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SPESIF-2010

Space, Propulsion & Energy Sciences
International Forum

February 23-26, 2010 · Johns Hopkins University Applied Physics Laboratory

2010 Theme: Future Directions

Call for Papers and Presentations

Technical and Publication Chair

Glen A. Robertson
IASSPES, Madison, AL

Papers and presentations are invited in all technical areas of the Space, Propulsion and Energy Sciences International Forum (SPESIF-2010), organized by the Institute for Advanced Studies in the Space, Propulsion and Energy Sciences (IASSPES). SPESIF-2010 will be held February 23 - 26, 2010, at the Johns Hopkins University Applied Physics Laboratory, Laurel, MD. Papers approved by the Technical and Editorial Committees will be publishable in an American Institute of Physics (AIP) proceedings.

It is the submitters' responsibility to obtain any clearances, i.e., internal or ITAR reviews, before submitting material to SPESIF for review. Delays due to clearances are expected. So please let us know as soon as possible of such delays.

ABSTRACT SUBMISSION: Interested authors or presenters are invited to submit abstracts for approval by email through the technical chairs listed within the individual descriptions with a copy sent to the editorial chair at abstract2010@ias-spes.org for cataloging. The email submission should indicate in the SPESIF forum, number and title of the technical session in which they wish their abstracts to be considered. The general deadline for submission of abstracts for papers and presentation is July 15, 2009. After this date, approval will depend on space availability. So please submit early.

The abstract guidelines/template can be found at www.ias-spes.org/SPESIF2010/SPESIF_Author_page.html. Generally, abstracts should include the name(s), phone number(s) and email(s) of all authors, and clearly indicate the **motivation and purpose of the work, important results, significance, applications, and briefly summarize approach or methodology**. Acknowledgment of receipt of submitted abstracts will be sent to the person submitting the abstract. Inquiries can be made by email to spesif@ias-spes.org or by calling (256) 694-7941.

REVIEW AND ACCEPTANCE OF FULL PAPERS: Authors with accepted abstracts will be asked to provide a draft manuscript for technical review by August 15, 2009. Draft manuscripts do not need to be complete, but must follow the format instructions for preparing the final manuscript and contain enough information for approval. The manuscript guidelines/template can be found at www.ias-spes.org/SPESIF2010/SPESIF_Author_page.html. **A minimum fee of \$50 will be required for editorial services rendered after draft approval; regardless of publication in the AIP proceedings.**

Final, camera-ready, manuscripts are due no later than November 15, 2009 to insure acceptance into the AIP proceedings.

SPESIF expects a fully paid registration to accompany the final camera-ready paper for it to be published in the SPESIF-2010 AIP Proceedings. Please let us know at draft manuscript submittal if a payment delay is expected. A full registration fee will be billed for publication in the AIP proceedings, regardless of attendance at SPESIF-2010.

For more information and updates, please consult the SPESIF homepage at: www.ias-spes.org/SPESIF.html.

DEADLINES

Initial Abstract Submission	July 15, 2009
Draft Manuscript	August 15, 2009
Final Camera Ready Manuscript	November 15, 2009

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A. 7th SYMPOSIUM ON NEW FRONTIERS IN THE SPACE PROPULSION SCIENCES

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This symposium pertains to the advancement of the space propulsion sciences from current technologies to emerging concepts and theories. The symposium is broken into the following Five Topic Areas cover the contemporary propulsion sciences, technologies and techniques for short-term objectives supporting near-term space initiatives for Earth, in-orbit, Moon and Mars-based propulsion and power systems over the next 30 years; enhancement of the feasibility of future space propulsion systems; new frontiers in the space propulsion sciences comprising ideas, concepts, experiments, theories and models; and approaches that could lead to new directions in space travel, exploration, astrophysics and particle physics with applications to propulsion, power or communication; or to help combine these areas of science with the space propulsion sciences toward new frontiers in science.

A01. Advances in Contemporary Propulsion Sciences

Chair: John Cole, NASA Marshall Space Flight Center, AL, Retired, (256) 882-0492, john.cole.hsv@gmail.com.

Co-Chair: TBD

Papers are solicited that examine advances in the diverse arena covering the contemporary propulsion sciences. This arena involves advances in chemical propulsion as well as hybrids, beam energy systems, electric and magnetic thrusters and launchers, magnetic, plasma and solar sails, other worthwhile concepts and innovative and alternative space propulsion approaches that have been tested and shown feasible within currently accepted physical laws. This section focuses on: New Advances in Propulsion Technology, Advanced Propulsion Concepts, and Experimental Results.

