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"Bridging the Future-Space Station and Beyond"

January 30-February 3, 2000

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	GRAND PAVILION HOURS:	PREFUNCTION AREA:
MONDAY:	**Exhibits Closed During Plenaries I and II** OPEN HOURS: 10:00 am – 10:25 am 2:30 pm – 5:00 pm 6:30 pm – 8:30 pm	OPEN HOURS: 8:00 am – 11:45 am 1:45 pm – 5:00 pm 6:30 pm – 8:30 pm
TUESDAY:	**Exhibits Closed During Plenary III** OPEN HOURS: 9:45 am – 12:00 noon 1:00 pm - 9:00 pm	OPEN HOURS: 8:00 am – 12:00 noon 1:00 pm – 9:00 pm
WEDNESDAY:	**Exhibits Closed During Plenary IV** OPEN HOURS: 9:45 am –12:00 noon 1:00 pm – 5:00 pm	OPEN HOURS: 8:00 am – 12:00 noon 1:00 pm – 5:00 pm
THURSDAY:	OPEN HOURS: 8:00 am – 12:00 noon	OPEN HOURS: 8:00 am – 12:00 noon

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The Schreiber-Spence Space Achievement Award was established by The University of New Mexico's Institute for Space and Nuclear Power Studies to recognize contributions that have advanced capabilities in space technologies and applications through excellence in pioneering applications, technical contributions, public service, or leadership. The award consists of a memento and a monetary award of $2,500. (Shared equally if there are multiple awardees who have contributed jointly.) The award is given by the Institute when a worthy person (or persons contributing jointly) is identified by the Awards Committee. The award is not given more frequently than, nor necessarily, annually. The Award(s) will be presented at the STAIF-2000 Luncheon. The awardee(s) is expected to attend the STAIF Conference, at which the award is given, and to address the attendees on a relevant topic. The award honors Raemer E. Schreiber and Roderick W. Spence for their pioneering and technical contributions to concepts and designs for nuclear propulsion in space during their tenure at Los Alamos National Laboratory.

NOMINATION: Nominations for the award can be submitted at any time to The University of New Mexico's Institute for Space and Nuclear Power Studies, c/o Schreiber-Spence Space Achievement Award, on the special nomination form. The final selection for the award will be made based on the criteria described in the award bylaws. A copy of the award bylaws and the nomination form can be obtained by writing to the Institute or by calling (505) 277-0446. Nominations are due on or before October 15 of the award year and will be retained for consideration for a three-year period.

SELECTION CRITERIA: Strict selection criteria have not been adopted, nor judged to be appropriate, except as they are implicit in the purposes for which the Award has been established and as noted in the first paragraph of these "Guidelines." Additionally, contributions are, or have been, substantial and specific, and contributions acknowledged to be worthy of unusual recognition for excellence by those actively engaged in the field of space nuclear power and propulsion.

NOMINATION FORM: To be considered by the Award Committee, all sections of the Nomination Form must be completed in compliance with the requirements. The Award Committee will place particular emphasis in its review of the nominations on the evidence substantiating the excellence of the contributions noted in the citation and as contained in the basis for the nomination. Nominations can be submitted at any time on the Nomination Form to ISNPS.

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1988-Raemer E. Schreiber
1988-Roderick W. Spence
1990-Jerome Mullein
1990-William E. Wright
1991-Stanley V. Gunn
1992-Harold B. Finger
1993-Robert T. Carpenter
1993-James J. Lombardo
1994-George Gryaznov, Russia
1994-Victor Ya. Poupko, Russia
1995-Martin Marietta Astro Space RTG Team
1996-SNAP-10A Team
1996-Gary L. Bennett
1997-Wesley T. Huntress
1998- The Cassini Mission Power Source Team
1999-NSTAR Team and SCARLET Team

MANUEL LUJAN, JR. STUDENT PAPER AWARD

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The Manuel Lujan Jr. Student Paper Award was established in 1987 by The University of New Mexico's Institute for Space and Nuclear Power Studies to recognize outstanding contributions by students in the field addressed at all conferences and symposia of the Space Technology & Applications International Forum. Up to two awards could be granted at the forum, with each consisting of a certificate and $500.00, shared equally if more than one awardee. The award is given by the Institute when worthy contributions are identified by the awards committee.

NOMINATION CRITERIA: Nominations for the award will be based on the quality of the paper published in the STAIF proceedings, as well as on the technical quality and originality of the oral presentation at the annual meeting. For a paper to be considered for the award, it must have the student as the lead author and he/she must have done the majority of the research.

The recipients of the Best Student Paper Award at STAIF-99 are **Gerrit Wölk**, University of Bremen, Germany, for his paper entitled "*Investigation on Two-Phase Flow in Small Diameter Non-Circular Channels under Low and Normal Gravity*." His co-authors are Michael Dreyer and Hans J. Rath, University of Bremen, Germany; and **Thomas L. Mahood**, California State University, for his paper entitled "*Propellantless Propulsion: Recent Experimental Results Exploiting Transient Mass Modification*." This award will be recognized at the STAIF-2000 Luncheon.

Recipients of the Manuel Lujan, Jr. Student Paper Award:

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AWARD COMMITTEE: **Dave Poston** (Chair), Los Alamos National Laboratory; **Jim Fountain**, The Boeing Company; **George Miley**, University of Illinois; **Mel Montemerlo,** NASA Headquarters; **Nick Morley**, Air Force Research Laboratory; **Joseph A. Sholtis, Jr**., Sholtis Engineering & Safety Consulting; and **Theodore Swanson**, NASA Goddard Space Flight Center.

The Space Nuclear Power and Propulsion Outstanding Paper Award was established in 1992 by The University of New Mexico's Institute for Space and Nuclear Power Studies (ISNPS) to recognize outstanding technical contributions to the fields of all hosted conferences and symposia of the Space Technology and Applications International Forum (STAIF). The recognition of an outstanding contribution is based upon the written paper published in the STAIF Proceedings and the content of the presentation at the meeting. The award is presented by ISNPS upon the recommendation of the STAIF Award Committees.

NOMINATION AND EVALUATION PROCEDURE: Contributions from STAIF conferences could be nominated by the session chair and co-chair, or any member of that conference or symposia Outstanding Paper Award Subcommittee. Nomination forms will be given to the session chairs and co-chairs at the speakers' breakfast. Individuals who wish to have their contribution or a colleague's contribution considered may request that a member of the Outstanding Paper Award Committee attend the session in which the presentation will be made. The request must be made in writing to the ISNPS office, the STAIF Outstanding Paper Award Committee Chair, or members prior to STAIF. For consideration, nominations must be received by the ISNPS office. STAIF Outstanding Paper Award Committee Chair, or Outstanding Paper Award Committee by the 2nd Friday in February following the STAIF Conference.

NOMINATION AND EVALUATION CRITERIA: The paper and the content of the presentation represents a technical contribution that (1) has an influential impact on the field of the topic of the conference or symposia in which it was presented, (2) has lasting technical value, and (3) is likely to be built upon and referenced by their peers. The primary

emphasis in the selection of the award will be based on the written paper. In the case of a close decision, input from subcommittee members who heard the oral presentation and the session chair and co-chair may be used to render a final decision. The paper must be well written, well organized, and have appropriate references and acknowledgments. The paper must also present a complete and scientifically sound analysis. The STAIF Outstanding Paper Award is presented for technical contributions. While overview and historical papers are important for the historical archives, they will not be considered for the award. The author(s) must be a major technical contributor to the work. The paper should also acknowledge all major technical contributors to the work who are not co-authors.

RECIPIENT OF 1999 AWARD: The recipients are X. Zhang, D.P. Johnson, A.R. Manerbino, J.J. Moore, and F. Schowengerdt, Center for Commercial Applications of Combustion in Space (CCACS), Colorado School of Mines, for their paper entitled *"Recent Microgravity Results in the Synthesis of Porous Materials"*.

GENERAL ERNEST C. HARDIN SCHOLARSHIP AWARD

This scholarship fund was established in 1986 by The University of New Mexico's Institute for Space and Nuclear Power Studies to recognize outstanding undergraduate and graduate students in engineering and science disciplines with an emphasis on space science and technology and related fields. Several awards are offered annually to deserving freshmen and engineering undergraduate students. Awards consist of a certificate of recognition and a monetary sum of $500 per year, for up to four years. The graduate student award has a monetary value of $1,200 per year and tuition waivers for up to three years.

OUTREACH ACTIVITIES / SECONDARY SCHOOL SPECIAL SESSION

EDUCATION OUTREACH ADVISORY BOARD MEMBERS: **Carla Rogers,** UNM-ISNPS; **Randi Buck**, UNM-Regional Science Fair; **Susan Dibble**, Desert Ridge Middle School, **Irene El-Genk, Chair**, West Mesa High School; **Mohamed S. El-Genk**, UNM-ISNPS; **Jeff King**, UNM-ISNPS; **Susan Ostlie**, Madison Middle School; **Steve Seiffert**, Consultant; **Gary Stiler**, Jefferson Middle School; and **Rose Thome**, Albuquerque. These sessions are organized by The University of New Mexico's Institute for Space and Nuclear Power Studies and cosponsored by the New Mexico Space Grant Consortium Program at UNM; NASA National Space Grant Colleges and Fellowship Program; and the American Nuclear Society, Trinity Section. Special session activities are coordinated by **Irene El-Genk**, West Mesa High School, Albuquerque, NM, who is a member of the Education and Outreach Advisory Board (EOAB), at the Institute for Space and Nuclear Power Studies. Secondary school science students and teachers from New Mexico who participated in the Space Design Competition are invited to attend and participate in this session to be held Monday, January 31, 2000, from 8:00am - 12:00 noon. Space-related topics will be presented by members of the science and engineering community. The Space Design Competition problem is "Searching for Life on Europa." The Design Competition judging will take place at this special session. Winners will receive prizes at the STAIF-2000 luncheon, held Monday, January 31. The Space Design Competition is coordinated by **Jeff King**, UNM-ISNPS.

PUBLICATIONS

Available from UNM's Institute for Space and Nuclear Power Studies (Add $10 for shipping and handling within the U.S., $25 outside the U.S.)

Transactions of the 2nd - 5th Symposia (1985 - 1989).....$10.00 (each)
Transactions of the 6th Symposium (1989).....$15.00

Available from the American Institute of Physics, c/o Springer-Verlag New York, Customer Service, 1-800-777-4643, or e-mail order@springer-ny.com, or mail to Springer-Verlag, P. O. Box 2485, Secaucus, NJ 07096-2485 (Add $4.00 for shipping and handling for the first volume; plus $1.00 for each additional volume.)

•Proceedings of the 8th Symposium (1991) (3-vol. hardback set), ISBN # 0-88318-838-4 AIP Conf. Proc.#217.....$175.00
•Proceedings of the 9th Symposium (1992) (3-vol. hardback set), ISBN # 1-56396-027-3 AIP Conf. Proc, #246.....$225.00
•Proceedings of the 10th Symposium (1993) (3-vol. hardback set), ISBN # 156396-137-7 AIP Conf. Proc. #271.....$275.00
•A Critical Review of Space Nuclear Power & Propulsion (1984-1993) (Anniversary Issue), AIP Press, ISBN # 1-56396-3175....$ 75.00
•Proc. 12th Symposium on Space Nuclear Power & Propulsion, Conf. on Alternative Power from Space, & Conf. on Accelerator-Driven
•Transmutation Technologies & Applications (1995) (2-vol. hardback set) ISBN # 1-56396-427-9 AIP Conf. Proc.# 324 .....$225.00
•Proc. 1st Conf. on NASA Centers for Commercial Development of Space (1-vol. hardback book), ISBN # 1-56396-431-7 and AIP Conf. Proc. # 325.....$125.00
•Proc. Space Technology and Applications International Forum (STAIF-96): 1st Conf. on Commercial Development of Space; 1st Conf. on Next Generation Launch Systems, 2nd Spacecraft Thermal Control Symposium, and 13th Symposium on Space Nuclear Power & Propulsion (1996) (3-vol. hardback set), ISBN # 1-56396-562-3 AIP Conf. Proc.# 361.....$275.00
•Proc. Space Technology and Applications International Forum (STAIF-97): 1st Conf. on Future Science and Earth Science Missions; •1st Conf. on Synergistic Power and Propulsion Systems Technology; 1st Conf. on Applications of Thermophysics in Microgravity; 2nd Conf. on Commercial Development of Space; 2nd Conf. on Next Generation Launch Systems; 14th Symposium on Space Nuclear Power and Propulsion (1997) (3-vol. Hardback set), ISBN # 1-56396-679-4 AIP Conf. Proc # 387.....$295.00
•Proc. Space Technology and Applications International Forum (STAIF-98): 1st Conf. on Global Virtual Presence; 1st Conf. on Orbital Transfer Vehicles; 2nd Conf. on Applications of Thermophysics in Microgravity; 3rd Conf. on Commercial Development of Space; 3rd

Conf. on Next Generation Launch Systems; and 15th Symposium on Space Nuclear Power and Propulsion (1998) (3-vol. Hardback set), ISBN # 1-56396-747-2, AIP Conf. Proc. # 420…..……..……$320.00
•Proc. Space Technology and Applications International Forum (STAIF-99): Conference on ISS Utilization; Conf. on Global Virtual Presence; Conf. on Applications of Thermophysics in Microgravity & Breakthrough Physics;Conf. on Next Generation Launch Systems; 16th Symposium on Space Nuclear Power and Propulsion (1999), AIP Conf. Proc. No. 458, (2-vol. Hardback set), ISBN # 156396-846-0 ……..$300.00
CD-ROM Version, ISBN # 156396-879-7……..……$200.00

Publications available from Krieger Book Company, P. O. Box 9542, Melbourne, FL 32902-9542, Phone: (407) 724-9542
•Space Nuclear Power Systems (1984 - 1989)–set (limited to stock on hand)……..……..… $500.00

CONFERENCE REGISTRATION AND FEES

Albuquerque Hyatt Regency Hotel, 2nd Floor

Registration:	Sunday, January 30:	4:30 pm - 6:30 pm	Tuesday, February 1:	7:30 am - 4:30 pm
	Monday, January 31:	7:00 am - 5:00 pm	Wednesday, February 2:	7:30 am - 4:30 pm
			Thursday February 3:	7:30 am - 11:00 am

ALL ATTENDEES AND EXHIBITORS MUST REGISTER AND PAY A REGISTRATION FEE: Cash, corporate or personal checks, Visa and MasterCard will be accepted. Payment by a personal or corporate check should be made payable to: INSTITUTE FOR SPACE AND NUCLEAR POWER STUDIES, STAIF-2000 Conferences, Farris Engineering Center, Room 239, The University of New Mexico, Albuquerque, NM 87131-1341, (505) 277-2813 or (505) 277-0446.

	Early (postmarked on or before 1/12/2000)	**Late** (postmarked after 1/12/2000)
OPEN TECHNICAL MEETING(a)	$300.00	$375.00
ONE DAY REGISTRATION (b)	$200.00	$260.00
STUDENTS (c)	$90.00	$90.00
STUDENT (WITH PROCEEDINGS)	$135.00	$135.00
ADDITIONAL LUNCHEON TICKET(d)	$25.00	$30.00
ADDITIONAL RECEPTION TICKET(d)	$25.00	$30.00

(a) Open Technical Meeting Full Registration Fee: Includes Sessions, Monday Luncheon and Evening Reception, Tuesday Hospitality, daily coffee breaks, and a set of Proceedings on CD-ROM.
(b) One-Day Registration: Includes Technical Sessions, coffee breaks and a set of Proceedings CD-ROM. (Luncheon tickets are extra)
(c) Student Registration: **TO QUALIFY, INDIVIDUALS MUST SHOW PROOF OF FULL TIME ENROLLMENT** for the 2000 Spring Semester. Pre-registrants should enclose a copy of their 2000 spring schedules. Registration fee includes Sessions, Monday evening reception, and coffee breaks. (Luncheon tickets are extra.)
(d) Additional luncheon tickets can be purchased on-site if available.

CANCELLATIONS AND REFUNDS

Those unable to attend the conferences may receive a refund of their registration fee (less a 20% processing charge) by calling the Institute office at (505) 277-0446 or by email at: mjbragg@unm.edu no later than January 17, 2000. NO REFUNDS WILL BE ISSUED after JANUARY 17, 2000. All refunds will be made promptly by mail.

LUNCHEON

In addition to the reception, one luncheon ticket will be included with each full registration. A name badge will be appropriate admittance to the reception. Additional tickets must be purchased in advance. Please be certain both you and your guest have registered.

LUNCHEON: MONDAY, January 31, 2000, 11:45 pm – 1:45 pm, Grand Pavilion, Albuquerque Hyatt Regency Hotel.

LUNCHEON SPEAKER: Robert T. Mitchell, *Casini Program Manager*, Jet Propulsion Laboratory, Pasadena, CA.

RECEPTION

HOSTED RECEPTION: MONDAY, January 31, 2000, 7:00 pm – 8:30 pm, Grand Pavilion, Albuquerque Hyatt Regency

INDUSTRY HOSPITALITY: TUESDAY, February 1, 2000, 6:00 pm – 9:00 pm, Grand Pavilion and Prefunction Area, Albuquerque Hyatt Regency. Sponsored by: The Boeing Company, Teledyne Brown, Swales Aerospace, and UNM's Institute for Space & Nuclear Power Studies.

SESSION CHAIRS' AND SPEAKERS' BREAKFAST

All STAIF-2000 speakers and session chairs are requested to attend the Speakers' Breakfast on the day of their session or presentation to discuss the session arrangements and guidelines. The breakfast is hosted by UNM's Institute for Space and Nuclear Power Studies. The speakers' breakfast will be held Monday and Tuesday in Sendero I and II, Wednesday in the Enchantment Ballroom, and Thursday in the Grand Pavilion, at 6:45–7:45 am each morning.

AUDIO VISUAL EQUIPMENT

An overhead projector will be provided at all sessions. A slide projector will also be provided on request without charge. Additional A.V. equipment must be ordered through Institute personnel, in advance, and paid for by the author. Please call (505) 277-2813 with special requests.

