, the rarest process observed in nature (first seen in geochemical

experiments), is allowed by standard electroweak theory. Another decay mode

$$\text{Nucleus}(Z,A) \rightarrow \text{Nucleus}(Z+2,A) + 2e^-, \quad (5)$$

called no-neutrino or 0ν double beta decay, will occur if the neutrino has mass and the neutrino is a Majorana particle (the particle and antiparticle are indistinguishable, which requires that lepton number is violated). This decay process can be considered a two-step process in which a neutrino emitted in the first step is absorbed in the second. Observation of 0ν double beta decay would clearly indicate new physics beyond the Standard Model.

None of the experimental searches for this process, which employ direct counting experiments that can distinguish 2ν and 0ν decays, have yet observed the 0ν process. The present limits for the 0ν double beta decay, expressed in values of the half-life for the decay of the parent nuclei, are $T_{1/2}(0\nu) > 10^{21}$ to 10^{23} years. The announcement in 1986 of the first laboratory observation of the 2ν double beta decay process (^{82}Se $T_{1/2}(2\nu) = (0.8 - 1.9) \times 10^{20}$ years) is an indication of the increasing sensitivity of the experiments searching for the elusive 0ν decay.

Neutrino Scattering. High-energy neutrinos created at particle accelerators have provided precision tests of the standard electroweak model as well as insights into the quark structure of matter. Since neutrino scattering cross-sections increase linearly with energy, the use of high-energy neutrinos allows the accumulation of reasonable statistics. However, the

detectors used to observe the interactions, such as scintillator-wire chamber detectors or bubble chambers, are still required to be quite massive. Measurements of neutrino-electron scattering (see figure 3) have not only demonstrated the occurrence of neutral current reactions, but have also confirmed the existence of the destructive interference between the weak neutral (mediated by the Z^0 boson) and charged currents (mediated by the W bosons) as predicted by the electroweak theory. Comparisons of neutral to charged current neutrino-nucleon scattering have also tested and confirmed the standard electroweak theory.

Studies of neutrinos scattering from nucleons have allowed the investigation of the quark-antiquark composition of matter. Neutrinos are naturally polarized, so in charged current interactions, the left-handed helicity neutrino scatters primarily from quarks, while the right-handed antineutrino interacts preferentially with antiquarks. (Helicity is defined as the alignment of a particle's spin parallel (right-handed) or anti-parallel (left-handed) to the direction of its momentum.) Experiments exploiting this property have played key roles in elucidating the quark nature of matter and the theory of strong interactions.

Extraterrestrial Neutrinos. Since 1970, an experiment deep underground in the Homestake gold mine in South Dakota has been searching for neutrinos emitted by the Sun. This experiment uses a large tank filled with perchlorethylene (a common cleaning fluid) located 1400 m underground to shield it from the radiation of cosmic rays. Radioactive argon atoms are created by the

reaction



Every few months, helium gas is used to sweep the few argon atoms that have been created out of the $\sim 4 \times 10^5$ liters of liquid. The decays of the extracted ${}^{37}\text{Ar}$ atoms are counted in small, low background proportional counters. This radiochemical chlorine experiment sees only about 1/3 of the neutrinos expected from solar model calculations. This discrepancy, known as the solar neutrino problem, could arise from an incomplete understanding of either solar physics or neutrino physics.

In 1989, an experiment using a water Cerenkov detector located underground in the Kamioka mine in Japan confirmed the results of the radiochemical experiment when it observed only about 1/2 of the predicted neutrino flux from the sun. Neutrino-electron scattering,



was used to observe the neutrino arrival time, energy, and direction. In figure 4, it is clear that as expected for solar neutrinos, more events originate from the direction of the sun than elsewhere.

A drawback in both of these measurements is that they are only sensitive to high-energy neutrinos, which are produced by nuclear reactions that have little influence on the energy produced in the sun. The principal fusion reaction thought to occur in the sun is



This reaction, called the pp reaction, emits only low-energy

neutrinos but is fundamentally linked to the total luminosity and hence energy production of the steady-state sun. Two experiments sensitive to these low energy neutrinos are now underway: a USSR-US collaboration located in the Caucasus Mountains in the USSR and a European collaboration located at the Gran Sasso Laboratory in Italy. These radiochemical experiments both use gallium metal targets, and techniques that are qualitatively similar to the chlorine experiment. A failure to observe the predicted number of low-energy neutrinos would likely point to new particle physics. Confirmation of an elegant theoretical model that uses neutrino oscillations enhanced in matter to solve the solar neutrino problem awaits results from these and other new solar neutrino experiments.

Supernova Neutrinos. In February 1987, light from a supernova located about 163,000 light-years away in the Large Magellanic Cloud (SN1987a) reached the earth. Preceding the optical signal, a burst of neutrinos was independently observed in two water Cerenkov detectors, one located in the US and the other in Japan. This historic detection of 19 neutrino events was the first recorded signature of the physics occurring at the core of a star during stellar collapse and is believed to have signaled the creation of a neutron star. The observation confirmed that, as predicted from theories of stellar collapse, about 99% of the binding energy of the star is emitted as neutrinos during the collapse. Model independent constraints on ν_e lifetime ($> 1.6 \times 10^5$ yr) and ν_e mass (< 30 eV/c²) were also determined from the observation of these few events.

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Boehm, F. and Vogel, P., *Physics of Massive Neutrinos*, 1987.

Brown, L. M., The idea of the neutrino, *Physics Today*, 31;23-28, 1978.

Commins, E. D. and Bucksbaum, P.H., *Weak Interactions of leptons and quarks*, 1983.

Kato, S. and Ohshima, T., *Neutrino Mass and Related Topics*, 1988.

Perkins, D. H., *Introduction to High Energy Physics*, 1987.

Figure Captions.

Figure 1. Beta decay energy spectrum in the endpoint region.

Figure 2. Schematic view of the Los Alamos gaseous tritium beta decay experimental apparatus.

Figure 3. Neutrino scattering diagrams.

Figure 4. Kamiokande II $\cos(\theta_{\text{Sun}})$ distribution, the cosine of the angle between the trajectory of an electron and the direction of the sun. The direction pointing at the sun is $\cos(\theta_{\text{Sun}}) = 1$.

Source of Figures.

Figure 1. Beta decay energy spectrum, J.F. Wilkerson.

Figure 2. Los Alamos tritium beta decay apparatus, J.F. Wilkerson.

Figure 3. Neutrino scattering diagrams, J.F. Wilkerson.