A02. Advanced Technologies, Concepts, and Techniques for Space Application

Chair: Chuck Suchomel, USAF WPAFB, OH, 937-904-8653, charles.suchomel@wpafb.af.mil

Co-Chair: Frank Mead, fbmeadjr@yahoo.com

Papers are solicited that examine advances in technologies and techniques for enhancing contemporary propulsion systems as well as other technologies required for space travel and exploration. This arena involves advances in power, communication and other technologies or other innovative and alternative approaches that are testable within engineering accepted limits as well as those concepts that may be on the edge of current engineering realities. This section focuses on but is not limited to: Advanced Power Concepts, Advanced Communication Concepts, Other Technological Concepts and Techniques for Space Application, and Experimental Results.

A03. Frontiers in Propulsion Science

A03.1. Theories, Models and Concepts

Chair: Martin Tajmar, Austrian Research Centers GmbH - ARC, Seibersdorf, Austria, +43-50550-3142, martin.tajmar@arcs.ac.at

Co-Chair: Ben Solomon, Interstellar Space Exploration Technology Initiative, P.O. Box 831, Evergreen, CO 80437, 303-618-2800; benjamin.t.solomon@iSETI.us

Papers are solicited that examine models and theories by providing new insight or extend theoretical concepts and models. These theoretical concepts and models should be governed by known physical laws (although perhaps in embryonic form or not yet formally well-established) and should be testable by current or foreseeable scientific and/or engineering techniques. Examples of technologies

to be examined in these sessions include (but are not limited to): interaction of gravitation and superconductors, propulsion using novel means such as zero-point fields, quantum entanglement, and novel propellantless propulsion techniques.

Papers should provide the theoretical groundwork for future space travel and/or exploration beyond the bounds possible using the current propulsion sciences, pushing their expansion towards new frontiers in the propulsion sciences, and so should stress the practical consequences of the work or concentrate on determining the limitations of contemporary scientific and technological approaches and explaining how such limitations may be overcome by using new, evolving, and enabling, technologies. Concepts can be either mathematical or speculative and should include rigorous, logical, scientific support and plausible assumptions to validate the fundamental aspects.

A03.2. Experimental Results

Chair: James Woodward, California State University, Fullerton, CA, 714-278-3596, jwoodward@fullerton.edu

Co-Chair: TBD

Papers are solicited that report on the experimental results or possible experimental techniques related to theoretical concepts and models in the basic research realm of the propulsion sciences, to include experiments related (but are not necessarily limited) to interaction of gravitation and superconductors, quantum entanglement, propulsion using novel means such as zero-point fields, and novel propellantless propulsion techniques. The experiments discussed should provide a better understanding of these concepts, either pro or con, and must provide suggestions for further work indicating clearly the likely future direction of the work.

A04. Toward New Directions in Astrophysics/Particle Physics with application to Propulsion, Power or Communications

A04.1. New Directions in Astrophysics/Particle Physics

Chair: Bernd Binder, Quanics, Salem, BW, Germany, ++497553827390, binder@quanics.com

Co-Chair: Andrew Beckwith, Menlo Park, California, 650-322-6768, rwill9955b@yahoo.com

Papers are solicited that examine areas in Astrophysics and Particle Physics that could provide new directions in propulsion, power or communication for space application, and focus on Astrophysics or Particle Physics Concepts, New Cosmological or Matter Models, Experimental Standards, and Experimental Results. These papers should not be general physics papers, but should instead address problems and resolutions thereof in propulsion, power or communication in terms readable by practicing professional engineers. Astrophysics/Particle Physics papers written with an engineering focus and application are particularly encouraged.

In papers covering a concept/theory/model, authors must indicate how these could enhance the area of propulsion, power or communication and if a new concept/theory/model authors must discuss experimental application(s). If necessary, the experimental discussion may be presented as a separate paper to allow for adequate discussion and description of the proposed experiment.

A04.2. Unconventional Physical Principles and Gravitational Models

Chair: Paul Murad, Vienna, VA, (703) 759-2028, ufoguyypaul@yahoo.com

Co-Chair: John Brandenburg, ORBITEC, Madison, WI, 608-229-2790, brandenburgj@orbitec.com

Papers are solicited that give a serious examination of physical, gravitational, or atmospheric anomalies and determine whether they are physically meaningful or not from an analytical or experimental perspective. This could include unusual physical principles such as converting angular momentum into linear momentum in a space drive, outlining the theoretical requirements as well as investigating potential proofs that demonstrate the existence of gravitational waves, the Gertsenshtein effect, the coupling of torsion with gravitation and electromagnetic fields, identifying gravitational vortices, new types of nuclear power generation such as aneutronic reactors, or finding new gravitational models that do away with the need for negative mass and energy.