SCHEDULE OF PROGRAM ACTIVITIES

SUNDAY, January 30, 2000

4:30 pm	-	6:30 pm	**Registration**, 2nd Floor, Albuquerque Hyatt Regency Hotel
6:00 pm	-	7:30 pm	**Steering Committee Meeting**, Sendero I, Albuquerque Hyatt Regency Hotel

MONDAY, January 31, 2000

6:45 am	-	7:45 am	***Speakers' Breakfast***, Sendero I, II, Albuquerque Hyatt Regency Hotel
7:00 am	-	5:00 pm	**Registration**, 2nd Floor, Albuquerque Hyatt Regency Hotel
7:30 am	-	8:00 am	**Secondary School Special Session Registration**, Fiesta Ballroom, Albuquerque Hyatt Regency Hotel
8:00 am	-	8:20 am	**Welcome and Opening Remarks**, Grand Pavilion, Albuquerque Hyatt Regency Hotel
8:00 am	-	11:45 am	**Secondary School Special Session**, Fiesta Ballroom, Albuquerque Hyatt Regency Hotel
8:20 am	-	10:00 am	**Plenary Session I**, Grand Pavilion, Albuquerque Hyatt Regency Hotel
10:00 am	-	10:25 am	**Press Conference**, Enchantment E & F, Albuquerque Hyatt Regency Hotel
10:00 am	-	10:25 am	***Coffee Break***, Prefunction Area, Albuquerque Hyatt Regency Hotel
10:25 am	-	11:45 am	P**lenary Session II**, Sendero Ballroom, Albuquerque Hyatt Regency Hotel
11:45 am	-	1:45 pm	***Awards Luncheon***, Grand Pavilion and Prefunction Area, Albuquerque Hyatt Regency Hotel
1:45 pm	-	3:45 pm	**Conference Opening Sessions** (see table of contents or centerfold for time and room)
1:45pm	-	3:45 pm	NASA Space Grant Session, Enchantment C & D
3:45 pm	-	4:00 pm	***Coffee Break***, Grand Pavilion and Prefunction, Albuquerque Hyatt Regency Hotel
4:00pm	-	5:00 pm	NASA Space Grant Session, Enchantment C & D
4:00 pm	-	6:00 pm	**Technical Sessions** (see table of contents or centerfold for time and room)
6:00 pm	-	7:00 pm	**Hardware, Multimedia Display Session**, Fiesta Room, Albuquerque Hyatt Regency Hotel
7:00 pm	-	8:30 pm	***Conference Reception (no host bar)***, Grand Pavilion and Prefunction Area

TUESDAY, February 1, 2000

6:45 am	-	7:45 am	***Speakers' Breakfast***, Sendero I, II, Albuquerque Hyatt Regency Hotel
7:30 am	-	4:30 pm	**Registration**, 2nd Floor, Albuquerque Hyatt Regency Hotel
8:00 am	-	9:45 am	**Plenary Session III**, Grand Pavilion, Albuquerque Hyatt Regency Hotel
9:45 am	-	10:15 am	***Coffee Break***, Prefunction Area, Albuquerque Hyatt Regency Hotel
10:15 am	-	12:15 pm	**Technical Sessions** (see table of contents or centerfold for time and room)
12:15 pm	-	1:15 pm	***Lunch Break*** and **Technical Program Committee Meetings, Albuquerque Hyatt Regency Hotel** **Conference on International Space Station Utilization**, Sendero I, 1st Floor **Conference on Thermophysics in Microgravity**, Sage I I, 1st Floor **Conference on Enabling Technology and Required Scientific Developments for Interstellar Missions**, Retail Room, 1st Floor **Conference on Commercial/Civil Next Generation Space Transportation**, Enchantment E & F **17th Symposium on Space Nuclear Power and Propulsion**, Enchantment C & D
1:15 pm	-	3:15 pm	**Technical Sessions** (see table of contents or centerfold for time and room)
3:15 pm	-	3:30 pm	***Coffee Break***, Grand Pavilion and Prefunction Area, Hyatt Regency Hotel
3:30 pm	-	5:30 pm	**Technical Sessions** (see table of contents or centerfold for time and room)

6:00 pm	-	9:00 pm	***Industry-Sponsored Hospitality***, Grand Pavilion and Prefunction Area

WEDNESDAY, February 2, 2000

6:45 am	-	7:45 am	***Speakers' Breakfast***, Enchantment Ballroom, Albuquerque Hyatt Regency Hotel
7:30 am	-	4:30 pm	**Registration**, 2nd Floor, Albuquerque Hyatt Regency Hotel
8:00 am	-	9:45 am	**Plenary Session IV**, Grand Pavilion, Albuquerque Hyatt Regency Hotel
9:45 am	-	10:15 am	***Coffee Break***, Prefunction Area, Albuquerque Hyatt Regency Hotel
10:15 am	-	12:15 pm	**Technical Sessions** (see table of contents or centerfold for time and room)
12:15 pm	-	1:15 pm	***Lunch Break***
12:15 pm	-	1:15 pm	**Advisory Committee Meeting,** Sage II , 1st Floor (lunch available for purchase to carry in)
1:15 pm	-	3:15 pm	**Technical Sessions** (see table of contents or centerfold for time and room)
3:15 pm	-	3:30 pm	***Coffee Break***, Grand Pavilion and Prefunction Area, Albuquerque Hyatt Regency Hotel
3:30 pm	-	5:30 pm	**Technical Sessions** (see table of contents or centerfold for time and room)
5:45 pm	-	7:15 pm	**Special Session: The Commercial Space Act – One Year Later** Grand Pavillion, Albuquerque Hyatt Regency Hotel
7:30 pm	-	9:00 pm	**Executive Technical Program Committee**, Sage II, 1st Floor, Albuquerque Hyatt Regency Hotel

THURSDAY, February 3, 2000

6:45 am	-	7:45 am	***Speakers' Breakfast***, Grand Pavilion, Albuquerque Hyatt Regency Hotel
7:30 am	-	11:00 am	**Registration**, 2nd Floor, Albuquerque Hyatt Regency Hotel
8:00 am	-	10:00 am	**Technical Sessions** (see table of contents or centerfold for time and room)
10:00 am	-	10:15 am	***Coffee Break***, Grand Pavilion and Prefunction Area, Albuquerque Hyatt Regency Hotel
10:15 am	-	12:15 pm	**Technical Sessions** (see table of contents or centerfold for time and room)

COMMITTEE MEETINGS

STEERING COMMITTEE

SUNDAY, JANUARY 30, 6:00 pm – 7:30 pm, Sendero I, Albuquerque Hyatt Regency Hotel

TECHNICAL PROGRAM COMMITTEES

TUESDAY, February 1, 12:15 pm – 1:15 pm, Albuquerque Hyatt Regency Hotel
(All Session Chairs and Co-Chairs are committee members of their respective conferences. Lunch available for purchase.)

- **Conference on International Space Station Utilization**, Sendero I, Albuquerque Hyatt Regency Hotel
- **Conference on Thermophysics in Microgravity**, Sage II , 1st Floor, Albuquerque Hyatt Regency Hotel
- **Conference on Enabling Technology and Required Scientific Developments for Interstellar Missions**, Retail Room, 1st Floor, Albuquerque Hyatt Regency Hotel
- **Conference on Commercial/Civil Next Generation Space Transportation**, Enchantment E & F, Albuquerque Hyatt Regency Hotel
- **17th Symposium on Space Nuclear Power and Propulsion**, Enchantment C & D, Albuquerque Hyatt Regency Hotel

ADVISORY COMMITTEE

WEDNESDAY, February 2, 12:15 pm – 1:15 pm, Sage II 1st Floor, Albuquerque Hyatt Regency Hotel
(Lunch available for purchase to carry in.)

STAIF EXECUTIVE TECHNICAL PROGRAM COMMITTEE

WEDNESDAY, February 2, 7:30 pm – 9:00 pm, Sage II, 1st Floor, Albuquerque Hyatt Regency Hotel
(Hosted Dinner)

PLENARY SESSION III: HUMAN PHYSIOLOGY IN SPACE

TUESDAY, FEBRUARY 1, 8:00 am – 9:45 am
Albuquerque Hyatt Regency Hotel, Grand Pavilion

Laurence R. Young, Co-Chair
Director
National Space Biomedical Research Institute
Massachusetts Institute of Technology
Cambridge, MA

Ronald J. White, Co-Chair
Associate Director
National Space Biomedical Research Institute
Baylor College of Medicine
Houston, TX

Human Space Flight: Medical Challenges
David R. Williams, M.D., Director, Space & Life Sciences, NASA Johnson Space Center, Houston, TX
Meeting the Challenges of Space Flight Through the National Space Biomedical Research Institute (NSBRI)
Laurence R. Young, Sc.D., Director, NSBRI, Massachusetts Institute of Technology
Space Flight Instrumentation and Technology Development at the NSBRI
Vincent L. Pisacane, Ph.D., Technology Development Team Leader, NSBRI, Johns Hopkins University/APL

PLENARY SESSION IV: INTERNATIONAL PANEL ON COLLABORATION IN THE USE OF THE INTERNATIONAL SPACE STATION

WEDNESDAY, FEBRUARY 2, 8:00 am – 9:45 am
Albuquerque Hyatt Regency Hotel, Grand Pavilion

Kathryn Clark, Chair
Space Station Senior Scientist
NASA Headquarters
Washington, DC

Roger Crouch, NASA Headquarters, Washington, DC
Andrew Eddy, Canadian Space Agency, Quebec, Canada
Roger Binot, Biotechnology Applications Coordinator, Directorate of Manned Spaceflight and Microgravity, European Space Agency
Susumu Yoshitomi, Deputy Director, Space Utilization Research Center, Office of Space Utilization Systems, Ibaraki, Japan

OUTREACH ACTIVITIES
SECONDARY SCHOOL SPECIAL SESSION

MONDAY, JANUARY 31, 8:00 am – 11:45 am, Fiesta Room, Albuquerque Hyatt Regency Hotel

Irene L. El-Genk, Chair
West Mesa High School
Albuquerque, NM

Jeff King, Co-Chair
UNM-ISNPS
Albuquerque, NM

Welcome
Irene El-Genk, West Mesa High School, Albuquerque, NM
NASA Space Grant Program
Julius Dasche, NASA Headquarters, Washington, DC
Judging of the Secondary School Space Design Competition
Jeff King, UNM-ISNPS, Albuquerque, NM
View STAIF-2000 Exhibits
Announcement of Space Design Competition Winners
Jeff King, UNM-ISNPS, Albuquerque, NM
NASA Astronaut, NASA Johnson Space Center, Houston, TX

SPECIAL SESSION: THE COMMERCIAL SPACE ACT – ONE YEAR LATER

WEDNESDAY, FEBRUARY 2, 5:45 pm – 7:15 pm, Grand Pavilion Ballroom, Albuquerque Hyatt Regency

Mark Uhran, Chair
NASA Headquarters
Washington, DC

International Space Station Commercial Development Plan – One Year Progress Report
Mark Uhran, NASA Headquarters, Washington, DC
Registration and Disposition Process for International Space Station Entrepreneurial Offers
Lance Bush, NASA Headquarters, Washington, DC
International Space Station Intellectual Property Protection
Marguerite Broadwell, NASA Headquarters, Washington, DC
International Space Station Pricing Policy
Chris Flaherty and Lance Bush, NASA Headquarters, Washington, DC
Annual Report of the NASA Commercial Space Centers
Mark Nall, NASA Marshall Space Flight Center, Huntsville, AL

CONFERENCE OPENING SESSIONS

MONDAY, JANUARY 31, 2000

CONFERENCE ON INTERNATIONAL SPACE STATION UTILIZATION

RESEARCH CAPABILITIES OF THE INTERNATIONAL SPACE STATION

MONDAY, JANUARY 31, 1:45 pm – 3:45 pm, Sendero Ballroom III

John-David Bartoe, Co-Chair
NASA Johnson Space Center
Houston, TX

Rick Nygren, Co-Chair
NASA Johnson Space Center
Houston, TX

Research Plans for the International Space Station – Research Begins This Year!
John-David F. Bartoe, NASA Johnson Space Center, Houston, TX
The ISS EXPRESS Rack: An Innovative Approach for Rapid Integration
Annette Sledd, NASA Marshall Space Flight Center, Huntsville, AL
Launch Site Processing of Payloads for the International Space Station
Maynette Smith, NASA Kennedy Space Center, Kennedy Space Center, FL
Payload Operations and TeleScience on the International Space Station
Rickey D. Cissom and Barbara J. Cobb, NASA Marshall Space Flight Center, Huntsville, AL; Kristi S. Ramage, Teledyne Brown Engineering, Huntsville, AL

CONFERENCE ON THERMOPHYSICS IN MICROGRAVITY

ROUND TABLE ON SPECIALS

MONDAY, JANUARY 31, 1:45 pm – 3:45 pm, Enchantment Ballroom E & F

Ted Swanson, Chair
NASA Goddard Space Flight Center
Greenbelt, MD

Ad Delil, Co-Chair
NLR Space Division
Ad Emmeloord, Netherlands

CONFERENCE ON ENABLING TECHNOLOGY AND REQUIRED SCIENTIFIC DEVELOPMENTS FOR INTERSTELLAR MISSIONS

MONDAY, JANUARY 31, 1:45 pm – 3:45 pm, Enchantment Ballroom A & B

Les Johnson, Program Chair
NASA Marshall Space Flight Center
Huntsville, AL

Marc Millis, Program Co-Chair
NASA Glenn Research Center
Cleveland, OH

Overview of the Interstellar Probe Project
Sarah Gavit, Jet Propulsion Laboratory, Pasadena, CA
Overview of the Interstellar Propulsion Research
Les Johnson, NASA Marshall Space Flight Center, Huntsville, AL
Update of the Breakthrough Propulsion Physics Project
Marc Millis, NASA Glenn Research Center, Cleveland, OH

CONFERENCE ON COMMERCIAL/CIVIL NEXT GENERATION SPACE TRANSPORTATION

MONDAY, JANUARY 31, 1:45 pm – 3:45 pm, Sendero Ballroom II

William A. Gaubatz, Program Co-Chair
Universal Space Lines, Inc.
Newport Beach, CA

Lori Garver, NASA Headquarters, Washington, DC
Karen Poniatowski, NASA Headquarters, Washington, DC
Jess Sponable, Universal Space Lines, Inc., Newport Beach, CA
Paul Birkeland, Kistler Aerospace, Los Angeles, CA
Hector J. Cuellar, Banc of America Securities LLC, Los Angeles, CA
Row Rogacki, Space Transportation, NASA Marshall Space Flight Center, Huntsville, AL
Bill Dettmer, New Mexico Space Commission, Albuquerque, NM

17TH SYMPOSIUM ON SPACE NUCLEAR POWER AND PROPULSION

MONDAY, JANUARY 31, 1:45 pm – 3:45 pm, Sendero Ballroom I

Michael G. Houts, Program Chair
LANL / NASA Marshall Space Flight Center
Los Alamos, NM

Robert Wiley, Program Co-Chair
Booz-Allen & Hamilton
Arlington, VA

Franklin Chang-Diaz, NASA Johnson Space Center, Houston, TX
Bob Sackheim, NASA Marshall Space Flight Center, Huntsville, AL

TECHNICAL SESSIONS
MONDAY, JANUARY 31, 2000

[B01] FUNDAMENTALS OF TWO-PHASE FLOW AND HEAT TRANSFER IN MICROGRAVITY

MONDAY, JANUARY 31, 4:00 pm – 6:00 pm, Sage I, 1st Floor

FREDERICK BEST, Chair
Texas A & M University
College Station, TX

AD DELIL, Co-Chair
NLR Space Division
Ad Emmeloord, Netherlands

Air-Water Two-Phase Flow in a 3-mm Horizontal Tube
Ing Youn Chen, National Yunlin University of Science and Technology, Taiwan; Yu-Juei Chang and Chi-Chung Wang, Energy & Resources Laboratories Industrial Technology Research Institute, Hsinchu, Taiwan

Critical Boiling Phenomena Observed in Microgravity
Yves Garrabos, Carole Lecoutre-Chabot, and Regis Wunenburger, Institut de Chimie de la Matière Condensée de Bordeaux, Centre National de la Recherche Scientifique, Universite de Bordeaus, Pessac Cedex, France; John Hegseth, University of New Orleans, New Orleans, LA; Daniel Beysens, Service des Basses Temperatures, Departement de Recherche Fondamentale sur la Matière Condensée, Commissariat à l'Energie Atomique, Grenoble Cedex, France

Overview of Pool Boiling Heat Transfer Studies in Variable Gravity
Patricia Arlabosse, École des Mines d'Albi Carmaux, Albi CT Cedex, France; Christelle Reynard and Lounes Tadrist, I.U.S.T.I., Marseille Cedex, France

Dynamics of Bubble Growth on a Heated Surface Under Low Gravity Conditions
D.M. Qiu, S. Singh, and V.K. Dhir, University of California Los Angeles, Los Angeles, CA

[A01] SPACE STATION INNOVATION DEVELOPED THROUGH THE SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM

MONDAY, JANUARY 31, 4:00 pm – 6:00 pm, Sendero Ballroom I

VITA CEVENINI, Co-Chair
NASA Headquarters
Washington, DC

HELEN STINSON, Co-Chair
NASA Marshall Space Flight Center
Huntsville, AL

The NASA Light-Emitting Diode Medical Program – Progress in Space Flight and Terrestrial Applications
Ron Ignatius, Quantum Devices, Barneveld, WI; Harry Whelan, Medical College of Wisconsin, Milwaukee, WI

Fabrication and Bonding of Large Composite Structures with Electron Beam Curing
Daniel Goodman, Science Research Laboratory, Somerville, MA

Commercial Biotechnology Processing Thermal Control for Transfer Payloads to/from the International Space Station
Mace Jennings IV, John C. Vellinger, and Mark S. Deuser, Space Hardware Optimization Technology, Inc., Floyd Knobs, IN

A Scanned Heterodyne Interferometer for Crystal Growth Rate Measurement
Amit Lal and James Trolinger, MetroLaser, Inc., Irvine, CA; Mark Pusey, NASA Marshall Space Flight Center, Huntsville, AL