Figure 4. Kamiokande II $\cos(\theta_{\text{Sun}})$ Distribution, K.S. Hirata et al., Physical Review Letters, 63;16-19, 1989.

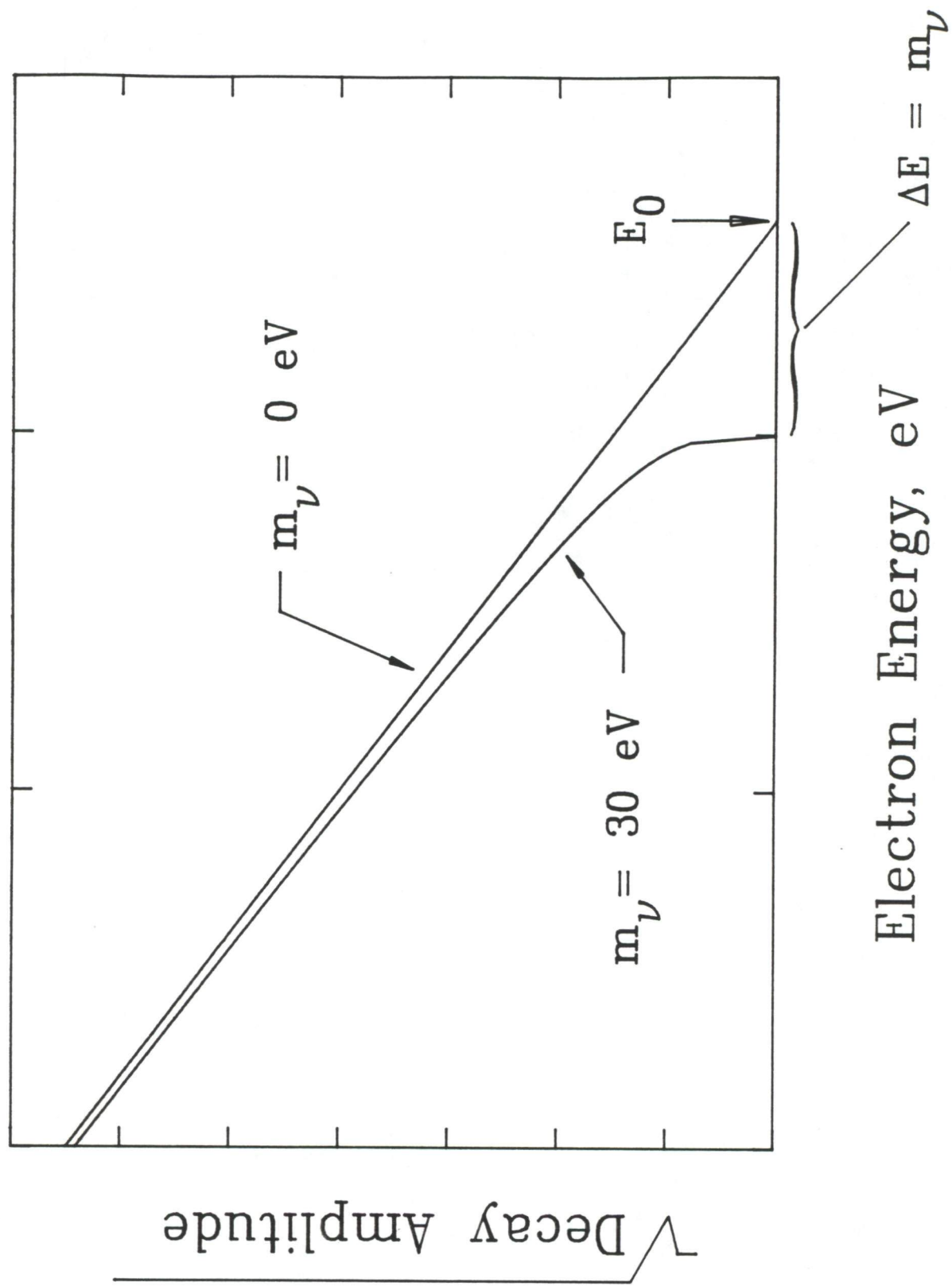


Figure 1.