A05. Far Term Space Transport/Environment Models and Theories

A05.1. Far Term Space Transport and Environment Models & Theories

Chair: Eric Davis, Warp Drive Metrics, Austin, TX, 512-342-2187, ewdavis@earthtech.org

Co-Chair: Ray Lewis, Pennsylvania State University, Boalsburg, PA, 814-466-6187, r3l@psu.edu

Papers are solicited that provide new models and theories or additional information covering older models and theories in the area of space transport, including environmental effects. Papers should generally be related to faster than light-speed, warp-drives, wormholes and other areas that could provide a better understanding of space transport mechanisms beyond our current knowledge. Concepts can be either mathematical or speculative and should include rigorous, logical, scientific support and plausible assumptions to validate the fundamental aspects.

A05.2 Conceptual Models and Theories Promoting Alternative Space-times

Chair: Gregory V. Meholic, The Aerospace Corporation, El Segundo, CA, 310 336-2919, Greg.V.Meholic@aero.org

Co-Chair: TBD

Papers are solicited that explore conceptual models and theories regarding the existence of an alternative space-time or space-like realm necessary for faster-than-light (FTL) travel or manipulation of the space-time metric. Concepts can be either mathematical or speculative and should include rigorous, logical, scientific support and plausible assumptions to validate the fundamental aspects. This arena also examines the characteristics of alternate dimensions and hyperspace as well as exploring the application of these ideas to gravitation theory, cosmology or quantum physics.

B. 14th CONFERENCE ON THERMOPHYSICS APPLICATIONS IN MICROGRAVITY

Program Chair

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This Conference pertains to thermophysical research and technology considered to be important for emerging aerospace applications. Sessions focus on scientific and technology research efforts originating from government, university and commercial research programs. The Conference starts with a session on emerging, and perhaps controversial, thermal control issues, which is followed by discussions on recent progress in fundamental research topics, and then the discussions move on to specific new technologies and applications. Technology discussions focus on; single and two-phase flow technologies, advanced thermal control coatings, convection interfacial mass transfer, and innovative thermal control devices for spacecraft applications.

B01. Current Topics in Thermal Control

Chair: Ted Swanson, NASA Goddard Space Flight Center, Greenbelt, MD, 301-286-7854, Ted.Swanson@nasa.gov

Co-Chair: Tung T. Lam, The Aerospace Corporation, Los Angeles, CA, 310-336-5408, tung.t.lam@aero.org

This opening session consists of invited talks, and possibly a round table discussion, which focus on emerging topics of current interest to the thermal management community. As these may be controversial, it is a presentation only session: no paper will be submitted.

Invitation Only - No Open Submissions

B02. Progress in Microgravity Thermophysics

Chair: Fred Best, Texas A&M University, fbest@ne.tamu.edu

Co-Chair: TBD

This session addresses recent advances in understanding the fundamentals of thermophysics in a microgravity, or partial gravity environment.

B03. Two-Phase Thermal Control Systems

Chair: Michael T Pauken, Jet Propulsion Laboratory, Pasadena, CA, 818-354-4242, michael.t.pauken@jpl.nasa.gov

Co-Chair: Bill Anderson, Advanced Cooling Technologies, Inc., Lancaster, PA 717-295-6066, Bill.Anderson@1-ACT.com

This session solicits papers addressing Two-Phase Thermal Control Systems for existing and future spacecraft systems. Relevant papers may address the design, analysis, testing and/or operation of Two-Phase Thermal Control Systems such as spray cooling, electrohydrodynamic devices, thin film heat transfer, heat pipes, loop heat pipes, capillary pumped loops and mechanically pumped loops with two-phase heat exchangers.

B04. High Capacity Heat Rejection Systems – Lasers, Processors, and Nuclear Heat Sources

Chair: Pete Cologer, ATK, Beltsville, MD, 301 902 4394, pete.cologer@atk.com

Co-Chair: Gary Adamson, Hamilton Sundstrand, Windsor Locks, CT, 860-654-2646, gary.adamson@hs.utc.com

Recent space initiatives are considering the use of high power density electronics, advanced lasers and nuclear electric propulsion. The power levels that future spacecraft will be dealing with are changing the order of magnitude from kilowatts to hundreds of kilowatts and even more. This change requires some fundamental revision of the Thermal Control System design approach. As there is only one way to get rid of the waste heat in space, to reject it via radiation, the radiator areas will increase so dramatically that they will start dictating application limitations and architecture. A global project of the cases when the heat rejection system is comparable and even exceeds the payload in weight and envelope. Papers in this session will describe different efforts and approaches to create advanced thermal control systems designed for large transport capacity and high heat flux applications. Examples are high transport/high temperature loop heat pipes, high heat flux/high temperature cooling loops and evaporators, and hybrid pumped fluid loops.