Applying X-Ray Topography & Diffractometry to Improve Protein Crystal Growth
David Black, NIST Ceramics Division, Gaithersburg, MD; Travis Gallagher, NIST Biotechnology Division, Gaithersburg, MD; Leonard Arnowitz, BioSpace International, Gaithersburg, MD

Virtual Environment for Design and Analysis of Vapor Transport Crystal Growth Processes
Ani Worlikar, M. R. Overholt, and Shariar Motakef, Cape Simulations, Inc., Newton, MA

[A02] PAYLOAD OPERATIONS ON THE INTERNATIONAL SPACE STATION

MONDAY, JANUARY 31, 4:00 pm – 6:00 pm, Sendero Ballroom III

KATHY E. SCHUBERT, Co-Chair
NASA Glenn Research Center
Cleveland, OH

ROBERT W. JACKSON, Co-Chair
NASA Ames Research Center
Moffett Field, CA

MSFC MDL and TSC Operations Concepts
Larry A. Bauer and Cynthia L. Frost, NASA Marshall Space Flight Center, Huntsville, AL

The Telescience Support Center at NASA Ames Research Center
Robert W. Jackson and Paul Savage, NASA Ames Research Center, Moffett Field, CA

Ames Research Center Telescience Support Center (TSC) Capabilities
Kaiser Adeni and Lou Picinich, NASA Ames Research Center, Moffett Field, CA

Operational Methodology for the International Space Station (ISS) High Rate Communications Outage Recorder (HCOR)
C. David Mixson, POIC Data Management, Marshall Space Flight Center, Huntsville, AL

Development of Operations Teams for the ISS Payload Operations Integration Center
Timothy J. Horvath and Wesley S. Beaver, Teledyne Brown Engineering, Huntsville, AL

~~***Concepts for Low Cost Telescience on the ISS***~~
~~Horst Engelke, DaimlerChrysler Aerospace (DASA) Space Infrastructure, Bremen, Germany; Holger Oelze, ZARM-Fab, Bremen, Germany; Richard Sethmann, OHB System GmbH, Bremen, Germany~~

The Telescience Support Center at NASA Glenn Research Center
Kathy Schubert, NASA Glenn Research Center, Cleveland, OH

[D01] MARKETS-PRESENT AND FUTURE

MONDAY, JANUARY 31, 4:00 pm – 6:00 pm, Sendero Ballroom II

LORI GARVER, Chair
NASA Headquarters
Washington, DC

Future Use of America's Space Launch Bases and Ranges
Vic Villhard, The White House, OSTP, Washington, DC

Expansion of Future Low-Earth Orbit Commercial Markets
Laura A. Schoppe, Research Triangle Institute, Research Triangle Park, NC

The Space Taxi™ Transportation System
Douglas Stanley, Orbital Sciences Corporation, Dulles, VA

Launch Cost Impacts on Chemical Versus Nuclear Propulsion for Piloted Mars Missions
Robert H. Frisbee, Jet Propulsion Laboratory, Pasadena, CA

Transportation Needs for Space Solar Power
David Maynard and Ned Ferraro, Jet Propulsion Laboratory, Pasadena, CA

Potential Impacts of Low-Cost Launch Vehicles on Deep-Space Missions
John R. Brophy, Jet Propulsion Laboratory, Pasadena, CA

[E01] POTENTIAL MANNED AND UNMANNED MISSIONS

MONDAY, JANUARY 31, 4:00 pm – 6:00 pm, Enchantment Ballroom E & F

GEORGE SCHMIDT, Chair
NASA Marshall Space Flight Center
Huntsville, AL

RON LIPINSKI, Co-Chair
Sandia National Laboratories
Albuquerque, NM

Future Planetary Missions Potentially Requiring Radioisotope Power Systems
Jack F. Mondt and Bill J. Nesmith, Jet Propulsion Laboratory, Pasadena, CA

Exploring the Ocean of Europa: Reactor or RHU?
David Poston and Andrei Belooussov, Los Alamos National Laboratory, Los Alamos, NM

Utilizing Fission Technology to Enable Rapid and Affordable Access to any Point in the Solar System

Mike Houts, Joe Bonometti, Jeff Morton, Ivana Hrbud, Leo Bitteker, Melissa Van Dyke, Tom Godfroy, Kevin Pedersen, Chris Dobson, Bruce Patton, James Martin, and Suman Chakrabarti, NASA Marshall Space Flight Center, Huntsville, AL

The Ph-D Project: Manned Expedition to the Moons of Mars

S. Fred Singer, Science and Environmental Policy Project, Fairfax, VA

NEP for a Kuiper Belt Object Rendezvous Mission

Ronald J. Lipinski, Roger X. Lenard, and Steven A. Wright, Sandia National Laboratories, Albuquerque, NM; Michael G. Houts and Bruce Patton, Marshall Space Flight Center, Huntsville, AL; and David I. Poston, Los Alamos National Laboratory, Los Alamos, NM

[C01] INTERSTELLAR MISSION CONCEPTS

MONDAY, JANUARY 31, 4:00 pm – 6:00 pm, Enchantment Ballroom A & B

SARAH A. GAVIT, Chair
Jet Propulsion Laboratory
Pasadena, CA

JAMES LING, Co-Chair
NASA Headquarters
Washington, DC

NASA's Interstellar Probe Mission

P.C. Liewer, J.A. Ayon, R.A. Wallace, Jet Propulsion Laboratory, Pasadena, CA; R.A. Mewaldt, California Institute of Technology, Pasadena, CA

A Realistic Interstellar Explorer

R. L. McNutt, Jr., G.B. Andrews, J. McAdams, R.E. Gold, A. Santo, D. Oursler, K. Heeres, M. Fraeman, and B. Williams, The John Hopkins University Applied Physics Laboratory, Laurel, MD

The Science Case for In-Situ Sampling of Kuiper Belt Objects

Emma Bakes, NASA Ames Research Center, Moffett Field, CA

The Quest for Interstellar Exploration

Richard A. Wallace and Juan A. Ayon, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA

HARDWARE, MULTIMEDIA DISPLAY SESSION

MONDAY, January 31, 6:00 pm – 7:00 pm, Fiesta Ballroom

FRED BEST, Co-Chair	**JIM FOUNTAIN, Co-Chair**	**JOHN COLE, Co-Chair**	**MOHAMED EL-GENK, Co-Chair**
Texas A&M	The Boeing Company	NASA Marshall Space	The University of New Mexico
College Station, TX	Huntsville, AL	Flight Center	Institute for Space & Nuclear Power
		Huntsville, AL	Albuquerque, NM

Search for a Correlation Between Josephson Junctions and Gravity

Glen A. Robertson, NASA, Marshall Space Flight Center, Huntsville, AL

This presentation will address the experimental apparatus being designed and built to test a correlation between Josephson Junctions and Gravity. The apparatus is being built around a Cavendish Balance, which will be automated and modified to test superconductor samples for a gravity effect.

Commercial Combustion Research: ISS Hardware and Commercial Products

F.D. Schowengerdt, Colorado School of Mines, Golden, CO

The Center for Commercial Applications of Combustion in Space (CCACS), at the Colorado School of Mines, collaborates with industry to develop products and processes through combustion research in space. The display depicts the Space DRUMS™ hardware, which will also go to ISS on UF-1, along with a new camera developed in CCACS.

Experiments in the Microgravity Glovebox Facility

Frank R. Juretzko, University of Alabama, Huntsville, AL

The Particle Engulfment and Pushing experiment evaluated the critical velocity of engulfment of particles by a planar solid/liquid interface. The samples contained organic transparent metal-analogue materials, which allowed for *in-situ* observation of the particle/interface interaction in *real-time* through video downlink. Presentation includes video samples of events, crew training, and results.

Summary By the Quark Search Group for the Hardware Multimedia Display Session At Space Technology and Applications International Forum

Paul Hudspeth, Georgetown High School, Georgetown, TX

A brief history of the project will be presented by video and poster board display. These media displays will illustrate original experiments performed by Robert Millikan in 1911 regarding his Nobel Prize-winning experiment up to the present, in which The

Quark Search Group has performed experiments on board the KC-135 airplane.

The Soft Stowage® Catalog: A New Approach to Procuring Space Qualified Hareware

David A. Smith, Boeing Space Lab Program, Huntsville, AL

To meet the objective of significantly reducing the cost and time to get payload to the International Space Station, Boeing has developed a comprehensive commercial catalog that offers users fixed pricing and expedited delivery terms for the Soft Stowage® Human Space Logistics System. Evaluation of the long-term viability of a catalog approach to human space products continues.

~~***Spaceborne and Ground Thermal Infrared Observations Provide a Firm Basis for the Space Station FireMapper***~~

~~James W. Hoffman, Space Instruments, Inc., Encinitas, CA; Philip J. Riggan, USDA Forrest Services, Pacific Southwest Research Station, Riverside, CA; James A. Brass, NASA Ames Research Center, Moffett Field, CA~~

ISS Qualified Thermal Carrier Equipment

Mark S. Deuser, John C. Vellinger, and Wm. M. Jennings IV, Space Hardware Optimization Technology, Inc., Floyd Knobs, IN

SHOT specializes in developing automated equipment for conducting tele-operated bioscience research in space. This includes equipment for: 1) separating bio-materials through phase partitioning, electrokinetic fields and electromagnetic fields; 2) growing cells, protein crystals, and microcapsules; 3) conducting avian and rodent research; and 4) supporting experiments requiring precise thermal control.

Texas A&M Vortex Type Phase Separator

Frederick Best, Texas A&M University, Department of Nuclear Engineering, NASA Commerical Center for Space Power, College Station, TX

The Texas A&M phase separator relies on centripetal driven buoyancy forces to form a gas-liquid vortex within a fixed cylinder. Two-phase flow is injected tangentially producing a radial acceleration gradient. The gradient produces a rotating flow that drives the buoyancy process by the production of a hydrostatic pressure gradient.

Heatpipe Power System Design and Fabrication

Dave Poston, Deborah Bennett and Bob Reid, Los Alamos National Laboratory, University of California, U.S. Department of Energy, Los Alamos, NM

Development of Nuclear Systems at a Non-Nuclear Facility

Melissa Van Dyke, Tom Godfroy, Mike Houts, Ricky Dickens, Chris Dobson, and Kevin Pedersen, NASA Marshall Space Flight Center, Huntsville, AL

This combination hardware and poster session will focus on ongoing experimental efforts to make space nuclear power and propulsion a reality. The session will include hardware displays related to first-generation fission systems, advanced fission systems, and other reasearch activities related to space nuclear power and propulsion.

GAISUS Planar Thermionic Converter

Les Begg, Hal Streckert, and Jean-Louis Desplat, General Atomics, San Diego, CA

Vehicle and Mission Design Features for Future Human Mars Exploration Using "Bimodal" NTR Propulsion

Stanley K. Borowski, NASA Glenn Research Center, Cleveland, OH

VASIMR Thruster Development Status

Franklin Chang-Diaz and/or Greg Chavers, NASA Johnson Space Center, Houston, TX

SmarTSP

Joan Pallix, NASA Ames Research Center, Moffett Field, CA

A rapid inspection method for Thermal Protection Systems using embedded sensors and wireless technology.

Direct Gain Solar Thermal Propulsion Systems

Harold Gerrish, NASA Marshall Space Flight Center, Huntsville, AL

TECHNICAL SESSIONS
TUESDAY, FEBRUARY 1, 2000

[B02] EMERGING THERMAL CONTROL TECHNOLOGIES FOR FUTURE SPACECRAFT – I
TUESDAY, FEBRUARY 1, 10:15 am – 12:15 pm, Sage II, 1st Floor

WALTER BIENERT, Chair
Dynatherm Corporation
Cockeysville, MD

DAN BUTLER, Co-Chair
NASA Goddard Space Flight Center
Greenbelt, MD

Design of Experiments for Thermal Protection System Process Optimization
Hans R. Longani, United Space Alliance, Kennedy Space Center, FL

Feasibility Investigation on Potential Working Fluids for Electrohydrodynamically-Assisted CPLs
B. Mo, M.M. Ohadi, and S.V. Dessiatoun, M. Molki, University of Maryland, College Park, MD

Thermal Analysis of International Space Station Freeze-Tolerant Early External Active Thermal Control System Radiators
Kambiz K. Andish, Lockheed Martin Space Operations, Houston, TX; Ing Youn Chen, National Yunlin University of Science and Technology, Taiwan

Multi-Evaporator Loop Heat Pipe
Konstantin A. Goncharov, Oleg A. Golovin and Vladimir Kolesnikov, TAIS Ltd., Moscow, Russia

Cryogenic Thermal Diodes
Brandon R. Paulsen, J.C. Batty and John Agren, Space Dynamics Laboratory, North Logan, UT

[A03] SPACE SCIENCES ON THE INTERNATIONAL SPACE STATION: SUB-SESSION I
TUESDAY, FEBRUARY 1, 10:15 am – 12:15 pm, Sendero Ballroom I

EUN-SUK SEO, Co-Chair
University of Maryland
College Park, MD

BETSY PARK, Co-Chair
NASA Goddard Space Flight Center
Greenbelt, MD

GIORGIO PALUMBO, Co-Chair
University of Bologna
Bologna, Italy

NASA Office of Space Science Plans for Selecting and Funding ISS Payloads
W. Vernon Jones, NASA Headquarters, Washington, DC

Accommodations for External Payloads on the International Space Station
Betsy Park, NASA Goddard Space Flight Center, Greenbelt, MD; Stephen A. Voels and Dean B. Eppler, NASA Johnson Space Center, Houston, TX

Alpha Magnetic Spectrometer (AMS) on the ISS
Roberto Battiston, Dipartimento di Fisica and INFN, Perugia, Italy

The ACCESS Experiment for the International Space Station
Simon Swordy, University of Chicago, Chicago, IL

EXIST: A High Sensitivity Hard X-ray Imaging Sky Survey Mission for ISS
Jonathan E. Grindlay, Tomohiko Narita, Peter F. Bloser, Johnathan A. Jenkins, and Marshall Perrin, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA

SPOrt: a Project for Radio Polarimetry from the International Space Station
Stefano Cortiglioni, Ettore Carretti, Michele Orsini, ITeSRE/CNR, Bologna, Italy; Alessandro Orfei, Jader Monari, IRA/CNR VLBI Radioastronomical Station of Medicina, Bologna, Italy; Roberto Fabbri, Dip. Fisica, University Firenze, Firenze, Italy; Giorgio Sironi, Giuliano Boella, Mario Zannoni, Dip. Fisica University Milano, Milano, Italy; Riccardo Tascone, IRITI/CNR c/o Dip. Elettronica Politecnico di Torino, Torino, Italy; Umberto Pisani, Dip. Elettronica Politecnico di Torino, Torino, Italy; Luciano Nicastro, IFCAI/CNR, Palermo, Italy; Kin-Wang Ng, Institute of Physics, Academia Sinica, Tapei, Taiwan, R.O.C.

AMICA, Astro Mapper for Instrument Check of Attitude
P. Trampus, Center for Advanced Research in Space Optics, Trieste, Italy; R. Stalio, University of Trieste, Trieste, Italy; S. Cortiglioni, ITeSRE CNR, Bologna, Italy

[A04] LAUNCH SITE INTEGRATION OF PAYLOADS FOR INTERNATIONAL SPACE STATION

TUESDAY, FEBRUARY 1, 10:15 am – 12:15 pm, Sendero Ballroom III

SHANNON BARTELL, Co-Chair
NASA Kennedy Space Center
Kennedy Space Center, FL

MAYNETTE SMITH, Co-Chair
NASA Kennedy Space Center
Kennedy Space Center, FL

Advanced Planning for ISS Payload Ground Processing
Kimberly A. Page, The Boeing Company, Kennedy Space Center, FL

Satisfying Payload Customer Requirements at the Launch Site
Neal Van Scyoc, The Boeing Company, Kennedy Space Center, FL

ISS Payload Launch Site Capabilities and Processing Flow
JoAnn Archer, NASA Kennedy Space Center, Kennedy Space Center, FL

ISS Ground Processing Late and Early Access Capabilities
Johnny Mathis and Jeff Traylor, NASA Kennedy Space Center, Kennedy Space Center, FL

Launch and Landing Site Science Processing for ISS Utilization
Mimi Shao, Jacqueline van Twest, Oliver van den Ende, Doug Gruendel, and Deborah Wells, Jerry Moyer, The Bionetics Corporation, Kennedy Space Center, FL; Jan Heuser, Guy Etheridge, NASA Kennedy Space Center, Kennedy Space Center, FL

Advanced Payload Processing into the 21st Century
Craig Jacobson, Robert Yaskovic, Joanna Johnson, NASA Kennedy Space Center, Kennedy Space Center, FL

[A05] BIOMEDICAL RESEARCH ON THE INTERNATIONAL SPACE STATION: SUB-SESSION I - HUMAN REACTIONS TO SPACEFLIGHT

TUESDAY, FEBRUARY 1, 10:15 am – 12:15 pm, Sendero Ballroom II

CHARLES SAWIN, Co-Chair
NASA Johnson Space Center
Houston, TX

SUZANNE SCHNEIDER, Co-Chair
NASA Johnson Space Center
Houston, TX

Radiation Measurements on Shuttle/MIR Missions
Guenther Reitz, German Aerospace Center, Köln, Germany; Rudolf Beaujean, Universitat Kiel, Experimentelle und Angewandte Physik, Kiel, Germany; Sandor Deme, KFKI Atomic Energy Research Institute, Budapest, Hungary; Wolfgang Heinrich, Universitat GH Siegen, Siegen, Germany; Joachim Kopp, Universitat Kiel, Experimentelle und Angewandte Physik, Kiel, Germany; Marlies Luszik-Bhadra, Physikalisch-Technische Bundesanstalt, Braunschweig, Germany; Karsten Strauch, RWTH Aachen, Lehrstuhl fur Flugmedizin, Aachen, Germany

A Proposal for the Integration of a Behavioural and Performance Research Program into ISS Operations
David M. Musson, University of Texas, Austin TX