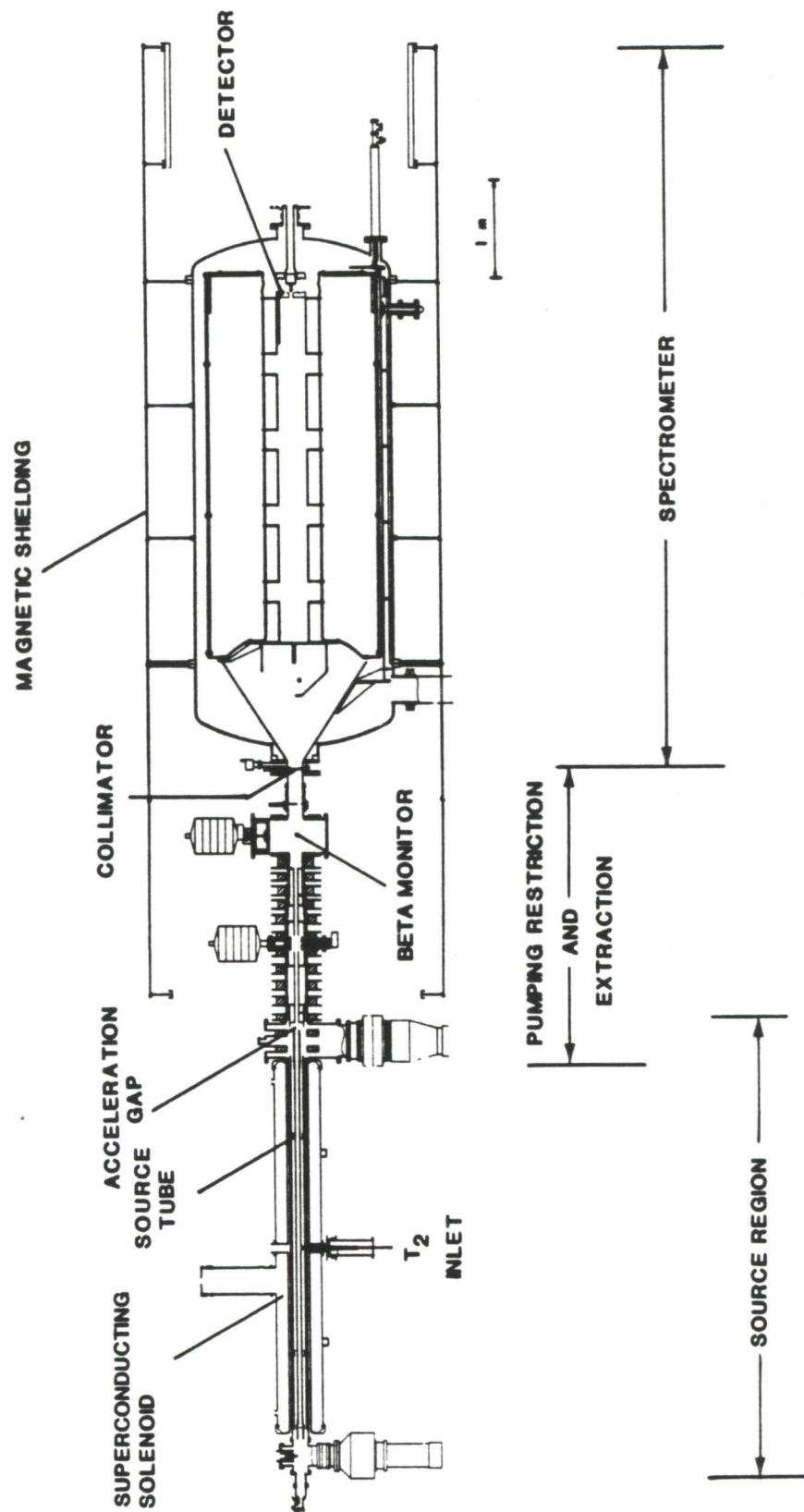
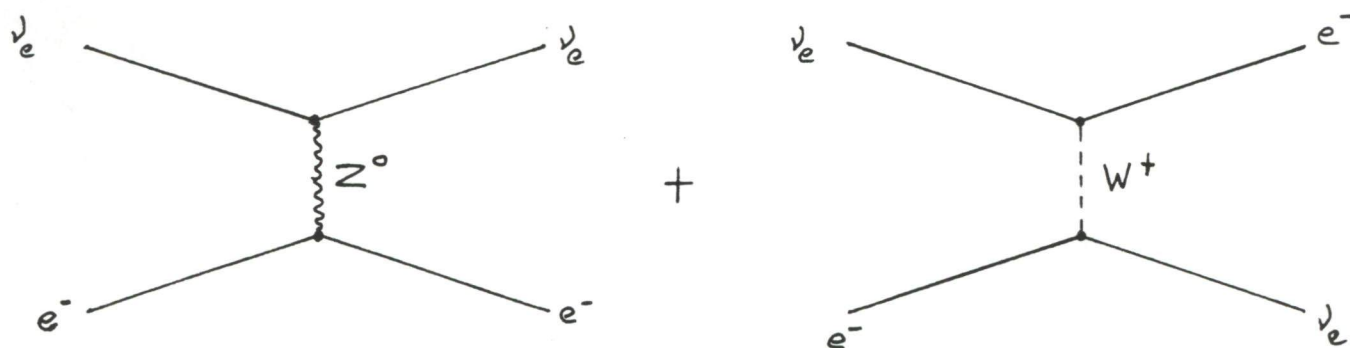
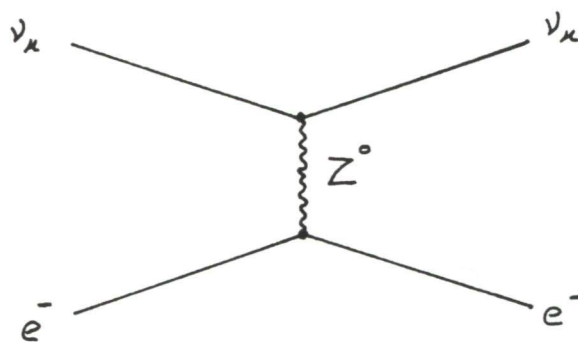


Figure 2.



$$\nu_e + e^- \rightarrow \nu_e + e^-$$



$$\nu_\mu + e^- \rightarrow \nu_\mu + e^-$$

Figure 3.

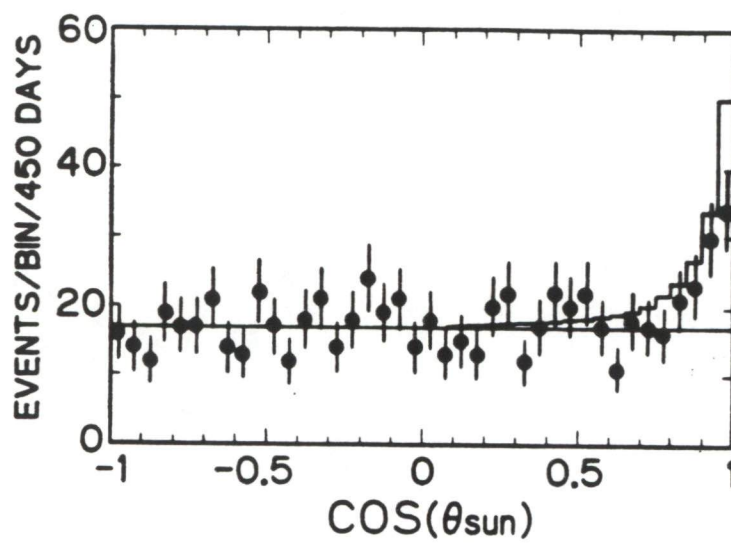


Figure 4.

THE WHITE HOUSE
WASHINGTON

August 31, 1989

Dear Jerry:

Many thanks for sending me the announcement of the get-together in Paris concerning the Probos-Mars Mission and Future Space Exploration of Mars. I shall make sure that Dick Truly and our Space Council colleagues get a look at this and I certainly agree with you that it may well provide a window of substantial importance.

With all best wishes for a very rewarding time in Mainz,

Sincerely yours,



D. Allan Bromley
Assistant to the President
for
Science and Technology

Professor G. J. Wasserburg
Max Planck Institut fur Chemie
Saarstrasse 23
Postfach 3060
F-6500 Mainz
Federal Republic of Germany

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
05a. Letter	To: Allan Bromley From: G.J. Wasserburg Re: Phobos-Mars conference (1 pp.)	8/89	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Date Closed:	2/9/2010	OA/ID Number:	62004-008
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
Re-review Case #:		Appeal Disposition:	
P-2/P-5 Review Case #:		Disposition Date:	
AR Case #:		MR Case #:	
AR Disposition:		MR Disposition:	
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Withdrawal/Redaction Sheet

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Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
05b. Schedule	Tentative program for conference in Paris on Space Exploration of Mars (5 pp.)	89	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

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AR Disposition:		MR Disposition:	
AR Disposition Date:		MR Disposition Date:	

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 (b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
 (b)(9) Release would disclose geological or geophysical information

THE WHITE HOUSE

WASHINGTON

August 31, 1989

Dear Jerry:

Mea culpa! Mea maxima culpa!! This time I will get the spelling right. So much for Latin!

Let me say at the outset how much I appreciate your rallying round on such short notice for the Space Council briefing. It was very important that people with your breadth, experience and background be present. Unfortunately, because of premature leaks to the media, the program did not proceed precisely as all of us had hoped, but we will keep working on it.

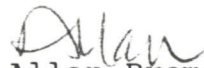
The points you make in your letter of August 15th are extremely well taken and when you find yourself on the way back from Mainz, please make a point of stopping by here in Washington so that we can have breakfast or lunch and discuss some of it.

Your closing comment that "one is never too old to be confirmed" reminds me of just what a cliff hanger this turned into in my case. The Senate finally decided to confirm me at 11:32 p.m. on August 3rd, just prior to going on the August recess, and I need hardly add that my life would have been enormously complicated had they taken off without going through these motions.

I hope that you are enjoying your stay at Mainz and that you will keep in touch. I am optimistic that the Space Council will play a very significant role in crafting a U.S. space program that will come closer to satisfying both of us.

With all best wishes,

Sincerely yours,



D. Allan Bromley
Assistant to the President
for
Science and Technology

Professor G. J. Wasserburg
% Professor F. Begemann
Max-Planck-Institut fur Chemie
Saarstrasse 23
Postfach 30 60
D-6500 Mainz
Federal Republic of Germany

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
06. Letter	To: Allan Bromley From: G.J. Wasserburg Re: European space exploration (2 pp.)	8/15/89	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Date Closed:	2/9/2010	OA/ID Number:	62004-008
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
Re-review Case #:		Appeal Disposition:	
P-2/P-5 Review Case #:		Disposition Date:	
AR Case #:		MR Case #:	
AR Disposition:		MR Disposition:	
AR Disposition Date:		MR Disposition Date:	

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
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P-3 Release would violate a Federal statute [(a)(3) of the PRA]
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C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

(b)(1) National security classified information [(b)(1) of the FOIA]
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(b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
(b)(9) Release would disclose geological or geophysical information

THE WHITE HOUSE
WASHINGTON

August 31, 1989

Dear Jerry:

Many thanks for sending me the announcement of the get-together in Paris concerning the Probos-Mars Mission and Future Space Exploration of Mars. I shall make sure that Dick Truly and our Space Council colleagues get a look at this and I certainly agree with you that it may well provide a window of substantial importance.

With all best wishes for a very rewarding time in Mainz,

Sincerely yours,



D. Allan Bromley
Assistant to the President
for
Science and Technology

Professor G. J. Wasserburg
Max Planck Institut fur Chemie
Saarstrasse 23
Postfach 3060
F-6500 Mainz
Federal Republic of Germany

THE WHITE HOUSE

WASHINGTON

August 31, 1989

Dear Jerry:

Mea culpa! Mea maxima culpa!! This time I will get the spelling right. So much for Latin!

Let me say at the outset how much I appreciate your rallying round on such short notice for the Space Council briefing. It was very important that people with your breadth, experience and background be present. Unfortunately, because of premature leaks to the media, the program did not proceed precisely as all of us had hoped, but we will keep working on it.

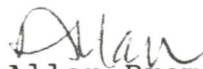
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With all best wishes,

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Assistant to the President
for
Science and Technology

Professor G. J. Wasserburg
% Professor F. Begemann
Max-Planck-Institut fur Chemie
Saarstrasse 23
Postfach 30 60
D-6500 Mainz
Federal Republic of Germany

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
07a. Letter	To: Allan Bromley From: G.J. Wasserburg Re: European space exploration (2 pp.)	8/15/89	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Date Closed:	2/9/2010	OA/ID Number:	62004-008
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
Re-review Case #:		Appeal Disposition:	
P-2/P-5 Review Case #:		Disposition Date:	
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AR Disposition:		MR Disposition:	
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RESTRICTION CODES

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THE WHITE HOUSE

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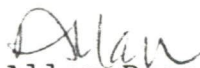
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Withdrawal/Redaction Sheet

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Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
07b. Letter	To: Allan Bromley From: G.J. Wasserburg Re: European space exploration [duplicate] (2 pp.)	8/15/89	(b)(1)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
File Location: D. Allan Bromley Correspondence - Presidential - W [1 of 2] [1989]

Date Closed:	2/9/2010	OA/ID Number:	62004-008
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
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07c. Letter	To: Allan Bromley From: G.J. Wasserburg Re: European space exploration [duplicate] (2 pp.)	8/15/89	(b)(1)	

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Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Correspondence Files
WHORM Cat.:
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THE WHITE HOUSE
WASHINGTON

September 15, 1989

Dear Paul:

As you know, the Office of the Assistant Administrator for Research and Development at the Environmental Protection Agency is still open, and I consider it of paramount importance that Bill Reilly get someone with real scientific credentials and technical competence.

It is clear that EPA will play a major role in environmental matters in this Administration, and I have seen an EPA report that identifies \$6 billion in environmental research within HHS, DOE and the other major agencies, so that the senior R&D officer at EPA can be expected to play a very important role.

I would be most appreciative of any nominations that you might be able to send me for people that you would consider suitable candidates for this post. Fortunately, I am very much in the loop for appointments of the scientific folk in this Administration and would be able to assure you that your nominees would be given very serious consideration.

I very much miss the opportunities that I had in the past to see you on a regular basis but will look forward to continuing contact and advice.

Pat joins me in sending you and Barbara our warmest best wishes.

Sincerely yours,

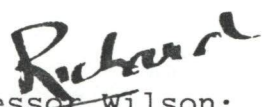


D. Allan Bromley
Assistant to the President
for
Science and Technology

Dr. Paul Waggoner
Director Emeritus
Connecticut Agricultural Experiment Station
P.O. Box 1106
New Haven, Connecticut 06504

THE WHITE HOUSE
WASHINGTON

September 19, 1989


Dear Professor Wilson:

I would like to thank you personally for the invaluable help you provided in connection with the Galileo mission launch approval.

It is good to have experts, such as yourself, who can be depended upon to offer unbiased scientific views on topics involving sensitive issues, fraught with strong emotional undertones, such as those associated with this mission.