Fingertip Communication: A Tactile Communication Device for a Glove
Gilbert R. Gonzales, Sloan-Kettering Cancer Center, New York, NY; Gary Gust, Micronix Surgical Inc., Cleveland, OH; and Kenneth Hughes, Cornerstone Solutions, Inc., Pataskala, OH

Measurement of Muscle Actions and Foot Reaction Forces from Crew Members During Entire Working Days on the International Space Station (ISS)
Jess G. Snedeker and Peter R. Cavanagh, Penn State University, University Park, PA

Biomedical Research on the International Space Station Postural and Manipulation Problems of the Human Upper Limb in Weightlessness
Gianluca Neri and V. Zolesi, Kayser Italia S.r.l., Livorno, Italy

International Hardware Development for Human Life Science Research on the International Space Station
David Baumann, NASA Johnson Space Center, Houston, TX

[D02] CONTINUED EVOLUTION AND UP-GRADING OF TODAY'S FLEETS

TUESDAY, FEBRUARY 1, 10:15 am – 12:15 pm, Enchantment Ballroom E & F

KAREN PONIATOWSKI, Chair
NASA Headquarters
Washington, DC

ROCKOT – An Available Launch System for Affordable Access to Space
U. de Vries, M. Kinnersley, and P. Freeborn, EUROCKOT Launch Services GmbH, Bremen, Germany
The ARIANE 5 Launch Vehicle Family
Jacques Breton, Arianespace Inc., Washington, DC
Focusing International Launch Services Products Toward Future Needs
Richard C. Waterman, Director, Mission Development International Launch Services, San Diego, CA
Status of the Delta IV Launch System Development Program
Frank A. Slazer**,** Director, US Government Sales, Delta Launch Services, The Boeing Company
Space Shuttle Upgrade Plan
Andrew Allen and Jeffrey A. Siders, United Space Alliance, Houston, TX

[E11] FUELS AND ADVANCED MATERIALS

TUESDAY, FEBRUARY 1, 10:15 am – 12:15 pm, Enchantment Ballroom C & D

SAMIT BHATTACHARYYA, Chair
Argonne National Laboratory
Argonne, IL

SAMIM ANGHAIE, Co-Chair
University of Florida
Gainesville, FL

Processing of Mixed Uranium/Refractory Metal Carbide Fuels for High Temperature Space Nuclear Reactors
Travis Knight and Samim Anghaie, University of Florida, Gainesville, FL
Helium Release from $^{238}PuO_2$ Fuel Particles
Mohamed S. El-Genk and Jean-Michel Tournier, Institute for Space and Nuclear Power Studies, The University of New Mexico, Albuquerque, NM
Processing of Tungsten Single Crystal by Chemical Vapor Deposition
Zhigang Xiao and Ralph H. Zee, Auburn University, Auburn, AL, and Lester L. Begg, General Atomics, San Diego, CA
Advanced Fuels for Space Nuclear Power and Propulsion Systems; Recent Developments
Sam Bhattacharyya, Argonne National Laboratory, Argonne, IL

[C02] PROPULSION TECHNOLOGIES FOR INTERSTELLAR PRECURSOR MISSIONS

TUESDAY, FEBRUARY 1, 10:15 am – 12:15 pm, Retail Room, 1st Floor

LES JOHNSON, Chair
NASA Marshall Space Flight Center
Huntsville, AL

The Ultimate Performance of Gridded Ion Thrusters for Interstellar Missions
David G. Fearn, Space Department, Defence Evaluation and Research Agency, Farnborough, Hants, UK
A Solar Sail Design for a Mission to the Near-Interstellar Medium
Charles E. Garner, William Layman, Sarah A. Gavit, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; Timothy Knowles, Energy Science Laboratories Inc., San Diego, CA
Mini-Magnetospheric Plasma Propulsion (M2P2): High Speed Propulsion Sailing the Solar Wind.
Robert Winglee, Geophysics Program University of Washington, Seattle, WA; John Slough, Tim Ziemba, Department of Aeronautics and Astronautics, University of Washington, Seattle, WA; Anthony Goodson, The Boeing Corporation, Seattle, WA
Sailcraft-Based Mission to the Solar Gravitational Lens
Giovanni Vulpetti, Advanced Space Mission Studies, Telespazio SpA, Rome, Italy
Fission-Based Electric Propulsion for Interstellar Precursor Missions
Ronald J. Lipinski, Roger X. Lenard, and Steven A. Wright, Sandia National Laboratories, Albuquerque, NM; Michael G. Houts, Bruce Patton, Marshall Space Flight Center, Huntsville, AL; David Poston, Los Alamos National Laboratory, Los Alamos, NM

[E02] NUCLEAR SYSTEM TESTING PROGRESS/RESULTS

TUESDAY, FEBRUARY 1, 10:15 am – 12:15 pm, Sage I, 1st Floor

MELISSA VAN DYKE, Chair
NASA Marshall Space Flight Center
Huntsville, AL

THOMAS GODFROY, Co-Chair
NASA Marshall Space Flight Center
Huntsville, AL

Space Rocket Engine on the Base of the Reactor-Pumped Laser for the Interplanetary Flights and Earth Orbital Applications
Andrey V. Gulevich, Peter P. Dyachenko, Oleg F. Kukharchuk, and Anatoly V. Zrodnikov, Institute of Physics & Power Engineering, Obninsk, Russia

Realistic Development and Testing of Fission Systems at a Non-Nuclear Testing Facility
Tom Godfroy, Melissa Van Dyke, Ricky Dickens, Kevin Pedersen, Roger Lenard, and Mike Houts, NASA Marshall Space Flight Center, Huntsville, AL

Results of a First Generation Least Expensive Approach to Fission Module Tests: Non-Nuclear Testing of a Fission System
Melissa Van Dyke, Tom Godfroy, Mike Houts, Ricky Dickens, Chris Dobson, Kevin Pedersen, NASA, Marshall Space Flight Center, Huntsville, AL; Bob Reid and J. Tom Sena, Los Alamos National Laboratory, University of California, U.S. Department of Energy, Los Alamos, NM

Compatibility of Liquid and Gaseous Phases of UF4 and UF4-UO2 with Tungsten and Molybdenum in 1500-3000K Temperature Range
Samim Anghaie and Robert Hanrahan, Jr., University of Florida, Gainesville, FL

Containment of Uranium Hexafluoride at Elevated Temperatures
Samim Anghaie, University of Florida, Gainesville, FL

[B03] EMERGING THERMAL CONTROL TECHNOLOGIES FOR FUTURE SPACECRAFT – II

TUESDAY, FEBRUARY 1, 1:15 pm – 3:15 pm, Sage II, 1st Floor

MARTIN DONABEDIAN, Chair
Aerospace Corporation
Los Angeles, CA

THOMAS REINARTS, Co-Chair
United Technologies
Kennedy Space Center, FL

Portable Infrared Reflectometer for Evaluating Emittance
Donald A. Jaworske, NASA Glenn Research Center, Cleveland, OH, and Timothy J. Skowronski, Cleveland State University, Cleveland, OH

Electrochromic Emittance Modulation Devices for Spacecraft Thermal Control
C.L. Trimble, E. Franke, and J.A. Woollam, University of Nebraska, Lincoln, NE; J.S. Hale, J.A. Woollam Co. Inc., Lincoln, NE

Variable Emissivity Through MEMS Technology
Ann Garrison Darrin, Robert Osiander, and John Champion, The John Hopkins University Applied Physics Laboratory, Laurel, MD; Ted Swanson and Donya Douglas, NASA Goddard Space Flight Center, Greenbelt, MD

Repeatability of Loop Heat Pipe Performance in a Production Environment
Walter Bienert, Michael Nikitkin, Dynatherm Corporation Inc., Hunt Valley, MD; Bruce Drolen, Hughes Space and Communications, El Segundo, CA

Parametric Study of Variable Emissivity Radiator Surfaces
Lisa M. Grob, Swales Aerospace, Beltsville, MD; Theodore D. Swanson, NASA Goddard Space Flight Center, Greenbelt, MD

[A06] SPACE SCIENCES ON THE INTERNATIONAL SPACE STATION: SUB-SESSION II

TUESDAY, FEBRUARY 1, 1:15 pm – 3:15 pm, Sendero Ballroom I

EUN-SUK SEO, Co-Chair
University of Maryland
College Park, MD

BETSY PARK, Co-Chair
NASA Goddard Space Flight Center
Greenbelt, MD

GIORGIO PALUMBO, Co-Chair
University of Bologna
Bologna, Italy

Particle Energy Determination Device for the International Space Station Using a New Approach to Cosmic Ray Spectral Measurements (TUS-M Mission)
J. Adams, Naval Research Laboratory, Washington, DC; G.L. Bashindzhagyan, N.A. Korotkova, D.M. Podorozhnyi, T.M. Roganova, L.G. Shevelnikova, A.N. Turundaevsky, and I.V. Yashin, Moscow State University, Moscow, Russia; A. Chilingarian, Yerevan Physics Institute, Armenia; L. Drury, Dublin Institute for Advance Studies, Ireland; N. Egorov, S. Golubkov, A Sidorov, Research Institute of Material Science and Technology, Zelenograd, Russia; J. Procqureur, Center of

Nuclear Energy, Gradignan-Cedex, France, O. Saavedra, Torino, University, Italy; M. Simon, University of Siegen, Germany

Outline of JEM-EF Capabilities
Mashahiro Takayanagi, Junichiro Shimizu, Kazuyoshi Kawasaki and Masaki Matsubara, NASDA, Tsukuba Space Center, Japan

Monitor of All-sky X-ray Image (MAXI)
Tatehiro Mihara, Nobuyuki Kawai, Atsumasa Yoshida, Hitoshi Negoro, Ikuya Sakurai and Yuji Shirasaki, The Institute of Physical and Chemical Research (RIKEN), Saitama, Japan; Masaru Matsuoka, Hiroshi Tsunemi, Emi Miyata, Kenichi Torii, Shiro Ueno, Mutsumi Sugizaki, Hiroshi Tomida, Tsukuba Space Center, Ibaraki, Japan; Makoto Yamauchi, Miyazaki University, Miyazaki, Japan

The Calorimetric Electron Telescope (CALET) for the JEM Exposure Facility
S. Torii, N. Tateyama, T. Tamura, T. Ouchi, K. Kashiwagi, K. Yoshida, K. Hibino, Kanagawa University, Yokohama, Kanagawa, Japan; T. Yamagami, Institute of Space and Astronautical Science, Sagamihara, Kanagawa, Japan; H. Murakami, Rikkyo University, Tokyo, Japan; T. Kobayashi, Aoyama-gakuin University, Tokyo, Japan; Y. Komori, Kanagawa Prefectural College of Nursing, Yokohama, Kanagawa, Japan; K. Kasahara, Shibaura Institute of Technology, Saitama, Japan; T. Yuda, M. Ohnishi, Institute for Cosmic Ray Research, University of Tokyo, Tokyo, Japan; M. Shibata, Yokahama National University, Kanagawa, Japan; F. Makino, National Space Development Agency of Japan, Ibaraki, Japan; J. Nishimura, Yamagata Institute of Technology, Yamagata, Japan

The Energetic Trans-Iron Cosmic Ray Experiment (ENTICE): An Instrument Calibration Using 10.6 GeV/nucleon $_{79}$ AU
J.R. Cummins, W.R. Binns, P.L. Hink, M.H. Israel, J.T. Link, and S.H. Sposato, Washington University, St. Louis, MO; J.H. Adams, Naval Research Laboratory, Washington, DC; L.M. Barbier, E.R. Christian, J.W. Mitchell, and R.E. Streitmatter, NASA Goddard Space Flight Center, Greenbelt, MD; G.A. DeNolfo, R.A. Leske, R.A. Mewaldt, S.M. Schindler, and E.C. Stone, Caltech, Pasadena, CA; W. Menn and M. Simon, University of Siegen, Siegen, Germany; C.J. Waddington, University of Minnesota, Minneapolis, MN; M.E. Wiedenbeck, Jet Propulsion Laboratory, Pasadena, CA

ECCO: The Extremely Heavy Cosmic Ray Composition Observer
A.J. Westphal, B.A. Weaver, K. Zaerpoor, University of California at Berkeley, Berkeley, CA; C.M. Collins, R. Lewis, E.A. Park Sauerwein, L.M. Barbier, R.C. Carter, and D.D. Yun, Goddard Space Flight Center, Greenbelt, MD; C.L. Lin, HD Associates, Emeryville, CA; C.M.R. Eby, Swales Aerospace, Inc., Beltsville, MD

[A07] BIOMEDICAL RESEARCH ON THE INTERNATIONAL SPACE STATION: SUB-SESSION II: CREW HEALTH CARE AND COUNTERMEASURES

TUESDAY, FEBRUARY 1, 1:15 pm – 3:15 pm, Sendero Ballroom III

CHARLES SAWIN, Co-Chair
NASA Johnson Space Center
Houston, TX

SUZANNE SCHNEIDER, Co-Chair
NASA Johnson Space Center
Houston, TX

ISS Utilization and Countermeasures Validation: Implementing the Critical Path Roadmap to Reduce Uncertainties of Extended Human Spaceflight Expeditions
Lauren B. Leveton, Universities Space and Research Association, Houston, TX; Judith L. Robinson and John B. Charles, NASA Johnson Space Center, Houston, TX

The Human Response to Artificial Gravity in a Weightless Environment: Results from the Neurolab Centrifugation Experiments
Steven T. Moore and Bernard Cohen, Mount Sinai School of Medicine, New York, NY; Gilles Clement, CNRS, Toulouse, France; Theodore Raphan, Brooklyn College, Brooklyn, NY; Ian Curthoys, University of Sydney, Australia; Izumi Koizuka, St. Marian University, Kanagawa, Japan

Total and Partial Sleep Deprivation: Effects on Plasma TNF-αRI, TNF-αRII, and IL-6, and Reversal by Caffeine Operating Through Adenosine A2 Receptor
William T. Shearer, Baylor College of Medicine, Houston TX; James M. Reuben and Bang-Ning Lee, University of Texas, Houston, TX; Janet Mullington, Harvard Medical School, Boston, MA; David Dinges and Nick Price, University of Pennsylvania School of Medicine, Philadelphia, PA

Secretory Proteins Characteristic of Environmental Changes in Cellular Signal Transduction: Expression in Oral Fluid
Maija Mednieks, University of Illinois, Chicago, IL; J.C. Burke, University of Connecticut, Farmington, CT; T.P. Sivakumar, A.R. Hand, R.E. Grindeland, NASA Ames Research Center, Moffett Field, CA

Hardware Development Process for Human Research Facility Applications
Liz Bauer, NASA Johnson Space Center, Houston, TX

Using Foot Pressure to Maintain Neuromuscular Function During Long-Duration Space Flight
Charles S. Layne, University of Houston, Houston, TX; Ajitkumar P. Mulavara and P.V. McDonald, Wyle Life Sciences,

Houston, TX; Casey J. Pruett, TecMath, Detroit, MI; Jacob J. Bloomberg, NASA Johnson Space Center, Houston, TX; Inessa B. Kozlovskaya, Institute for Biomedical Problems, Moscow, Russia

[A08] FLUIDS RESEARCH ON THE INTERNATIONAL SPACE STATION: SUB-SESSION I

TUESDAY, FEBRUARY 1, 1:15 pm – 3:15 pm, Sendero Ballroom II

BHIM SINGH, Co-Chair
NASA Glenn Research Center at Lewis Field
Cleveland, OH

IWAN ALEXANDER, Co-Chair
Case Western Reserve University
Cleveland, OH

Microgravity Fluid Physics and Transport Phenomena Experiments Planned for ISS
Bhim S. Singh, NASA Glenn Research Center at Lewis Field, Cleveland, OH; and J. Iwan D. Alexander, Department of Mechanical and Aerospace Engineering and National Center for Microgravity Research, Case Western Reserve University, Cleveland, OH

Studies of Gas-Particle Interactions in a Microgravity Flow Cell
Michel Louge and Haitao Xu, Sibley School of Mechanical and Aerospace Engineering; James Jenkins, Department of Theoretical and Applied Mechanics; and Anthony Reeves, School of Electrical Engineering, Cornell University, Ithaca, NY

Constitutive and Stability Behavior of Soils in Microgravity Environment
Khalid A. Alshibli, University of Alabama at Huntsville, Huntsville, AL; Stein Sture and Nicholas C. Costes, University of Colorado, Boulder, CO

A Summary of Capabilities and Operations for the Fluids Combustion Facility Fluids Integrated Rack – First Four Experiments
Myron E. Hill and Suzanne M. Saavedra, NASA Glenn Research Center, Cleveland, OH

Modeling Transport Processes in a Constrained Vapor Bubble Under Microgravity Conditions
J. Huang, J. Plawsky, and P.C. Wayner, Jr., The Isermann Department of Chemical Engineering, Rensselaer Polytechnic Institute, Troy, NY

Surfactant Effects on Heat Transfer at Gas/Liquid Interfaces
J.M. Lopez, Arizona State University, Tempe, AZ, and A.H. Hirsa, Rensselaer Polytechnic Institute, Troy, NY

[D03] NEW VEHICLE DEVELOPMENTS

TUESDAY, FEBRUARY 1, 1:15 pm – 3:15 pm, Enchantment Ballroom E & F

JESS SPONABLE, Chair
Universal Space Lines, Inc.
Newport Beach, CA

~~***Military Spaceplane Integrated Technology Testbed (MSPITT) – An Effective Reusable First Stage***~~
~~Ray O. Charette, Doug Blue, Preston Ferguson, Keith Chmielewski, and Paul Staszak, The Boeing Company, Seal Beach, CA~~

Crew/Cargo Transfer Vehicle (C^2TV) – A Key Element of Next Generation Space Transportation Systems
Walt Faulconer, Tom Megna and Don Randolph, Lockheed Martin Astronautics, Denver, CO

Pioneer Rocketplane New Vehicle Concept
Mitchell Burnside Clapp, Pioneer Rocketplane, Vandenberg, CA

Opening the Spaceways
Jess Sponable, Universal Space Lines, Inc., Newport Beach, CA

A Commercial Spaceplane Architecture for the 21st Century
Jim Hollopeter, Kelly Space and Technology