Best regards,



D. Allan Bromley
Assistant to the President for
Science and Technology

Professor Richard Wilson
Department of Physics
Harvard University
Cambridge, Massachusetts 02138

THE WHITE HOUSE
WASHINGTON

November 29, 1989

Dear Dr. Wilcox: .

I appreciate your thoughtful letter of November 2. You have addressed an important problem, namely that of the intense competition for Federal research funds in biomedical science. I have become aware of this problem and can assure you that this Office will address this issue and seek to mitigate it if we can.

Without wishing to gainsay the truth of your basic argument I should point out a few statements in your letter that I believe to be in error, as a repetition of these comments is likely to contribute to an erosion of morale. You state that the Reagan Administration cut research funds 8 years ago. This is not correct in the biomedical science area. When President Reagan took office, the NIH budget was \$3.5 billion and when he left office the budget was just under \$7.2 billion. Thus, the budget more than doubled and this increment represented about 40% of real growth. During this time the total number of research project grants supported by the NIH increased from about 16,000 to about 21,000, and a number of new programs were introduced to extend the term of awards and to increase the stability of the biomedical research enterprise.

It is true that the award rate may be 20% or less this year. Bear in mind that close to 95% of submitted applications are now recommended for support, compared with about 70% a decade or so ago. However, even with the appropriate corrections to express success rates in comparable terms, it is true that this year is likely to be a tight year as the Administration and the Congress wrestle with the deficit. But just as a comparable period at the end of the 70's was transient, I am optimistic that real growth in the research budget can resume, and that not only projects of high social priority, such as AIDS research, will be favored.

I suspect these comments are not especially comforting to someone who is attempting to secure funding for meritorious research during a time of fiscal constraint. I would encourage you to keep trying at the NIH, and also to investigate all possible alternatives for support of your laboratory.

Many thanks for writing,

Sincerely yours,

A handwritten signature in dark ink, appearing to read "D. Allan Bromley". The signature is fluid and cursive, with a large, stylized initial "D".

D. Allan Bromley
Assistant to the President
for
Science and Technology

Kent W. Wilcox, Ph.D.
Associate Professor
Department of Microbiology
Medical College of Wisconsin
8701 Watertown Plank Road
Milwaukee, Wisconsin 53226

"CORRESPONDENCE TRACKING"

TYPE: Action Item

DOCUMENT NUMBER: 8920319

FROM: KENT W. WILCOX
MEDICAL COLLEGE OF WISCONSIN

TO: BROMLEY

DATE OF
CORRESPONDENCE: 11/02/89

SUBJECT: THANK YOU FOR THE RECOMMENDATION AND BRINGING TO
YOUR ATTENTION THE FUNDING PROBLEMS ASSOCIATED WITH
THE GOVERNMENT IN THE FIELD OF BIOLOGICAL RESEARCH.

ASSIGNED TO: James Wyngaarden

ACTION REQUIRED: DRAFT RESPONSE FOR DAB SIGNATURE

SENDER'S DUE DATE: OSTP DUE DATE: 12/04/89

DATE COMPLETED: -----

COPIES TO: D. Allan Bromley

REMARKS:

DATE RECEIVED: 11/09/89

FILE: NEOB



Department of Microbiology

2 November 1989

D. Allan Bromley
Assistant to the President for Science and Technology
The White House
Washington, D.C.

Dear Dr. Bromley:

Thank you very much for your thoughtful letter of reference for Ms. Anne Janzer-Pfeil, who has applied for admission to the graduate program in the Department of Microbiology at the Medical College of Wisconsin. Her credentials are quite noteworthy and I can assure you that she is a serious candidate.

As a previous academic scientist, you certainly understand that the best training environment for future scientists is one in which the faculty are highly motivated and the research facilities are well-funded. Because this country is suffering a growing crisis in both of these areas, I feel compelled to write.

Since you are not a biologist, you may not be aware that research funds for biological research are becoming nearly impossible to obtain. For example, it has been estimated that less than 20% of the research grants that are being submitted to NIH this year will be funded. A few years ago the percentage funded was above 35%. Some members of the federal government may dismiss this low rate of funding by claiming that the process is "weeding out" the nonproductive researchers. The problem with this argument is that the Reagan administration cut research funds 8 years ago. Since most grants expire after 3 years, the "weeding out", such that it was, occurred at least 5 years ago. In the past 5 years, NIH has failed to provide continued funding to many productive scientists. This year the research programs of many of those remaining scientists who somehow managed to survive the Reagan administration are doomed by further reductions in the NIH research budget.

You might reply that the NIH budget is no lower now than it was 8 years ago. However, the demands on this budget are much higher. AIDS research and the Human Genome Project threaten to consume much of the available funding; it is inappropriate and inefficient to expect every academic molecular biologist in this country to switch to one of these two projects. Mr. Reagan stated

that if the research was worth funding, then industry would fund it. I am sure you recognize the holes in this argument, just as Mr. Reagan did. (He certainly didn't expect private industry to pay for the research needed to implement his defense strategy, for example).

My congressman says that these are "tough times" and that "hard decisions must be made" and that "a few must suffer." With the stock market at an all time high, unemployment way down, and inflation running at less than 5%, these are not hard times economically. And frankly, I don't think they are hard times politically.

I agree that hard decisions must be made, and I am asking your help in convincing Mr. Bush to make them. You must inform him of the crisis in research funds for academic research. Tell him that the ranks of academic scientist are being decimated due to lack of research funds. Tell him that many of our most promising college graduates have no interest in obtaining a Ph.D. in the biological sciences because the opportunity that once existed for intellectual freedom in academic research is nearly gone. Tell him that we recognize that there is a federal deficit and that something must be done about the deficit. And then ask him to DO something, the only obvious thing that can be done, and that is to increase the revenue to the Federal Government.

I realize that Mr. Bush has vowed not to raise taxes. Does he actually realize what the consequences of his decision are? Does he recognize that his decision is eroding the community of scientists that has been responsible for numerous Nobel prizes in Medicine? Does he understand that in the absence of research funds, we cannot train Anne Janzer-Pfeil and other promising scientists like her? Does he not listen to the reports which document the declining scientific aptitude of our high school graduates?

If I have overstated my case, I apologize. My wife says that the problem with scientists is that they prefer to do science and are totally inadequate when it comes to public or private appeals. No doubt you will agree with her after reading this letter.

Thank you for your consideration of the issues I have raised.