Development of Mhd Airbreathing Propulsion Technology for Future Space Transportation and Hypersonic Flight
H.D. Froning, Jr., Flight Unlimited, Flagstaff, AZ, and R.L. Chase, ANSER, Arlington, VA

[E03] ADVANCED PROPULSION CONCEPTS I

TUESDAY, FEBRUARY 1, 1:15 pm – 3:15 pm, Enchantment Ballroom C & D

GEORGE MILEY, Chair
University of Illinois
Urbana, Illinois

J. BOISE PEARSON, Co-Chair
NASA Marshall Space Flight Center
Huntsville, AL

Proposed Experiment on a Controlled Orbital Mass
Thomas E. Lett, III, Lexington, KY

Recent Advances in Inertial-Electrostatic Confinement (IEC) Fusion for Space Power and Propulsion
J. Nadler, G.H. Miley, M. Coventry, NPL Associates, Champaign, IL; H. Momota, Fusion Studies Laboratory, University of Ilinois, Urbana, IL

Devlopment of High-Density Antimatter Storage
Steven D. Howe and Gerald A. Smith, Synergistic Technologies, Inc., Los Alamos, NM

External Pulsed Plasma Propulsion and its Potential for the Near Future
J.A. Bonometti, P.J. Morton, and G.R. Schmidt, NASA Marshall Space Flight Center, Huntsville, AL

[C03] PROPULSION TECHNOLOGIES FOR INTERSTELLAR FLYBY AND RENDEZVOUS MISSIONS

TUESDAY, FEBRUARY 1, 1:15 pm – 3:15 pm, Retail Room, 1st Floor

GREGORY MATLOFF, Chair
New York University/New York City Technical College
Brooklyn, NY

GIOVANNI VULPETTI, Co-Chair
Telespazio SpA
Rome, Italy

MICF: A Fusion Propulsion System for Interstellar Missions
Terry Kammash, Nuclear Engineering and Radiological Sciences Dept., University of Michigan, Ann Arbor, MI; Brice N. Cassenti, United Technologies Research Center, East Hartford, CT

Dielectric Films for Solar-and Laser-Pushed Lightsails
Geoffrey A. Landis, Ohio Aerospace Institute, NASA Glenn Research Center, Cleveland, OH

Laser-Light Sailing and Non-Stationary Power Stations Applied to Robotic Star Probes
Gregory L. Matloff, New York University, General Studies Program, New York, NY, and Department of Physical and Biological Sciences, New York City Technical College, Brooklyn, NY

[E04] STIRLING ENERGY CONVERSION

TUESDAY, FEBRUARY 1, 1:15 pm – 3:15 pm, Sage I, 1st Floor

AL SCHOCK, Chair
Orbital Sciences Corporation
Germantown, MD

RICHARD SHALTENS, Co-Chair
NASA Glenn Research Center
Cleveland, OH

Self-Supporting Radioisotope Generators With STC-55W Stirling Converters
C. Or, V. Kumar, R. Carpenter, and A. Schock, Orbital Sciences Corporation, Germantown, MD

Performance of the Preferred Self-Supporting Radioisotope Power System With STC 55-W Stirling Converters
C. Or, V. Kumar, R. Carpenter, and A. Schock, Orbital Sciences Corporation, Germantown, MD

Technology Development for a Stirling Radioisotope Power System
Lanny G. Thieme, NASA Glenn Research Center, Cleveland, OH; Songgang Qiu and Maurice A. White, Stirling Technology Company, Kennewick, WA

Preliminary Test Results From a Free-Piston Stirling Engine Technology Demonstration Program To Support Advanced Radioisotope Space Power Applications
Maurice A. White, Songgang Qiu, and Jack E. Augenblick, Stirling Technology Company, Kennewick, WA

Solar Stirling for Deep Space Applications
Lee S. Mason, NASA Glenn Research Center, Cleveland, OH

[A09] SPACE SCIENCES ON THE INTERNATIONAL SPACE STATION: SUB-SESSION III

TUESDAY, FEBRUARY 1, 3:30 pm – 5:30 pm, Sendero Ballroom I

EUN-SUK SEO, Co-Chair
University of Maryland
College Park, MD

BETSY PARK, Co-Chair
NASA Goddard Space Flight Center
Greenbelt, MD

GIORGIO PALUMBO, Co-Chair
University of Bologna
Bologna, Italy

XEUS, the X-Ray Evolving Universe Spectroscopy Mission
Giorgio G.C. Palumbo, Universita di Bologna, Bologna, Italy

The SHOUT Project – A Space Telescope Assembled at the International Space Station
Toshihiro Handa, Masuo Tanaka, Hirokazu Kataza and Ken'ichi Nomoto, University of Tokyo, Tokyo, Japan; Carlton Pennymaker and Peter Nugent, University of California, Berkeley, CA; Toshikazu Ebisuzaki, Riken; Yoshiyuki Takahashi and James B. Hadaway, University of Alabama, Huntsville, AL; Andrew Frucher, Space Tele. Sci. Inst.; Kouji Ohta, Kyoto University; Jun-ichi Watanabe, Hidekhiko Agata and Tomoya Nagai, National Astron. Obs., Japan; Yutaka Hayano, Communication Research Lab., Japan

The Grand Observatories – A Step Toward a Space Factory
Toshikazu Ebisuzaki, Riken; Yoshiyuki Takahashi, and Mamoru Mohri, University of Alabama, Huntsville, AL; Toshihiro Handa, University of Tokyo, Tokyo, Japan; Carlton Pennymaker, University of California, Berkeley, CA; Tetsuya Honda, Ishikawazima Harima Industry; Izumi Mikami, Melco

OWL – Orbital Wide Angle Light Collector for Air Watch Program, and Multiple OWL
Toshikazu Ebisuzaki, Computational Science Laboratory, RIKEN, Saitama, Japan; Yoshiyuki Takahashi, Mamoru Mohri, John O. Dimmock, Lloyd W. Hillman, James B. Hadaway, and David J. Lamb, University of Alabama, Huntsville, AL; Toshihiro Handa, University of Tokyo, Tokyo, Japan

Space Very Long Baseline Interferometry and the International Space Station: Scientific Tasks and Technological Challenge
L.I. Gurvits, Joint Institute for VLBI in Europe, Dwingeloo, The Netherlands

European Concepts of Very Large Scale Missions Using the Space Station as Assembly Base
Henk Olthof and Jens Schiemann, ESA/ESTEC, Noordwijk, The Netherlands

[A10] BIOMEDICAL RESEARCH ON THE INTERNATIONAL SPACE STATION: SUB-SESSION III: LIFE SCIENCES TECHNOLOGIES

TUESDAY, FEBRUARY 1, 3:30 pm – 5:30 pm, Sendero Ballroom III

CHARLES SAWIN, Co-Chair
NASA Johnson Space Center
Houston, TX

SUZANNE SCHNEIDER, Co-Chair
NASA Johnson Space Center
Houston, TX

Non-Invasive Assessment of Alterations in Cardiovascular Regulation and Function and Susceptibility to Ventricular Arrhythmias Resulting from Microgravity Exposure
Craig D. Ramsdell, Grete H. Sundby, Gordon H. Williams, and Richard Cohen, Harvard Medical School, Boston, MA; Derin Sherman, Ming Maa, Jacquelyn L. Baskin, Massachusetts Institute of Technology and the NASA Center for Quantitative Cardiovascular Physiology, Modeling and Data Analysis, Cambridge, MA

Magnetic Resonance Microscopy of Osteoporotic Bone
Renato Toffanin, University of Trieste and PROTOS Research Institute, Trieste, Italy; Pavol Szomolanyi and Franco Vittur, University of Trieste, Trieste, Italy; Vladimir Jelluš, Slovak Academy of Sciences, Bratislava, Slovakia; Maria Cova and Roberto S. Pozzi-Mucelli, Cattinara Hospital, University of Trieste, Trieste, Italy

Multiple Projection DEXA Scanner for Precision Bone and Muscle Loss Measurements and Analysis During Prolonged Spaceflight
H.K. Charles, Jr., H.S. Feldmesser, T.C. Magee, T.S. Spisz, and V.L. Pisacane, The Johns Hopkins University, Applied Physics Laboratory, Laurel, MA; T.J. Beck, The Johns Hopkins University, School of Medicine, Baltimore, MA

Urinalysis by Surface-Enhanced Raman Spectroscopy
Stuart Farquharson and Yuan-Hsiang Lee, Advanced Fuel Research, East Hartford, CT; Hyeog Kwon and Mahmoud Shahriari, Rutgers University, Piscataway, NJ; Petrie Rainey, Yale University, New Haven, CT

Quantitative Determination of 3-Methylhisitidine in Urine by Matrix-Assisted Laser Desorption Mass Spectrometry
Richard S. Potember, Wayne A. Bryden, and Miquel Antoine, Applied Physics Laboratory, The Johns Hopkins University, Laurel, MD

Portable Real Time Neutron Spectrometry II
Richard H. Maurer, David R. Roth, R. Fainchtein, J.O. Goldstein, and J.D. Kinnison, The Johns Hopkins Applied Physics

Laboratory, Laurel, MD

[A11] FLUIDS RESEARCH ON THE INTERNATIONAL SPACE STATION: SUB-SESSION II

TUESDAY, FEBRUARY 1, 3:30 pm – 5:30 pm, Sendero Ballroom II

BHIM SINGH, Co-Chair
NASA Glenn Research Center at Lewis Field
Cleveland, OH

IWAN ALEXANDER, Co-Chair
Case Western Reserve University
Cleveland, OH

Results of Recent Fluid Physics and Transport Phenomena Space Flight Experiments
J. Iwan D. Alexander, Case Western Reserve University, Cleveland, OH, and Bhim S. Singh, NASA Glenn Research Center, Cleveland, OH

Multi-function Light Microscopy Module for the International Space Station
Christian T. Lant, Andrew Resnick, Dynacs Engineering Co., Inc., NASA Glenn Research Center, Cleveland, OH

Optical Tomograph Based on Holographic Interferometry for Fluid Research on the International Space Station
J. Becker, ESA ESTEC, TOS-MMG, Noordwijk, NL; M. Cecconi and L. Gatti, Alenia Aerospazio, Space Division, Control Dynamics and New Studies, Torino, Italy; J.L. Dewandel, Microgravity Research Centre-Free University of Brussels, Brussels, Belgium

Magnetic Cooling Refrigerator for Microgravity Environments
Eric N. Smith, John Beamish, and Jeevak M. Parpia, Cornell University, Ithaca, NY

Aggregation of Bubbles by Thermocapillary Flow
Hiroki Kasumi, Scott Guelcher, John L. Anderson, Yuri E. Solomentsev, and Paul J. Sides, Carnegie Mellon University, Pittsburgh, PA

[D04] TECHNOLOGY FOR COMMERCIAL AND CIVIL PROJECTS

TUESDAY, FEBRUARY 1, 3:30 pm – 5:30 pm, Enchantment Ballroom E & F

PAUL BIRKELAND, Co-Chair
Kistler Aerospace Corporation
Kirkland, WA

Michael Kelly, Co-Chair
Kelly Space and Technology
San Bernadinto, CA

On-board Decision Making With a Piloted System
Michael Kelly, Kelly Space and Technology, San Bernardino, CA

On-Board Decision Making With an Autonomous System
Richard Bailey, Automated Environments

Deriving an Acceptable Level of Reusable Launch Vehicle Flightworthiness
René J. Rey, The Boeing Company, Huntington Beach, CA.

Experimental Aviation as an Alternate Roadmap for Launch Vehicle Licensing
Pat Bahn, TGV Rockets, Bethesda, MD

[E05] ADVANCED PROPULSION CONCEPTS II

TUESDAY, FEBRUARY 1, 3:30 pm – 5:30 pm, Enchantment Ballroom C & D

DAVID POSTON, Chair
Los Alamos National Laboratory
Los Alamos, NM

MOHAMED S. EL-GENK, Co-Chair
The University of New Mexico, ISNPS
Albuquerque, NM

Pulsed Laser Thermal Propulsion for Interstellar Precursor Missions
Jordin T. Kare, Kare Technical Consulting, San Ramon, CA

Direct Gain Solar Thermal Propulsion at MSFC
Harold P. Gerrish, Jr. and James W. Smith, NASA Marshall Space Flight Center, Huntsville, AL

Advanced Plasma Propulsion for Human Missions to Jupiter
Benjamin B. Donahue, The Boeing Company, Huntsville, AL, and J. Boise Pearson, NASA Marshall Space Flight Center, Huntsville, AL

Dual-Mode, High Energy Utilization System Concept for Mars Missions
Mohamed S. El-Genk, Institute for Space and Nuclear Power Studies and Dept. of Chemical and Nuclear Engineering, The

University of New Mexico, Albuquerque, NM

[E07] NOVEL POWER SYSTEM CONCEPTS AND RELATED ISSUES

TUESDAY, FEBRUARY 1, 3:30 pm – 5:30 pm, Retail Room, 1st Floor

JOSEPH A. SHOLTIS, JR., Chair
Sholtis Engineering & Safety Consulting
Tijeras, NM

LYLE L. RUTGER, Co-Chair
U.S. Department of Energy
Germantown, MD

The Heatpipe Power System (HPS) for Mars Outpost and Manned Mars Missions
David I. Poston, Stewart L. Voit, and Robert S. Reid, Los Alamos National Laboratory, Los Alamos, NM, and Peter J. Ring, Advanced Methods and Materials, San Jose, CA

A Deep Space Power System Option Based on Synergistic Power Conversion Technologies
Jeffrey G. Schreiber, NASA Glenn Research Center, Cleveland, OH

Five Major NASA Health and Safety Issues
Raymond B. Gavert, NASA Headquarters, Washington, DC

The Safe Use of Nuclear Power Systems in Outer Space: Current Safety Standards and a Suggested Framework for the Future
Michael D. White, Blank Rome Comisky & McCauley LLP, Washington, DC; Daniel F. Stenger, Hopkins & Sutter, Washington, DC

[E06] THERMIONIC TECHNOLOGY AND APPLICATIONS

TUESDAY, FEBRUARY 1, 3:30 pm – 5:30 pm, Sage I, 1st Floor

LES BEGG, Chair
General Atomics
San Diego, CA

YURI NIKOLAEV, Co-Chair
Research Institute of SIA LUCH
Podolsk, Russia

Development of a Cylindrical Inverted Thermionic Converter for Solar Power Systems
Holger H. Streckert, Lester L. Begg, General Atomics, San Diego, CA; Yuri V. Nikolaev, David L. Tsetskhladse, Stanislav A. Eriomin, Oleg L. Izhvanov, and Nikolai L. Lapochkin, State Research Institute of SIA LUTCH, Podolsk, Moscow Region, Russian Federation

Development and Testing of Conductively Coupled Multi-Cell TFE Components
Holger H. Streckert and Lester L. Begg, General Atomics, San Diego, CA; Yuri V. Nikolaev, Valentin S. Kolesov, Oleg L. Izhvanov, Nikolai L. Lapochkin, and David L. Tsetskhladse, State Research Institute of SIA LUTCH, Podolsk, Moscow Region, Russian Federation

Development of Thin Film Scandate Emitters for Thermionic Applications
K.R. Zavadil, J.A. Ruffner, and D.B. King, Sandia National Laboratories, Albuquerque, NM

Thermodynamic Characterization of a Diamond-Based Electron Emitter
T.S. Fisher, A.M. Strauss, J.L. Davidson, and W.P. Kang, Vanderbilt University, Nashville, TN

An Advanced Thermionic Theory: Recent Developments
Albert C. Marshall, Defense Threat Reduction Agency, Kirtland Air Force Base, Albuquerque, NM

TECHNICAL SESSIONS
WEDNESDAY, JANUARY 2, 2000

[B04] EMERGING THERMAL CONTROL TECHNOLOGIES FOR FUTURE SPACECRAFT – III

WEDNESDAY, FEBRUARY 2, 10:15 am – 12:15 pm, Sage II, 1st Floor

MARTIN DONABEDIAN, Chair
Aerospace Corporation
Los Angeles, CA

WALTER BIENERT, Co-Chair
Dynatherm
Cockeysville, MD

Thermal Management Approaches for Large Planar Phased Array Space Antennas
Fred M. Jonas, Nichols Research, Albuquerque, NM, Air Force Research Laboratory, Phillips Research Site, Space Vehicles Directorate, Active Sensors Group, AFRL/VSSS

Oscillatory Accelerations on Gas-Liquid Systems
Régis Wunenburger, Carole Lecoutre-Chabot, Yves Garrabos, Institute de Chimie de la Matière Condensée de Bordeaux, Centre National de la Recherche Scientifique, Pessac Cedex, France; Daniel Beysens, Service des Basses Températures, DRFMC, CEA-Grenoble, France; Pierre Evesque, Laboratoire de Mécanique des Sols Structures Matériaux, Ecole Centrale de Paris, Chatenay Malabry Cedex, France; Stephan Fauve, Laboratoire de Physique Statistique, Ecole Normale Supérieure, Paris Cedex, France

Development of Liquid Flow Metering Assemblies for Space
A.A.M. Delil, National Aerospace Laboratory NLR, Emmeloord, Netherlands; P. van Put, Bradford Engineering, Heerle, Netherlands; M. Dubois, SABCA, Brussels, Belgium; W. Supper, ESA-ESTEC, Noordwijk, Netherlands

Development and Testing of Advanced Cryogenic Thermal Switch Concepts
B. Marland, D. Bugby and C. Stouffer, Swales Aerospace, Beltsville, MD

[A12] PANEL-EARTH SCIENCE AND REMOTE SENSING ON THE INTERNATIONAL SPACE STATION: SUB-SESSION I: ISS UTILIZATION PLANS OF THE OFFICE OF EARTH SCIENCE

WEDNESDAY, FEBRUARY 2, 10:15 am – 12:15 pm, Enchantment E

JOHN KELLEY, Co-Chair
NASA Headquarters
Washington, DC

BETSY PARK, Co-Chair
NASA Goddard Space Flight Center
Greenbelt, MD

GEORGE MAY, Co-Chair
Space Remote Sensing Center
Stennis Space Center, MS

This session is intended to provide an open forum for an interactive exchange between the science community and the NASA Office of Earth Science to discuss Earth Science utilization of the ISS. Invited panel members include Mike Luther, OES Deputy Associate Administrator; Angie Johnson, Program Planning Development Division Director; Dr. Nancy Maynard, Applications and Outreach Division Director; and Dr. Jack Kaye, Research Division Director.

[A13] OVERVIEW OF BUSINESS INVESTMENTS AND COMMITMENTS THROUGH THE COMMERCIAL SPACE CENTER PROGRAM

*WEDNESDAY, FEBRUARY 2, 10:15 a*m – 12:15 pm, Enchantment Ballroom A & B

WILLIAM E. POWELL, Co-Chair
NASA Marshall Space Flight Center
Huntsville, AL

MARK DEUSER, Co-Chair
Space Hardware Optimization Technology, Inc.
Greenville, IN

The Center for Advanced Microgravity Materials Processing- A Partnership Between NASA, Northeastern University and Industry
Albert Sacco, Jr. and Nurcan Bac, Northeastern University, Boston, MA

The Metalcasting Industry and Future Research on the International Space Station
Joe Santer, American Foundrymen's Society, Des Plaines, IL, and Tony Overfelt, Auburn University, Auburn, AL

Commercial Investments in Combustion Research Aboard ISS
F.D. Schowengerdt, Colorado School of Mines, Golden, CO

Space-DRUMS™ Experimental Development Using Parabolic Reduced Gravity Flights
Jacques Yves Guigné, Ron Davidson, and D. Millan, Guigné International Ltd., Newfoundland, Canada

BIOFAC – An Investment in Space Infrastructure for Biotechnology
Mark S. Deuser and John C. Vellinger, Space Hardware Optimization Technology, Inc., Greenville, IN

[A14] GRAVITATIONAL BIOLOGY RESEARCH ON THE INTERNATIONAL SPACE STATION

WEDNESDAY, FEBRUARY 2, 10:15 am – 12:15 pm, Enchntment Ballroom C & D

GARY JAHNS, Co-Chair
NASA Ames Research Center
Moffett Field, CA

KATHRYN I. CLARK, Co-Chair
NASA Headquarters
Washington, DC

Integrated Payload Resource Requirements for NASA's Gravitational Biology Research Laboratory on the International Space Station
Lauren E. Fletcher, George L. Sarver, SSBRP Systems Engineering, Lockheed Martin Engineering and Sciences, Gary Jahns, NASA Ames Research Center, Space Station Biological Research Project, Moffett Field, CA

A Plant's Response to Microgravity as a Wave Phenomenon
Orvin E. Wagner, Wagner Research Laboratory, Rogue River, OR

State-of-the-Art Plant Growth Chamber for Conducting Commercial Plant Research in Microgravity
Weijia Zhou, Wisconsin Center for Space Automation and Robotics, University of Wisconsin, Madison, WI, and Paul Falk, Teledyne Brown Engineering, Huntsville, AL

It Was a First Class Start Which Laid the Basis for a Promising Future; Experience from Comparative Studies on Gravity Related Behavior in Animals and Consequences for Future Experiments
Eberhard R. Horn, Department of Neurology, Gravitational Physiology, University of Ulm, Ulm, Germany

The Scorpion – An Ideal Animal Model to Study Long-Term Microgravity Effects on Circadian Rythms
Pascal Riewe and Eberhard Horn, Department of Neurology–Gravitational Physiology, University of Ulm, Ulm, Germany

[A15] COMBUSTION SCIENCE ON THE INTERNATIONAL SPACE STATION

WEDNESDAY, FEBRUARY 2, 10:15 am – 12:15 pm, Enchantment Ballroom F

HOWARD ROSS, Co-Chair
NASA Glenn Research Center at Lewis Field
Cleveland, OH

FRANK SCHOWENGERDT, Co-Chair
Colorado School of Mines
Golden, CO

Progress on the Combustion Integrated Rack Component of the Fluids and Combustion Facility
Karen J. Weiland, NASA Glenn Research Center, Cleveland, OH

Preliminary Analysis of a High Pressure Spray and Cloud Combustion Module for the ISS
I. Gökalp, C. Chauveau, B. Legrand, E. Shafirovich, Laboratoire de Combustion et Systèmes Réactifs, Centre National de la Recherche Scientifique, Orléans Cedex, France; D. Durox, F. Lacas, Laboratoire EM2C, Centre National de la Recherche Scientifique, Chatenay-Malabry, France

The Water-Mist Fire Suppression Experiment: Recent Ground-Based Results and Planned Space Experiments
Francine Amon, Angel Abbud-Madrid, Edward P. Riedel and J. Thomas McKinnon, Colorado School of Mines, Golden, CO

The Role of Natural Convection on Cool Flames and Autoignition
Richard Chapek, Donna Neville, William Sheredy, NASA Glenn Research Center, Cleveland, OH; Ming-Shin Wu, National Center for Microgravity Research, Cleveland, OH; David Hehemann, Kent State University, Kent, OH; and Howard Pearlman, University of Southern California, Los Angeles, CA

Combustion Synthesis of Glass-Ceramic Composites under Terrestrial and Reduced Gravity Conditions
Anthony Manerbino, H.C. YI, and J.Y. Guigné, Guigné International LTD, Paradise, NF, Canada; J.J. Moore, Center for Commercial Application of Combustion in Space, Colorado School of Mines, Golden, CO

[D05] FINANCING AND FUNDING THE ENTERPRISE

WEDNESDAY, FEBRUARY 2, 10:15 am – 12:15 pm, Boardroom East

HECTOR J. CUELLAR, Chair
Banc of America Securities LLC
Los Angeles, CA

Price Elasticity of Demand and Market Failure in Space Transportation
William Robert Claybaugh II, National Aeronautics and Space Administration, Washington, DC
Financing Reusable Launch Vehicles
Chuck McBride, Kistler Aerospace, Los Angeles, CA
Satellite Radio (DARS): The Challenge of Financing an Emerging Satellite Service
Heinz Stubblefield, XM Satellite Radio Inc., Washington, DC
Global Satellite & Space Financing
Hector J. Cuellar, Banc of America Securities LLC, Los Angeles, CA

[C04] TOWARD BREAKTHROUGH PROPULSION: EXPERIMENTS WITH ELECTROMAGNETISM, SPACE, AND GRAVITY

WEDNESDAY, FEBRUARY 2, 10:15 am – 12:15 pm, Retail Room, 1st Floor

ALAN HOLT, Chair
NASA Johnson Space Flight Center
Houston, TX

FRANK MEAD, JR., Co-Chair
Air Force Research Labs-AFRL/PRSP
Edwards AFB, CA

Experimental Investigation of 5-D Divergent Currents as a Gravity-Electromagnetism Coupling Concept
M. Tajmar, Vienna University of Technology, Institut für Allgemeine Elektronik und Quantenektronik, Vienna, Austria
Simple Electrostatic Aether Drift Sensors (SEADS): New Dimensions In Space Weather and Their Possible Consequences on Passive Field Propulsion Systems
Alexandre D. Szames, Apex Division, Éditions A. Szames, Boulogne, France; Patrick Cornille and Jean-Louis Naudin, Advanced Electromagnetic Systems S.A., Saint-Rémy-lés-Chevreuse, France; Christian Bizouard, Astronomer, Paris, France
Mass Fluctuations, Stationary Forces, and Propellantless Propulsion
James F. Woodward, Departments of History and Physics, California State University, Fullerton, CA
Search for a Correlation Between Josephson Junctions and Gravity
Glen A. Robertson, Propulsion Research Center, NASA Marshall Space Flight Center, Huntsville, AL
Candidate In-Orbit Experiment to Test the Electromagnetic Inertia Manipulation Concept
Hector Hugo Brito, Centro de Investigaciones Aplicadas, Instituto Universitario Aeronáutico, Córdoba, Argentina
Theoretical and Experimental Investigations of Gravity Modification by Specially Conditioned EM Radiation
H.D. Froning, Flight Unlimited, Flagstaff, AZ, and T.W. Barrett, BSEI, Vienna, VA

[E08] AMTEC CONVERSION TECHNOLOGY AND APPLICATIONS – I

WEDNESDAY, FEBRUARY 2, 10:15 am – 12:15 pm, Sage I, 1st Floor

JEAN-MICHEL TOURNIER, Chair
Institute for Space and Nuclear Power Studies
Albuquerque, NM

TOM HUNT, Co-Chair
Advanced Modular Power Systems, Inc.
Ann Arbor, MI

Small AMTEC Systems as Battery Substitutes
Thomas K. Hunt, Robert .K. Sievers, and Andrew C. Patania, Advanced Modular Power Systems, Inc., Ann Arbor, MI
Conical Evaporator and Liquid Return Wick Model for Vapor Anode, Multi-tube AMTEC Cells
Jean-Michel Tournier and Mohamed S. El-Genk, ISNPS, The University of New Mexico, Albuquerque, NM
Performance Measurements of Advanced AMTEC Electrodes
Michael Schuller, Brad Fiebig, Patricia Hudson, and Imran Kakwan, Texas A&M University, College Station, TX
Lifetimes of AMTEC Electrodes: Molybdenum, Rhodium-Tungsten, and Titanium Nitride
M.A. Ryan, V.B. Shields, R.H. Cortez, L. Lara, M.L. Homer, and R.M. Williams, Jet Propulsion Laboratory, Pasadena, CA
Analyses of Nb-1Zr/C-103, Vapor Anode, Multi-Tube AMTEC Cells
Jeffrey C. King and Mohamed S. El-Genk, ISNPS, The University of New Mexico, Albuquerque, NM

[A16] EARTH SCIENCE AND REMOTE SENSING ON THE INTERNATIONAL SPACE STATION: SUB-SESSION II: EARTH SCIENCE ATTACHED PAYLOADS

WEDNESDAY, FEBRUARY 2, 1:15 pm – 3:15 pm, Enchantment E

JOHN KELLEY, Co-Chair
NASA Headquarters
Washington, DC

BETSY PARK, Co-Chair
NASA Goddard Space Flight Center
Greenbelt, MD

GEORGE MAY, Co-Chair
Space Remote Sensing Center
Stennis Space Center, MS

Accommodations for External Payloads on the International Space Station
Betsy Park, NASA Goddard Space Flight Center, Greenbelt, MD; Stephen A. Voels and Dean B. Eppler, NASA Johnson Space Center, Houston, TX

The Stratospheric Aerosol and Gas Experiment III (SAGEIII) Mission Aboard the International Space Station
Lorelei S. Szatkowskia, Obie H. Bradleya, Jr., Lemuel E. Mauldina, III, Mary Beth Wusk, William Chua, Lester C. Farwell, and Piero Galeone, NASA Langley Research Center, Science Applications International Corporation, Ball Aerospace Corporation, European Space Agency, European Space and Technology Center

Lightning Imaging Sensor (LIS) for the International Space Station
Hugh J. Christian, Richard J. Blakeslee, and Steven J. Goodman, NASA Marshall Space Flight Center, Huntsville, AL

International Space Station Utilization for Radiometric Calibration Support to Earth Remote Sensing Programs
Ambler Thompson, Raju Datla, Robert Saunders, and Albert Parr, National Institute of Standards and Technology, Gaithersburg, MD

~~***Remote Sensing of Fire and Deforestation in the Tropics from the International Space Station***~~
~~James W. Hoffman, Space Instruments, Inc, Encinitas, CA; Philip J. Riggan, USDA Forest Service, Riverside, CA; James A. Brass, NASA Ames Research Center, Moffett Field, CA~~

[A17] ENGINEERING RESEARCH AND TECHNOLOGY DEVELOPMENT ON THE INTERNATIONAL SPACE STATION: SUB-SESSION I

WEDNESDAY FEBRUARY 2, 1:15 pm – 3:15 pm, Enchantment Ballroom A & B

FRANK BUZZARD, Co-Chair
NASA Johnson Space Center
Houston, TX

DAVID BOYLE, Co-Chair
Texas A&M University
College Station, TX

The International Space Station Evolution Data Book: An Overview and Status
Jeffrey Antol, NASA Aerospace Systems Concepts and Analysis, NASA Langley Research Center, Hampton, VA, and Catherine A. Jorgensen, Federal Data Corporation, Space Concepts Analysis Section, NASA Langley Research Center, Hampton, VA

The Photovoltaic Engineering Testbed: Design Options and Trade-offs
Geoffrey A. Landis, NASA Glenn Research Center, Cleveland, OH; Andrew Sexton, Richard Abramczyk, Joseph Francz, D.B. Johnson, Liu Yang, Daniel Minjares, and James Myers, Dynacs, Inc., Brook Park, OH

Design and Analysis of Palletized ISS Payloads
Magdalini Z. Lagoudas and David R. Boyle, Texas A&M University, College Station, TX

International Space Station Attitude Motion Associated With Flywheel Energy Storage
Carlos M. Roithmayr, NASA Langley Research Center, Hampton, VA

Hitchhiker JEM-EF Carrier System
Gerard J. Daelemans, NASA Goddard Space Flight Center, Greenbelt, MD, and Theodore C. Goldsmith, Swales Aerospace Inc., Beltsville, MD

The International Space Station as a Test Platform for Evaluating Robot Mobility in a Microgravity Environment
Christopher H. Baum, Unaffiliated, Mount Laurel, NJ

[A18] PROTEIN CRYSTAL GROWTH RESEARCH ON THE INTERNATIONAL SPACE STATION

WEDNESDAY FEBRUARY 2, 1:15 pm – 3:15 pm, Enchantment Ballroom C & D

RON PORTER, Chair
NASA Marshall Space Flight Center
Huntsville, AL

An Observable Protein Crystal Growth Apparatus for Studying the Effects of Microgravity on Protein Crystallization
Alexander McPherson, Alexander J. Malkin, Yurii G. Kutznetsov, Stan Koszelak, Mark Wells, and Greg Jenkins, University of California, Irvine, Department of Molecular Biology & Biochemistry, Irvine, CA, and Jeff Howard and Greg Lawson, Teledyne Brown Engineering, Huntsville, AL

ISS: A Science Classroom for America
Alexander McPherson, Stan Koszelak, Greg Jenkins, Merle Myers, and John Perkey, University of California, Irvine, Department of Molecular Biology & Biochemistry, Irvine, CA; and Joe Ng, University of Alabama, Department of Biology, Huntsville, AL

Protein Crystal Growth Studies at the Center for Macromolecular Crystallography
Lawrence J. DeLucas, Marianna M. Long, Karen M. Moore, Michael Harrington, William T. McDonald, Craig D. Smith, Terry Bray, Johanna Lewis, William B. Crysel, and Lance D. Weise, Center for Macromolecular Crystallography (CMC), University of Alabama at Birmingham (UAB), Birmingham, AL

The X-Ray Detector Test Experiment on Mir
Iraja N. Bandeira, Huberto Closs and Nelson Veissid, Instituto Nacional de Pesquisas Espaciais (INPE), Centro de Technologias Especiais (CTE), Sao Jose dos Campos, SP, Brasil; Stephen R. Smith, Princeton Scientific Instruments, Inc (PSI), Monmouth Junction, NJ; William T. McDonald and Lawrence J. DeLucas, Center for Macromolecular Crystallography (CMC), University of Alabama at Birmingham (UAB), Birmingham, AL

Diffusion-Controlled Protein Crystallization
Daniel C. Carter, Brenda S. Wright, and Robert S. Snyder, New Century Pharmaceuticals Inc., Huntsville, AL; Teresa Y. Miller, Marshall Space Flight Center, Huntsville, AL

[A19] MATERIALS RESEARCH ON THE INTERNATIONAL SPACE STATION

WEDNESDAY, FEBRUARY 2, 1:15 pm – 3:15 pm, Enchantment Ballroom F

SHARON COBB, Co-Chair
NASA Marshall Space Flight Center
Huntsville, AL

AL SACCO, JR., Co-Chair
Northeastern University
Boston, MA

Development Approach for the Accommodation of Materials Science Research for the Materials Science Research Facility on the International Space Station
David A. Schaefer, Materials Science Program Office; S.D. Cobb and F.R. Szofran, Materials Science Group, NASA Marshall Space Flight Center, Huntsville, AL

Quench Module Insert (QMI) and the Diffusion Module Insert (DMI) Furnace Development
Mycha R. Crouch, Jeff Farmer, NASA Marshall Space Flight Center, Huntsville, AL; William E. Carswell, University of Alabama, Huntsville, AL; Fred Rose, Pace & Waite, Inc., Huntsville, AL; Paul H. Tidwell II, Micro Craft, Inc., Hunstsville, AL

A Low Temperature Furnace for Solution Crystal Growth on the International Space Station
Nurcan Baç and Albert Sacco Jr., Center for Advanced Microgravity Materials Processing (CAMMP), Northeastern University, Boston, MA; Joseph Harpster and Robert A. Maston, Intek Inc., Westerville, OH

Microgravity Science in Space Flight Gloveboxes
Charles Baugher, David Cockrell, David Jex, Barry Musick, and James Poe, NASA Marshall Space Flight Center, Huntsville, AL; Nancy Bennett, USRA, Huntsville, AL; Walter Roark, Mevatec, Huntsville, AL

The Physics of Particle Pushing and Engulfment: Experimental and Theoretical Developments
D. M. Stefanescu, F. R. Juretzko, and S. Mukherjee, University of Alabama, Tuscaloosa, AL; A.V. Catalina and S. Sen, University Space Research Alliance, Huntsville, AL; P.A. Curreri, NASA Marshall Space Flight Center, Huntsville, AL

The Coupled Growth in Hypermonotectics Flight Experiment
Barry Andrews, University of Alabama at Birmingham, Department of Materials and Mechanical Engineering, Birmingham, AL, and Sam Coriell, National Institute of Standards and Technology, Gaithersburg, MD

An Investigation of Reactive Sputter Deposited Titania and Titania-Zirconia Nanolaminates
Juanita D. DeLoach and C.R. Aita, Department of Electrical Engineering and Materials, and the Laboratory for Surface Studies, University of Wisconsin-Milwaukee, Milwaukee, WI