Sincerely yours,



Kent W. Wilcox, Ph.D.
Associate Professor

THE WHITE HOUSE
WASHINGTON

November 29, 1989

Dear Henry:

Many thanks for your kind remarks concerning my talk at the Fulbright dinner for for sending me the information about the Research Foundation for Opto-Science and Technology. This is obviously a very powerful group, and your letter gives me a good overview of some of their activities.

I should tell you that over the years I have been cribbing material from your publications and books in nuclear medicine, in shameless fashion, for lectures and talks, and I really would like to take this opportunity to congratulate you for the leadership role that you have played in developing nuclear medicine to its present stage of effectiveness and importance. You can be justly proud of what you have accomplished.

With warmest best wishes,

Sincerely yours,



D. Allan Bromley
Assistant to the President
for
Science and Technology

Henry N. Wagner, Jr., M.D.
Director, Divisions of Nuclear Medicine
and Radiation Health Sciences
The Johns Hopkins Medical Institutions
615 North Wolfe Street
Baltimore, Maryland 21205-2179

THE JOHNS HOPKINS MEDICAL INSTITUTIONS

DIVISIONS OF NUCLEAR MEDICINE AND RADIATION HEALTH SCIENCES

615 NORTH WOLFE STREET
BALTIMORE, MARYLAND 21205-2179

Telephone 301; 955-3350

October 24, 1989

The Honorable D. Allan Bromley
Science Advisor to the President
Old Executive Office Building, Room 360
Washington, D.C. 20506

Dear Dr. Bromley:

Many thanks for helping make the dinner honoring Senator Fulbright so memorable. The fact that so many took the time and trouble to come meant a lot to him and will serve as a reminder and inspiration for all of us.

Several persons at the dinner asked me about the Research Foundation for Opto-Science and Technology. I have enclosed a brochure that will give you some idea of its goals. I have also enclosed a brief description of previous meetings sponsored by the Foundation. I hope you find them interesting.

Sincerely yours,

Henry
Henry N. Wagner, Jr., M.D.
Professor of Medicine, Radiology
and Environmental Health Science
Director, Divisions of Nuclear Medicine
and Radiation Health Sciences

Enclosures

*As I told you, your talk was perfect!
I hope you had a good time.*

DIRECTOR
OFFICE OF THE
RECEIVED

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89 OCT 26 A4:04

OFFICE OF THE
DIRECTOR

Peace Through Mind/Brain Science

Conventional wisdom is that international conflict is due to the existence of individual nations, resulting in pervasive international insecurity, anxiety, and fear, often progressing to aggressive behavior and war. Socioeconomic inequality is often cited as another cause of human conflicts. A third but less conventional cause—abnormal brain function—was emphasized at recent scientific meetings in Japan, where it was proposed that a key to world peace may lie in a greater understanding of how brain chemistry affects human emotions.

"Peace Through Mind/Brain Science" was the theme of two conferences held in Hamamatsu City, Japan—the first in May 1988, and the second in February 1989.¹⁻³ Discussion at these conferences emphasized new imaging technologies, including positron emission tomography (PET), that make it possible for the first time to relate human thought, emotions, and behavior to measurable chemical reactions within the living human brain.^{4,5}

The second conference was sponsored by a newly formed international Research Foundation for Opto-Science and Technology, whose support includes the Science and Technology Agency and Ministry of International Trade and Industry of Japan. In addition to Japanese physicians and scientists, 18 persons from the United States and 8 from the Soviet Union attended the conference, among them academician N. P. Bekhtereva, a full member of the Soviet Academy of Sciences and director of the Institute of Experimental Medicine in Leningrad.

Changes in regional brain blood flow measured by PET were described in human subjects during anticipatory fear. Abnormal chemical findings in depressed and schizophrenic patients having delusions, hallucinations, and thought disorders were also described. Using stereoscopically implanted gold electrodes in patients with Parkinson's disease, Soviet scientists examined the organization of electrical activity of the brain during the performance of various mental tasks. In mapping the spatial distribution of the brain circuitry, their goal is to determine whether the same regions of the brain are always involved in the same mental tasks.⁶⁻⁸ Among the most interesting Japanese reports were studies of the patterns of activation of the brain in blind persons. The new technologies of biomagnetism and optical imaging of the temporal and spatial patterns of organization of the visual cortex in animals were also described.

Positron emission tomography makes possible quantitative imaging of regional blood flow, the utilization of oxygen and glucose by the functioning brain, and the chemistry of neurotransmission.⁵ The technique involves intravenous administration of short-lived radioactive tracers labeled with radionuclides (radioactive species of atoms) that emit positrons

(positive electrons) in the process of radioactive decay. Before injection, the radionuclides are incorporated rapidly into molecules such as glucose, oxygen, amino acids, neurotransmitters, or drugs that affect brain function, both licit and illicit. The PET scanner then creates images that portray the distribution of the radioactive tracers at various times after injection into the patient, during which time the radioactive molecules take part in biochemical processes in the brain. These "functional" or "biochemical" images reveal the human brain in action and make it possible to relate behavior to brain chemistry, and brain chemistry to behavior.

Some of the most important findings concern neuroreceptors, which serve as "recognition sites," providing a mechanism for selection of signals to be propagated from one nerve cell to another. Receptor patterns, originally genetically determined and then modified by experience, provide a possible mechanism for the broad range of possible responses to what would otherwise be an overwhelming range of different input signals from the environment.

Positron emission tomography extends the use of electroencephalography, invented in 1929, which made it clear that mental abnormalities, such as epilepsy, were the result of brain disease. Until recently, electrical activity could be measured only at the surface of the brain, so what was happening within specific structures deep within the brain remained a mystery. Today, the use of electrodes placed within the brain or beneath the skull on the surface of the brain and the new technique of magnetoencephalography make it possible to examine the electrical activity within the brain. With PET and magnetoencephalography, it is now possible to relate the electrical and chemical activity to thinking, feeling, and behavior.

Already, it has been established beyond question that in human beings, as well as nonhuman primates, regional neuronal activity is reflected by increased regional blood flow and by increased glucose and oxygen metabolism. This finding provides a mechanism for assigning distinct, well-defined mental processes to "seats," or anatomic structures within the human brain. We can ask whether certain anatomic regions are necessary for normal mental functions, and we can relate structure to function.

Such advances in biomedical research depend on advances in the basic sciences, including the new science of *photonics*, the science of light.⁹ These advances depend on the use of lasers as well as broader applications of the electromagnetic spectrum, such as near-infrared light. Billions of dollars per year are being invested in photonics research in the United States, Japan, and the Soviet Union, as well as other European countries.