[D06] TECHNOLOGIES FOR FUTURE REUSABLE LAUNCH VEHICLES

WEDNESDAY, FEBRUARY 2, 1:15 pm – 3:15 pm, Boardroom East

ROW ROGACKI, Chair
NASA Marshall Space Flight Center
Huntsville, AL

"X-33"
Cleon Lacefield, Lockheed-Martin Skunkworks, Palmdale, CA
Affordability: The Key Technology for Reusable Launch Vehicles
Michael D. Griffin, Orbital Sciences Corporation, Dulles, VA
How X-37 Technology Demonstration Supports Reusable Launch Vehicles
David J. Manley, Richard T. Cervisi, and Paul R. Staszak, The Boeing Company, Seal Beach, CA
Key Air Force RLV Technologies
Robert C. Corley, Air Force Research Laboratory, AFRL/PR, Edwards AFB, CA
"NASA's Pathfinder X-Vehicles"-Flight Demonstrators for the Future
John R. London, NASA Marshall Space Flight Center, Space Transport Directorate, Huntsville, AL

[E10] FUSION SPACE SYSTEMS APPLICATION

WEDNESDAY, FEBRUARY 2, 1:15 pm – 3:15 pm, Retail Room, 1st Floor

TERRY KAMMASH, Chair
University of Michigan
Ann Arbor, MI

BILL EMRICH, Co-Chair
NASA Marshall Space Flight Center
Huntsville, AL

AIMStar: Antimatter Initiated Microfusion for Pre-cursor Interstellar Missions
Kevin J. Kramer, Raymond A. Lewis, Kirby J. Meyer, and Gerald A. Smith, The Pennsylvania State University, University Park, PA, and Steven D. Howe, Synergistic Technologies, Inc., Los Alamos, NM
Performance Optimization of the Gasdynamic Mirror Propulsion System
William J. Emrich, Jr., NASA Marshall Space Flight Center, Huntsville, AL, and Terry Kammash, University of Michigan, Ann Arbor, MI
Colliding Beam Fusion Reactor Space Propulsion System
Frank J. Wessel, Michl W. Binderbauer, Norman Rostoker, University of California, Irvine, CA; Hafiz Ur Rahman, University of California, IGPP, Riverside, CA; and Joseph O'Toole, Los Alamos National Laboratories, Los Alamos, NM
Evaluation of a Fusion-Driven Thruster for Interplanetary and Earth-to-Orbit Flight
H.D. Froning Jr., Flight Unlimited, Flagstaff, AZ; John J.Watrus, Michael H. Frese, and Richard A. Gerwin, NumerEx, Albuquerque, NM
Propagating Magnetic Wave Acceleration for Fusion Propulsion Application
John Slough, University of Washington Redmond Plasma Physics Laboratory, Redmond, WA

[E09] AMTEC CONVERSION TECHNOLOGY AND APPLICATIONS – II

WEDNESDAY, FEBRUARY 2, 1:15 pm – 3:15 pm, Sage I, 1st Floor

AMY RYAN, Chair
Jet Propulsion Laboratory
Pasadena, CA

MIKE SCHULLER, Co-Chair
Texas A&M University
College Station, TX

A Review of Refractory Materials for Vapor-Anode AMTEC Cells
Jeffrey C. King and M.S. El-Genk, Institute for Space and Nuclear Power Studies, The University of New Mexico, Albuquerque, NM
Investigation of Molybdenum–44.5% Rhenium as Cell Wall Material in an AMTEC Based Space Power System
Daniel P. Kramer, Joe D. Ruhkamp, Dennis C. McNeil, Edwin I. Howell, Melvin K. Williams, James R McDougal, and Robert A. Booher, Babcock & Wilcox of Ohio, Miamisburg, OH
Impedance Measurements on Single and Multi-tube AMTEC Cells
V.B. Shields, R.H. Cortez, R.M. Williams, M.L. Homer, A.K. Kisor, and M.A. Ryan, Jet Propulsion Laboratory, Pasadena, CA
Thermal Stability of Beta Alumina Solid Electrolyte under AMTEC Operating Conditions
Roger M. Williams, Margie L. Homer, James Kulleck, Liana Lara, Adam K. Kisor, Roger H. Cortez, Virgil B. Shields, and Margaret A. Ryan, Jet Propulsion Laboratory, Pasadena, CA

[B05] FLUID PHYSICS RESEARCH IN MICROGRAVITY – I

WEDNESDAY, FEBRUARY 2, 3:30 pm – 5:30 pm, Sage II, 1st Floor

JEAN-CLAUDE LEGROS, Chair
University of Brussels, Microgravity Research Centre
Brussels, Belgium

HANS RATH, Co-Chair
Center of Applied Space Technology/Microgravity
Bremen, Germany

Surface Reorientation Upon Step Reduction in Gravity
Jens Gerstmann, Michael E. Dreyer, Hans J. Rath, Center of Applied Space Technology and Microgravity (ZARM), University of Bremen, Bremen, Germany

The Thermodynamics of Meniscus Formation on Wilhelmy Plate Immersion at the Air/Water Interface and the Mechanics of Initial Film Deposition
Nicholas J. Tumavitch, D. Allan Cadenhead, and Brian J. Spencer, Departments of Chemistry and Mathematics, University at Buffalo, Buffalo, NY

Microgravity and Earth Thermal Diffusion in Liquids Holographic Visualization of Convection
Jean Colombani and Jacques Bert, Université Claude Bernard-Lyon I, Départment de Physique des Matériaux, Lyon-Villeurbanne, France

Periodic Oscillations of Low Prandtl-Number Fluids in Rectangular Enclosures
Daniel W. Crunkleton, Ranga Narayanan, and Timothy J. Anderson, Department of Chemical Engineering, University of Florida, Gainesville, FL

Ground Based Experiments About Stability of Deformable Liquid Bridges
V.M. Shevtsova, M. Mojahed, and J.C. Legros, MRC, University Lebre de Bruxelles, Brussels, Belgium

[A20] EARTH SCIENCE AND REMOTE SENSING ON THE INTERNATIONAL SPACE STATION: SUB-SESSION III: EARTH SCIENCE WINDOW OBSERVATIONAL RESEARCH FACILITY (WORF) PAYLOADS

WEDNESDAY, FEBRUARY 2, 3:30 pm – 5:30 pm, Enchantment Ballroom E

JOHN KELLEY, Co-Chair
NASA Headquarters
Washington, DC

BETSY PARK, Co-Chair
NASA Goddard Space Flight Center
Greenbelt, MD

GEORGE MAY, Co-Chair
Space Remote Sensing Center
Stennis Space Center, MS

Space Station and Space Shuttle Studies of Ocean Dynamics and Coastal Resources
Quanan Zheng, Victor Klemas, Xiao-Hai Yan, and Richard Field, University of Delaware, Newark, DE

Validation of Current Land Cover Maps Utilizing Astronaut Acquired Photography
Jennifer Gebelein and John E. Estes, University of California, Santa Barbara, CA

Real-time Earth Observation and Mapping Using Multispectral Space Station Videography
Timothy McCarthy, University of London, London, England

Follow-Ons to the KidSAT/EarthKAM Student Remote Sensing Program
G. R. Mah, USGS' EROS Data Center, Sioux Falls, SD

[A21] ENGINEERING RESEARCH AND TECHNOLOGY DEVELOPMENT ON THE INTERNATIONAL SPACE STATION: SUB-SESSION II

WEDNESDAY, FEBRUARY 2, 3:30 pm – 5:30 pm, Enchantment Ballroom A & B

FRANK BUZZARD, Co-Chair
NASA Johnson Space Center
Houston, TX

DAVID BOYLE, Co-Chair
Texas A&M University
College Station, TX

Evaluation of Conditions Necessary for Successful Bioprocessing of Gray Water in a Microgravity Environment
James E. Urban, Kansas State University, Manhattan, KS; Laura Supra, Allen MacKnight, AlliedSignal Aerospace, Torrance, CA

Diagnostic Solution Assistant Cornerstone for Intelligent System Monitoring, Management, Analysis and Administration
Gordon Aaseng, Courtney Holland, and Bill Nelson, Honeywell, Satellite Systems Operation, Phoenix, AZ

Portable Satellite Assistant
Yuri Gawdiak, Hans Thomas, Dan Clancy, John Loch, NASA Ames Research Center, Moffett Field, CA; Jeff Bradshaw, The Boeing Company, Seattle, WA; and Brian Williams, MIT Department of Aeroautics and Astronautics, Cambridge, CA

IMP: Using Microsat Technology to Support Engineering Research Inside of the International Space Station
Kieran A. Carroll, Dynacon Enterprises Limited, Mississauga, Ontario, Canada

Promotion of Engineering Education Through Engineering Research Technology Development on the ISS
Maria Puente and Olga Carbajal, Texas A&M University, College Station, TX

Variability Reduction and Experimental Techniques for Improving Performance of the International Space Station Kit for External Repair of Module Impacts
Ravi Chaudhary, Rafael Moras, St. Mary's University, San Antonio, TX; Stephen Hall, NASA Marshall Space Flight Center, Huntsville, AL; and William Bohl, Sverdrup Inc., Huntsville, AL

[A22] FUNDAMENTAL BIOTECHNOLOGY AND CELL TISSUE CULTURE RESEARCH ON THE INTERNATIONAL SPACE STATION

WEDNESDAY, FEBRUARY 2, 3:30 pm – 5:30 pm, Enchantment C & D

NEAL PELLIS, Co-Chair
NASA Johnson Space Center
Houston, TX

TERRY JOHNSON, Co-Chair
Kansas State University
BioServe Space Technologies
Manhattan, KS

Electrophoresis Experiments for Space
Robert S. Snyder and Percy H. Rhodes, New Century Pharmaceuticals Inc., Huntsville, AL

A Commercial Isoelectric Focusing Apparatus For Use In Microgravity
Jerald F. Johnson, Jonathan S. Dandy, Terry C. Johnson, BioServe Space Technologies, Kansas State University, Manhattan, KS

Use of Spaceflight and Spaceflight Simulation to Evaluate Osteoprotegerin for Treatment of Disuse Osteoporosis
Ted A. Bateman, Louis S. Stodieck, Virginia L. Ferguson, and Steven J. Simske, BioServe Space Technologies, University of Colorado, Boulder, CO, and Paul J. Kostenuik, Amgen Inc., Thousand Oaks, CA

A Cell Stabilization Factor for Transport of Experimental Cell Cultures to and from the International Space Station
Heideh K. Fattaey, Richard A. Consigli, Ladonna Grenz, and Terry C. Johnson, BioServe Space Technologies, Kansas State University, Manhattan, KS

[A23] MICROGRAVITY MEASUREMENT AND DEVICES

WEDNESDAY, FEBRUARY 2, 3:30 pm – 5:30 pm, Enchantment Ballroom F

RICHARD DELOMBARD, Chair
NASA Glenn Research Center
Cleveland, OH

Acceleration Measurements in JEM
Toshitami Ikeda and Keiji Murakami, National Space Development Agency of Japan (NASDA), Ibaraki, Japan

An Embedded Acceleration Measurement Capability for EXPRESS Rack Payloads
William M. Foster II and Thomas J. Sutliff, NASA Glenn Research Center, Cleveland, OH

High Precision Flow Cell Accelerometer for Measuring Quasi-Steady Microgravity Accelerations
Robert J. Naumann and Glenn Haulenbeek, University of Alabama in Huntsville, Huntsville, AL

Microgravity Vibration Isolation for the International Space Station
Mark S. Whorton, NASA Marshall Space Flight Center, Huntsville, AL

CSA's ISS MIM BASE UNIT for the EXPRESS Rack
Rodney A. Herring and Philip R. Gregory, Canadian Space Agency, Quebec, Canada

Disturbance of the Microgravity Environment by Experiments
Richard DeLombard, NASA Glenn Research Center, Cleveland, OH

[E15] HIGH POWER ELECTRIC PROPULSION – I

WEDNESDAY, FEBRUARY 2, 3:30 pm – 5:30 pm, Boardroom East

IVANA HRBUD, Chair
NASA Marshall Space Flight Center
Huntsville, AL

JAY POLK, Co-Chair
Jet Propulsion Laboratory
Pasadena, CA

High Power Electromagnetic Propulsion Research at the NASA Glenn Research Center
Michael R. LaPointe, Ohio Aerospace Institute, Cleveland, OH, and John M. Sankovic, NASA Glenn Research Center, Cleveland, OH

Interstellar Rendezvous Missions Employing Fission Propulsion Systems
Roger X. Lenard, NASA Marshall Space Flight Center, Huntsville, AL, and Ronald J. Lipinski, Sandia National Laboratories, Albuquerque, NM

Megawatt Plasma Thruster Based On An Inductive Plasma Accelerator (IMPAC)
Dr. J. Slough, University of Washington, Redmond, WA

Cathode Temperature Reduction by Addition of Barium in High Power Lithium Plasma Thrusters
James Polk, Jet Propulsion Laboratory, Pasadena, CA; Viktor Tikhonov, Sergei Semenikhin, and Vladimir Kim, Moscow Aviation Institute, Moscow, Russia

[C05] TOWARD BREAKTHROUGH PROPULSION: QUANTUM VACUUM PHYSICS

WEDNESDAY, FEBRUARY 2, 3:30 pm – 5:30 pm, Retail Room, 1st Floor

F. MICHAEL SERRY, Chair
Digital Instruments, Inc.
Santa Barbara, CA

G. JORDAN MACLAY, Co-Chair
Quantum Fields LLC
Richland Center, WI

Toward an Interstellar Mission: Zeroing in on the Zero-Point-Field Inertia Resonance
Bernhard Haisch, Solar & Astrophysics Laboratory, Lockheed Martin, Palo Alto, CA, and Alfonso Rueda, Department of Electrical Engineering and Department of Physics & Astronomy, California State University, Long Beach, CA

Precision Measurements of the Material and Boundary Geometry Dependence of the Casimir Force
Anushree Roy, Chiung-Yuan Lin and U. Mohideen, University of California, Riverside, CA

A Design Manual for Micromachines Using Casimir Forces: Preliminary Considerations
G. Jordan Maclay, Quantum Fields LLC, Richland Center, WI

Relating Work, Change in Internal Energy, and Heat Radiated for Dispersion Force Situations
Daniel C. Cole, Department of Manufacturing Engineering, Boston University, Boston, MA

[E13] THERMOELECTRIC ENERGY CONVERSION AND APPLICATIONS

WEDNESDAY, FEBRUARY 2, 3:30 pm – 5:30 pm, Sage I, 1st Floor

THIERRY CAILLAT, Chair
Jet Propulsion Laboratory
Pasadena, CA

JIRO NAGAO, Co-Chair
Hokkaido Nat. Industrial Research Inst.
Toyohira, Sapporo, Japan

Thermoelectric Properties of $Bi_{2(1-x)}In_{2x}Te_3$ Ternary Samples
Jiro Nagao and Marhoun Ferhat, Hokkaido National Industrial Research Institute, Sapporo, Japan

Miniaturized Radioisotope Solid State Power Sources
J.-P. Fleurial, G.J. Snyder, J. Patel, J.A. Herman, T. Caillat, B. Nesmith, and E.A. Kolawa, Jet Propulsion Laboratory/California Institute of Technology, Pasadena, CA

High Efficency Segmented Thermoelectric Unicouples
Thierry Caillat, Alex Borshchevsky, Jeff Snyder, and Jean-Pierre Fleurial, Jet Propulsion Laboratory/California Institute of Technology, Pasadena, CA

Thermoelectric Properties of $Ag_2Te_xSe_{1-x}$ Ternary Compounds
Marhoun Ferhat and Jiro Nagao, Hokkaido National Industrial Research Institute, Sapporo, Japan

TECHNICAL SESSIONS
THURSDAY, FEBRUARY 3, 2000

[B06] FLUID PHYSICS RESEARCH IN MICROGRAVITY – II

THURSDAY, FEBRUARY 3, 8:00 am – 10:00 am, Sage II, 1st Floor

ZIAD SAGHIR, Chair
Ryerson Polytechnic University
Toronto, Ontario, Canada

RODNEY HERRING, Co-Chair
Canadian Space Agency
Quebec, Canada

The Experimental Study of the Periodic Instability of Thermocapillary Convection Around an Air Bubble
Christelle Reynard, Robert Santini, Lounès Tadrist, I.U.S.T.I., UMR Technopôle de Chateau Gombert, Marseille Cedex, France, and Patricia Arlabosse, Ecole des Mines d'Albi Carmaux, Albi CT Cedex, France

Theoretical Analysis of 3D, Transient Convection and Segregation in Microgravity Bridgman Crystal Growth
Andrew Yeckel, Valmor F. de Almeida, and Jeffrey J. Derby, Department of Chemical Engineering and Materials Science, Army HPC Research Center, and Minnesota Supercomputer Institute, University of Minnesota, Minneapolis, MN

Effect of Gravitational Potential Energy on the Rate of Evaporation
P. Rahimi and C.A. Ward, Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, Canada

Stress Singularities in Confined Thermocapillary Convection
Guillaume Kasperski, Claudine Delcarte, Gérard Labrosse, Université Paris-Sud XI, France; Eric Chénier, Université de Marne la Vallée, Cite Descartes, Bat. Lavoisier, Marne la Vallee Cedex 2, France

Magnetic Compensation of Gravitational Forces in (-p) Hydrogen Near its Critical Point: Application to Weightlessness Conditions
Daniel Beysens and Denis Chatain, Service des Basses Temperatures, DRFMC, CEA Grenoble, Cedex, France; and Régis Wunenburger and Yves Garrabos, Institute de Chimie de la Matière Condensée de Bordeaux, Centre National de la Recherche Scientifique, Pessac Cedex, France

[E14] MULTI-MEGAWATT POWER SYSTEMS

THURSDAY, FEBRUARY 3, 8:00 am – 10:00 am, Enchantment Ballroom E

ROGER X. LENARD, Chair
Sandia National Laboratories
Albuquerque, NM

DEBORAH BENNETT, Co-Chair
Los Alamos National Laboratory
Los Alamos, NM

Square Lattice Honeycomb Reactor for Space Power and Propulsion
Reza Gouw and Samim Anghaie, University of Florida, Gainesville, FL

Technology Needs for Asteroid and Comet Trajectory Deflection Of a Tunguska-Sized Object Using Fission Propulsion
Roger X. Lenard, Sandia National Laboratories, Albuquerque, NM, and Mike Houts, NASA Marshall Space Flight Center, Huntsville, AL

The Mag Orion-A Propulsion System for Human Exploration of the Outer Planets
Jason Andrews, Andrews Space & Technology, El Segundo, CA, and Dana Andrews, Boeing Advanced Space & Communications Group, Seal Beach, CA

Colliding Beam Fusion Electric Power System for Space Exploration
Joseph A. O'Toole, Los Alamos National Laboratory, Los Alamos, NM; Frank J. Wessel, N. Rostoker, and M. Binderhauer, University of California, Irvine, CA

[A24] INNOVATIVE APPROACHES TO COMMERCIAL ACTIVITIES ON THE INTERNATIONAL SPACE STATION: WHAT CAN THE PRIVATE SECTOR DO?: SUB-SESSION I

THURSDAY, FEBRUARY 3, 8:00 am – 10:00 am, Enchantment Ballroom A & B

JEFFREY IRONS, Co-Chair
Teledyne Brown Engineering
Huntsville, AL

MICHAEL KEARNEY, Co-Chair
SPACEHAB, Inc.
Washington, DC

BEOS – A New Approach to Promote and Organize Industrial ISS Utilization
Helmut Luttmann, Henning Buchholz, and Burkhard Bratke, DaimlerChrysler Aerospace, Bremen, Germany; Detlev Hueser, OHB-System GmbH, Bremen, Germany; Hansjörg Dittus, ZARM, Universität Bremen, Bremen, Germany

A Commercial Space Technology Testbed on ISS
David R. Boyle, Texas A&M University, College Station, TX

Open for Business: A New Approach to Commercialisation of the International Space Station
Master of Space Studies 1998-1999 (MSS4) Class, International Space University, Strasbourg, France

Commercial Programs Update
Michael Kearney, SPACEHAB, Inc., Washington, DC

Commercial Space Initiative
Cathy Shields, The Boeing Company, Titusville, FL

[A25] COMMERCIAL COMMUNICATIONS SYSTEMS FOR THE INTERNATIONAL SPACE STATION: SUB-SESSION I

THURSDAY, FEBRUARY 3, 8:00 am – 10:00 am, Enchantment Ballroom C & D

JOHN S. BARAS, Co-Chair
University of Maryland
College Park, MD

KUL BHASIN, Co-Chair
NASA Glenn Research Ctr. at Lewis Field
Cleveland, OH

Supporting Broadband Communications Needs of the International Space Station Using Commercial Satellites
Michael Hadjitheodosiou, Sreenivas Ramaswamy, and John Baras, University of Maryland, College Park, MD

Migration to Commodity Industry Communications for Space
David Beering, Infinite Global Infrastructures, LLC, Wheaton, IL, and Martin J. Skudlarek, Lockheed Martin, Space Operations Company, Houston, TX

An Advanced Ka Band Phased Array Communication System at Commercial Frequencies
Lawrence Wald, NASA Glenn Research Center, Cleveland, OH; Thomas Kacpura, Dynacs Engineering, Brookpark, OH; Dennis Kershner, Raytheon System Corporation, Plano, TX

ISS Enhanced Payload Data Network for International Space Station Utilization On -Orbit
Robert W. Mortonson, The Boeing Company, Nassau Bay, TX

[A26] FUNDAMENTAL PHYSICS RESEARCH ON THE INTERNATIONAL SPACE STATION: SUB-SESSION I

THURSDAY, FEBRUARY 3, 8:00 am – 10:00 am, Enchantment Ballroom F

FENG-CHUAN LIU, Co-Chair
Jet Propulsion Laboratory
Pasadena, CA

DAVID J. SEIDEL, Co-Chair
Jet Propulsion Laboratory
Pasadena, CA

The Laser Cooling and Atomic Physics (LCAP) Program at JPL
R.J. Thompson, W.M. Klipstein, D.J. Seidel, J. Kohel, and L. Maleki, Jet Propulsion Laboratory, Pasadena, CA

RACE: High Performance Laser-cooled Rb Clock for the ISS
Chad Fertig and Kurt Gibble, Yale University, New Haven, CT; and Bill Klipstein, James Kohel, Lute Maleki, David Seidel, and Rob Thompson, Jet Propulsion Laboratory, Pasadena, CA

Low Temperature Research on the International Space Station
Mary Jane Adriaans, Feng-Chuan Liu, and Ulf E. Israelsson, Jet Propulsion Laboratory, Pasadena, CA

The Low Temperature Microgravity Physics Experiments Project
Warren Holmes, Anthony Lai, Arvid Croonquist, and Talso Chui, Jet Propulsion Laboratory, Pasadena, CA; J.H. Eraker, Randy

Abbott, Gary Mills, and James Mohl, Ball Aerospace and Technology Corporation, Boulder, CO; James Craig, Balu Balachandra, and Jade Gannon, Swales Aerospace, Pasadena, CA

Boundary Effects Near the Superfluid Transition (BEST), an Experiment Proposed for the ISS

Guenter Ahlers, Edgar Genio, Kerry Kuehn, Sarabjit Mehta, and Daniel Murphy, University of California, Santa Barbara, CA; and Paul Finley, Feng-Chuan Liu, and Yuan-Ming Liu, Jet Propulsion Laboratory, Pasadena, CA

Gravitational Alignment in Ground-Based Measurements to Support Critical Dynamics in Microgravity

Sven Mueller, Jena University, Urbich, Germany; T.D. McCarson, D.A. Sergatskov, R.V. Duncan, The University of New Mexico, Albuquerque, NM

[D07] SPACEPORT DEVELOPMENTS – I

THURSDAY, FEBRUARY 3, 8:00 am – 10:00 am, Boardroom East

BILL DETTMER, Chair
New Mexico Space Commission
Albuquerque, NM

HERB BACHNER, Co-Chair
Federal Aviation Administration
Washington, DC

Development of Commercial Spaceports

Herb Bachner, Federal Aviation Agency, Washington, DC

Spaceports of Tomorrow and Beyond: Enabling Technologies and Systems for a New Space Launch Infrastructure

John J. Hudiburg, Kennedy Space Center, FL

~~***RLV Spaceport Operations***~~

~~Ron Williams, Lockheed Martin~~

New Mexico Space Port

Hanson Scott, New Mexico Office of Space Commercialization, Santa Fe, NM

Pursuit of Spaceport Texas

Tom Moser, Texas Aerospace Commission, Austin, TX

[C06] TOWARD BREAKTHROUGH PROPULSION: VARIOUS ISSUES AND POSSIBILITIES

THURSDAY, FEBRUARY 3, 8:00 am – 10:00 am, Retail Room, 1st Floor

G. JORDAN MACLAY, Chair
Quantum Fields LLC
Richland Center, WI

CLAUDIO MACCONE, Co-Chair
Alenia Spazio
Torino, Italy

Simplistic Propulsion Analysis of a Breakthrough Space Drive for Voyager

Malcolm D.K. Boston, Tennessee State University, College of Engineering & Technology, Nashville, TN

Engineering Warp Drives

Brice N. Cassenti, United Technologies Research Center, East Hartford, CT, and Harry I. Ringermacher, General Electric Company, Schenectady, NY

Gravitational Radiation and its Application to Space Travel

Giorgio Fontana, University of Trento, Faculty of Science, Trento, Italy

Frequency- and Time-Domain Detection of Superluminal Group Velocities in One Dimensional Photonic Crystals (1DPC)

Mohammad Mojahedi, Kevin J. Malloy, Center for High Technology Materials (CHTM), Albuquerque, NM; Raymond Chiao, Department of Physics, University of California at Berkeley, Berkeley, CA

Computational Tools for Breakthrough Propulsion Physics: State of the Art and Future Prospects

Claudio Maccone, Alenia Spazio, Torino, Italy

[E16] HIGH POWER ELECTRIC PROPULSION – II

THURSDAY, FEBRUARY 3, 8:00 am – 10:00 am, Sage I, 1st Floor

IVANA HRBUD, Chair
NASA Marshall Space Flight Center
Huntsville, AL

JAY POLK, Co-Chair
Jet Propulsion Laboratory
Pasadena, CA

~~***Lithium Lorentz Force Accelerator Studies***~~
~~Edgar Y. Choueiri, Andrea Kodys, and Gregory Emsellem, Electric Propulsion and Plasma Dynamics Laboratory, Princeton University, Princeton, NJ~~

An Exploratory Look at Nuclear Power Architectures for VASIMR
Jeffrey A. George, Franklin R. Chang Díaz, Advanced Space Propulsion Laboratory, NASA Johnson Space Center, Houston, TX

High Power Theta-Pinch Propulsion for Piloted Deep Space Exploration
Michael R. LaPointe, Horizon Technologies Development Group, Cleveland, OH

IEC Fusion: The Future Power and Propulsion System for Space
Walter E. Hammond, HQ Air Force/SB, Washington, DC; Matt Coventry, George H. Miley, Jon Nadler, University of Illinois at Urbana-Champaign, Urbana, IL; John Hanson and Ivana Hrbud, NASA Marshall Space Flight Center, Huntsville, AL

[A27] INNOVATIVE APPROACHES TO COMMERCIAL ACTIVITIES ON THE INTERNATIONAL SPACE STATION: WHAT CAN THE PRIVATE SECTOR DO?: SUB-SESSION II

THURSDAY, FEBRUARY 3, 10:15 am – 12:15 pm, Enchantment A & B

CATHY SHIELDS, Co-Chair
The Boeing Company
Titusville, FL

The ISS, an Opportunity for Technology in Space
D. Routier and Jacques Tailhades, Matra Marconi Space, Toulouse Cedex, France

Commercial Opportunities on Space Station Freedom(?): Some Thoughts on What the ISF Is and Isn't
Alden M. Richards, Space Machine Advisors, Inc., Greenwich, CT

The ISADORA Module: A Multi-Purpose Studio for the Arts for the International Space Station
Richard Seabra, Design Academy of Eindhoven, The Netherlands

Microgravity as a Research Tool to Improve US Agriculture
R.J. Bula, AgSpace Technologies International, LLC, Cross Plains, WI, and Bratislav Stankovic, Wisconsin Center for Space Automation and Robotics, University of Wisconsin-Madison, Madison, WI

The Effect of Microgravity on the Fragrance of a Miniature Rose, "Overnight Scentsation" on Space Shuttle (STS-95)
Braja D. Mookherjee, Subha Patel, International Flavors and Fragrances, Inc., Union Beach, NJ, and Weijia Zhou, University of Wisconsin-Madison, Madison, WI

[A28] COMMERCIAL COMMUNICATIONS SYSTEMS FOR THE INTERNATIONAL SPACE STATION: SUB-SESSION II: PANEL DISCUSSION

THURSDAY, FEBRUARY 3, 10:15 am – 12:15 pm, Enchantment C & D

KUL BHASIN, Moderator
NASA Glenn Research Ctr., Lewis Field
Cleveland, OH

John S. Baras, University of Maryland, College Park, MD
Thomas Brackey, Hughes Space & Communications Company, El Segundo, CA
Frank Buzzard, NASA Johnson Space Center, Houston, TX
Jeff Grant, Astrolink, Bethesda, MD
Fred Stillwagen, NASA Langley Research Center, Hampton, VA

[A29] FUNDAMENTAL PHYSICS RESEARCH ON THE INTERNATIONAL SPACE STATION: SUB-SESSION II

THURSDAY, FEBRUARY 3, 10:15 am – 12:15 pm, Enchantment Ballroom F

FENG-CHUAN LIU, Co-Chair
Jet Propulsion Laboratory
Pasadena, CA

DAVID J. SEIDEL, Co-Chair
Jet Propulsion Laboratory
Pasadena, CA

A Laser-Cooled Atomic Clock in Space
T.P. Heavner, L. W. Hollberg, S.R. Jefferts, J. Kitching, D.M. Meekhof, T.E. Parker, W.D. Phillips, S.L. Rolston, H.G. Robinson, J.H. Shirley, D.B. Sullivan, and F.L. Walls, National Institute of Standards and Technology, Boulder, CO; N. Ashby, University of Colorado, Boulder, CO; W.M. Klipstein, L. Maleki, D.J. Seidel, R.J. Thompson, S. Wu, and L. Young, Jet Propulsion Laboratory, Pasadena, CA; R.F.C. Vessot, Harvard Smithsonian Center for Astrophysics, Cambridge, MA; A. DeMarchi, Politecnico di Torino, Torino, Italy

Utilizing the International Space Station for the Primary Atomic Reference Clock in Space (PARCS) Mission
D.J. Seidel, W.M. Klipstein, R.J. Thompson, J. Kohel, and L. Maleki, Jet Propulsion Laboratory, Pasadena, CA; S.R. Jefferts, T.P. Heavner, L.W. Hollberg, J. Kitching, D.M. Meekhof, T.E. Parker, W. Phillips, S. Rolston, H.G. Robinson, J.H. Shirley, D.B. Sullivan, and F.L. Walls, National Institute of Standards and Technology, Boulder, CO; N. Ashby, University of Colorado, Boulder, CO; R.F.C. Vessot, Harvard Smithsonian Center for Astrophysics, Cambridge, MA

A Test of Local Position Invariance Principle of General Relativity Using Precision Clocks on Space Station
J.A. Lipa, M. Dong, W. A. Moeur, S. Wang, S. Buchman, and J.P. Turneaure, Stanford University, Stanford, CA

Measurements of the Heat Capacity of He-II Under a Heat Current Near the Lambda Transition
Alexa W. Harter, Davd L. Goodstein, Condensed Matter Physics, Pasadena, CA, and Jet Propulsion Laboratory, Pasadena, CA

Dynamical Properties of Confined Superfluids Near the Lambda Point
Kwangsik Nho and Efstratotios Manousakis, Florida State University, Tallahassee, FL

A Search for Free Quarks in the Micro Gravity Environment of the International Space Station
Paul Hudspeth, Georgetown High School, Georgetown, TX, and Robert Klingler, Technical Elucidations, Georgetown, TX

[D08] SPACEPORT DEVELOPMENTS – II

THURSDAY, FEBRUARY 3, 10:15 am – 12:15 pm, Boardroom East

BILL DETTMER, Chair
New Mexico Space Commission
Albuquerque, NM

HERB BACHNER, Co-Chair
Federal Aviation Administration
Washington, DC

~~***Kodiak Launch Complex Status***~~
~~Pat Lander, Alaska Spaceport, Anchorage, AK~~
~~***Commercial Space-The Next California Gold Rush***~~
~~Janice Bellucci Dunn, California Space and Technology Alliance, Santa Monica, CA~~
Next Generation Launch Vehicles and Their Launch Base Support
Edward A. O'Connor, Spaceport Florida Authority, Cape Canaveral, FL
The Virginia Space Flight Center Model for an Integrated Federal/Commercial Launch Range
Billie M. Reed, Virginia Commercial Space Flight Authority, Norfolk, VA
~~***Spaceport Washington, A Flight To The Future***~~
~~William K. King, Aerospace Programs, Washington State Dept. of Community Trade and Economic Development, Seattle, WA~~

[C07] TOWARD BREAKTHROUGH PROPULSION: PHYSICS OF HYPERFAST TRAVEL

THURSDAY, FEBRUARY 3, 10:15 am – 12:15 pm, Retail Room, 1st Floor

CLAUDIO MACCONE, Chair
Alenia Spazio
Torino, Italy

LEO BITTEKER, Co-Chair
NASA Marshall Space Flight Center
Huntsville, AL

Alcubierre's Warp Drive: Problems and Prospects
Chris Van Den Broeck, Starlab, Zaventem, Belgium
Wormholes and Time Travel
P.C. Aichelburg, Institute for Theoretical Physics, University of Vienna, Vienna, Austria

Toward a Traversible Wormhole
Serguei Krasnikov, The Central Astronomical Observatory at Pulkovo, St. Petersburg, Russia
A Viable Superluminal Hypothesis: Tachyon Emission from Orthopositronium
M. Skalsey, R.S. Conti, J.J. Engbrecht, D.W. Gidley, R.S. Vallery, University of Michigan, Ann Arbor, MI; P.W. Zitzewitz, University of Michigan Dearborn, Dearborn, MI
Extended Relativity
Eduardo Valencia, Advanced Gravity AC, Cuernavaca, Morelos, Mexico

[E12] ADVANCED RADIOISOTOPE POWER SYSTEMS

THURSDAY, FEBRUARY 3, 10:15 am – 12:15 pm, Sage I, 1st Floor

LISA HERRERA, Chair
U.S. Department of Energy
Germantown, MD

ROBERT CARPENTER, Co-Chair
Orbital Sciences Corporation
Germantown, MD

Performance Analysis of Coated $^{238}PuO_2$ Fuel Particles Compact for Radioisotope Heater Units
Jean-Michel Tournier and Mohamed S. El-Genk, Institute for Space and Nuclear Power Studies, The University of New Mexcio, Albuquerque, NM
Coated Particle Fuel for Radioisotope Power Systems and Heater Units: Status and Future Research Needs
Mohamed S. El-Genk and Jean-Michel Tournier, Institute for Space and Nuclear Power Studies, Albuquerque, NM; Ron Lipinski, Sandia National Laboratories, Albuquerque, NM; Joe Sholtis, Sholtis Engineering & Safety Consulting, Tijeras, NM
Milliwatt Thermoelectric Generator for Space Applications
Daniel T. Allen, John C. Bass, Norbert B. Elsner, Saeid Ghamaty, and Charles C. Morris, Hi-Z Technology, Inc., San Diego, CA
Advanced Power for Planetary Missions
Robert D. Cockfield and E. Wayne Tobery, Lockheed Martin Astronautics, King of Prussia, PA
A Filament Wound Carbon-Carbon Composite for Impact Shell Application
Ralph H. Zee, Auburn University, Auburn, AL, and Glenn Romanoski, Oak Ridge National Laboratory, Oak Ridge, TN