The technology of photonics makes possible the study of

quantum chemistry at the atomic and molecular level in living human beings as well as experimental animals. With optical spectroscopy, especially at near-infrared and x-ray energies, fluorescent reactions can be examined that take place in the brain in picoseconds and femtoseconds producing exceedingly small numbers of photons in the process, which can only be seen by cameras designed to respond to extremely low light levels and ultrahigh speeds.¹⁰ The Japanese have built new video cameras that contain about 1 million picture elements, a wide dynamic range over 50 logs of intensity, and the capacity to collect data 30 times a second. The ultrasmall, ultrafast reactions of ion channels in nerve cell membranes can now be viewed on a video screen. Hamamatsu Photonics, one of the sponsors of the conference, developed television in Japan 65 years ago and is now developing a "new physics" to explore the human brain and its functions, using instruments such as the world's first optical measurement system, called a *streak camera*, that can measure optical phenomena as short as 0.4 ps (1 ps is equal to one trillionth of a second).

At the conclusion of the second conference, the scientists and engineers who attended declared their intention to promote the scientific study of brain mechanisms involved in destructive and violent behavior, as well as those related to loving and creative behavior.

They formulated the goals of the foundation as follows:

1. To develop the concept that peace will depend on a better scientific understanding of the human brain and its role in behavior.

2. To facilitate scientific and technological advances in the peaceful applications of photonics—the science and technology of light—to the solution of human problems.

3. To facilitate international communication among basic and clinical neuroscientists; manufacturers and users of photonics technology; scientists and the public; and scientists and political leaders.

The Research Foundation for Opto-Science and Technology will encourage the development of scholarly and scientific exchanges and joint research projects among persons from the Soviet Union, Japan, the United States, and other countries. The concept is that, under the sponsorship of the foundation and with support of the prefectural and national governments in Japan, persons with insight, imagination, and courage, through their relationships and collaborative scientific research activities, can help improve the atmosphere of international cooperation, especially among the Soviet Union, Japan, and the United States. The benefits of international collaboration would not only be of scientific benefit, but in the very process of these collaborative, creative efforts in science, political rivalry may decrease.

One dramatic suggestion raised in informal discussion at the conference was that perhaps one of the disputed northern

Kurile Islands, which were taken over by the Soviet Union at the end of World War II, might become the site of an International Center for Mind/Brain Science, under the auspices of the United Nations. Such a step might be just what is needed to further a settlement of the Japanese-Soviet controversies involving these islands.

In any case, a testable hypothesis is whether mind/brain science can help explain violent and overly aggressive behavior. In the context of modern means of destruction, available to both individuals and nations, violence can be viewed not only as socioeconomic and political phenomena, but also as a form of mental illness, subject to investigation by means of biochemical, electrical, and psychological methods. Brain chemistry changes have been found in diseases such as schizophrenia and depression, as well as in panic states and after the administration of drugs. The hypothesis is that *peace through mind/brain science* may be an idea whose time has come.

The foundation's more modest and immediate goal is to promote scientific collaborative research on the brain mechanisms of violence and destructive behavior in human beings and to make such research a major focus of collaboration between scientists and engineers of Japan, the Soviet Union, and the United States.

We have come a long way since bizarre human behavior was believed to be inspired by God or by Satan and attributed to demonic possession. Today it is widely accepted that the mind is amenable to scientific study and is not the exclusive domain of philosophy. The insight of philosophers is being extended by the eyes of modern science, and *peace through mind/brain science* is where science and politics meet.

Henry N. Wagner, Jr, MD
The Johns Hopkins University
Baltimore, Md

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RESEARCH FOUNDATION FOR OPTO-SCIENCE AND TECHNOLOGY

Office:

**325-6 Sunayama-cho, Hamamatsu City,
Shizuoka Prefecture, Japan, 430**

TEL: (0534) 54-0598 FAX: (0534) 54-1929

Purpose of the Establishment of the RESEARCH FOUNDATION FOR OPTO-SCIENCE AND TECHNOLOGY



Chairman of
the Board
Dr. Daisaku Miwa



Establishment
Organizer
Teruo Hiruma

In recent years, the various properties of light have been employed in an ever-expanding number of ways—in communications, precision measurement, processing, and data processing, and in the areas of nuclear fusion, space and marine research. This range has not been limited to scholastic endeavors, however, as the contributions made to the improvement of industry and to society as a whole have been remarkable, and have led to an awareness of light greater than at any time in the past.

Despite this progress, much of the true nature of light remains unexplored, and it is imperative that new scientific explorations be stimulated in the pursuit of knowledge still greater than that made possible by the basic research carried out thus far.

It is essential that the highly specialist knowledge present in the fields of science, engineering, and medicine be brought together in a complete, organic manner to support research into the basic qualities of light and the interaction of light and matter, and into the applications of optical science and technology based on the fruits of such research.

In addition, Japan has been criticized for basing all of our scientific and technological advances on research done in Western nations. Therefore, we believe Japan should take the initiative in the development of this important field to refute the above criticism.

Given circumstances such as these, the need to promote optical science and technology and to evaluate research in this area can best be met by gathering information about research activities both in Japan and abroad. It is felt that the promotion of the exchange of opinions and ideas among scientists and scholars in many fields from different nations makes this project most worthwhile.

With such considerations in mind, assistance and commendations will be provided to support basic investigations and research in optical science and technology in an effort to promote a greater understanding of light and the creation of new sciences. Making it our purpose to contribute in a concrete manner to the development of the field of scientific technology and industrial economies, we have established the RESEARCH FOUNDATION FOR OPTO-SCIENCE AND TECHNOLOGY.

Foundation Summary / Details of Operation

- Name:** Research Foundation for Opto-Science and Technology
- Address:** 325-6 Sunayama-cho, Hamamatsu City, Japan
- Founder:** Hamamatsu Photonics K.K.
- Government Agencies:** Science and Technology Agency
Ministry of International Trade and Industry
- Date of Establishment:** December 23, 1988
- Basic Capital:** At time of establishment: 100 million yen
(after 5 years—500 million yen)
- Purpose of Operation:** This foundation has been established to provide assistance and commendations to support basic investigations and research in optical science and technology in an effort to promote a greater understanding of light and the creation of new sciences. It is our purpose to contribute in a concrete manner to the development of the field of scientific technology and industrial economies.
- Details of Operations:**
1. Basic research and investigations into optical science and technology
 2. Assistance and commendations for research done in optical science and technology
 3. Dissemination of awareness of optical science and technology
 4. Other operations required to support the goals of this foundation
- Initially, in addition to conducting investigations of domestic and foreign sources together with providing support for superior research, efforts will be made to organize symposiums and lectures to increase awareness of optical science and technology. The cornerstone of these operations will be the initiation of research in this field.
- In addition, in order to meet the goal of developing and improving optical science and technology, this foundation hopes to sponsor an annual international forum for the exchange of ideas among scientists and scholars from all over the world.

Foundation Officers and Councilors

Officers

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M. Okamoto: Member, Council for Science and Technology, Prime Minister's Office

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Y. Yamanaka: Executive Managing Director, Japan Environmental Sanitation Center

Y. Yonekura: Lecturer, Department of Nuclear Medicine, Faculty of Medicine, Kyoto University

THE WHITE HOUSE
WASHINGTON

November 30, 1989

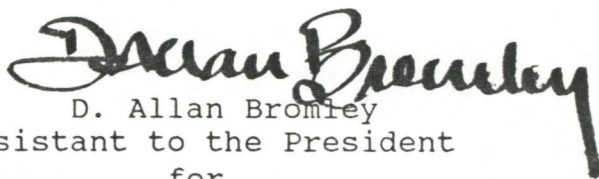
Dear Ms. Bidwell:

Thank you for your kind letter of invitation to join the distinguished group of participants that will be assembling for the World Economic Forum on May 16, 1990 in Washington, D.C.

With the understanding that it is always possible that at the last moment I might have to either drop out or send a substitute, I would be delighted to accept your invitation.

With best wishes,

Sincerely,

A handwritten signature in dark ink, reading "D. Allan Bromley". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

D. Allan Bromley
Assistant to the President
for
Science and Technology

Ms. Gail Bidwell
Member of the Executive Board
World Economic Forum
53 chemin des Hauts-crets
CH-1223
Cologny/Geneve, Switzerland

THE WHITE HOUSE
WASHINGTON

November 30, 1989

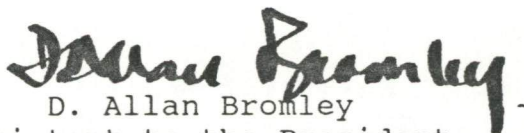
Dear Dr. Pedersen:

Thank you for your kind letter of invitation to be the keynote speaker at your Medicine and Biology Conference on November 4, 1990 in Philadelphia.

Unfortunately, I already recognize that the particular date in question is one where I am already committed. That being the case, I will unfortunately be unable to join you, much as I would like to.

I hope, however, that you will keep me in mind in the future and I offer my best wishes for a successful conference.

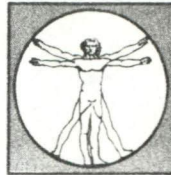
Sincerely,

A handwritten signature in dark ink, appearing to read "D. Allan Bromley". The signature is stylized with a large, sweeping initial "D" and a long, horizontal stroke extending to the right.

D. Allan Bromley
Assistant to the President
for
Science and Technology

Dr. Peder C. Pedersen
Associate Professor
Department of Electrical Engineering
Worcester Polytechnic Institute
Worcester, Massachusetts 01609

12TH ANNUAL
INTERNATIONAL CONFERENCE
IEEE
ENGINEERING IN MEDICINE
AND BIOLOGY SOCIETY



NOVEMBER 1-4, 1990

PHILADELPHIA
PENNSYLVANIA
USA

October 20, 1989



The Honorable D. Allen Bromley
Assistant to the President for Science and Technology
The Old Executive Office Building
17th and Pennsylvania Ave.
Washington, D.C. 20506

Dear Dr. Bromley:

I am Program Chair for the 1990 IEEE Engineering in Medicine and Biology Conference in Philadelphia, November 1 to 4. This is the major international conference for biomedical engineering researchers and scientists, with 1500 to 2000 attendees, about 1000 presented papers, and a large international participation.

I would like to invite you, as the science adviser to President Bush, to be the keynote speaker for this conference, and address the participants at the conference brunch on the morning of Sunday, November 4th. The conference will be held at the Franklin Plaza Hotel in downtown Philadelphia.

Since the policies of the White House and the Congress have a significant influence on the direction of health care technology and the health care delivery system in the United States, the Conference Organizing Committee considers it highly appropriate for you to address this body of scientists and research engineers on the topic of the U.S. science policies in the 1990s in general and on the scientific aspects of the US health care policies in particular. Of course, you should feel free to apply your own emphasis to this address.

I have attached a one page description of various aspects of the conference, and I would naturally be most happy to supply any other information that you may desire if you might be able to consider this invitation.

Sincerely yours

Peder C. Pedersen, Ph.D.
Assoc. Prof., Dept. of Electrical Eng.
Program Chair,
1990 International EMBS Conference

Encl.

cc: Dr. Onaral

Conference Chair
Banu Onaral
Biomedical Engineering and
Science Institute
Drexel University
Philadelphia, PA 19104

Program Chair
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Executive Chair
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International Chair
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University of Miami
P.O. Box 248294
Coral Gables, FL 33124

Finance Chair
William Freedman
Biomedical Engineering and
Science Institute
Drexel University
Philadelphia, PA 19104

THE EMBS CONFERENCE IN PHILADELPHIA, NOV. 1 - 4, 1990.

The Twelfth Annual International Conference of the IEEE Engineering in Medicine and Biology Society in Philadelphia, November 1-4, 1990 promises to be the one of the most exciting Biomedical Engineering events of 1990. The purpose of the conference is to provide a forum for dissemination of the latest technical information in the various fields of Biomedical Engineering, to cover important developments in engineering and science which may impact Biomedical Engineering, and to give the participants a sense of the future directions of health care technology and biomedical research.

Several mini-symposia are being organized where leading authorities will highlight the most recent developments in Biosensor Technology, Biomedical Applications of Fractals, Neural Networks, and Physiological Systems Identification and Modeling. The medical imaging area will receive increased emphasis, with special tracks covering MRI, Medical Ultrasound, and Reconstruction and Display Tomographic Radiology. It is important to note, however, that the EMBS Conference is not limited to these topics, but serves as the proper forum for ALL disciplines within Biomedical Engineering. Hence, the major strength and importance of the conference lie in its ability to unify the broad and diverse field of Biomedical Engineering.

The conference hotel is the Wyndham Franklin Plaza which is located in the cultural and culinary center of the city, just steps away from the museum district and Fairmount Park. Independence National Historic Park, the US Mint, Chinatown, farmers' markets, Franklin Court, the riverfront on the Delaware are all within walking distance.