B05. Advanced Thermal Control Technologies via Conduction, Convection, and/or Radiation

Chair: Jeffrey Didion, NASA Goddard Space Flight Center, Greenbelt, MD, 301 286-4363, Jeffrey.R.Didion@nasa.gov

Co-Chair: Glenn.T.Tsuyuki, Jet Propulsion Laboratory, Pasadena, CA, 818 354-2955, Glenn.T.Tsuyuki@jpl.nasa.gov

Two-phase technologies have become the standard tools for spacecraft thermal control. Papers are invited that discuss either recent advancements in these established technologies or address emerging techniques: Examples are: phase-change and sensible heat thermal storage, heat pumps, high conductivity structures and substrates, thermal switches, novel radiator concepts, and single-phase mechanically pumped technologies. Papers on issues/scalability of high power thermal systems in microgravity are also invited.

B06. Thermal Control for Lunar and Deep Space Missions

Chair: Dan Butler, NASA Goddard Space Flight Center, Greenbelt, MD, 301 286-8618, Dan.Butler@nasa.gov

Co-Chair: TBD

This session invites papers on novel spacecraft thermal control design, analysis, testing, and advanced technologies for lunar, planetary, and deep space missions. Advanced concepts such as autonomous thermal control and thermal energy management based thermal control are also solicited.

This session will also consider technical papers which cover thermal concepts and technologies applied to any aspect of human space exploration; including crew transfer and landing vehicles, lunar and planetary bases and crew space life support.

B07. Advances in Spray Cooling

Chair: Kirk L. Yerkes, USAF/ Air Force Research Laboratory, Wright-Patterson AFB, OH, kirk.yerkes@wpafb.af.mil

Co-Chair: TBD

Papers in this session will concentrate on spray cooling research which addresses fundamental thermophysics cooling system design for ground-based, airborne and space applications and platforms. Topics of interest include evaporator design, alternative fluids, large surface area ($> 2 \text{ cm}^2$) studies, scalability, nozzle design and enhancements to spray cooling.

The next generation of airborne and space based platforms include the development of alternative power systems, advanced Lasers and electronic components. On-board components such as Laser-Diode Arrays (LDA's) and Multi-chip modules (MCM's) require high heat flux thermal management techniques. Technology requirements for these systems include the cooling of high flux heat sources ($\geq 100 \text{ W/cm}^2$), while maintaining tight temperature control (approx. $\pm 2 \text{ }^\circ\text{C}$), reliable start-up, shut down, and long term stability. Spray cooling provides the potential for high heat flux (HHF) cooling upwards of 100 W/cm^2 using fluorinerts and 1000 W/cm^2 for water. It allows for tight temperature control at low coolant fluid flow rates. Spray cooling is one of the most appealing heat acquisition techniques for the thermal management needs of tomorrow's HHF systems.

B08. Advanced Heat Pipe Technologies

Chair: Bob Reid, Los Alamos National Laboratory, Los Alamos, NM, 505-667-2626, rsr@lanl.gov

Co-Chair: D. Angirasa, EADS Astrium, Stevenage, Hertfordshire, SG1 2AS, UK, +44-1438-774072; a_devarakonda@yahoo.com

This session considers the technologies of thermosyphons, heat pipes, loop heat pipes and other related devices. Technical papers are sought on such topics as fluid properties, thermo-chemical compatibility, corrosion resistance, wick structures and development, novel materials, thermal performance tests and life test data. Technical papers addressing single heat pipe modeling and thermal system models that incorporate heat pipes as components are also sought. In addition, papers presenting experimental data on thermal management systems with heat pipes as significant heat transport mechanism are encouraged.

B09. Smart Materials

Chair: Kenneth Shannon, Eclipse Energy Systems, 2345 Anvil Street North, St. Petersburg, FL, 727-344-7300,

kshannon@eclipsethinfilms.com

Co-Chair: TBD

Smart coatings and materials are enabling technologies that have a wide range of applicability including spacecraft and instrument thermal control. Of particular interest are technologies that vary their emittance or absorptance in response to a change in the environment. This session focuses on the development, fabrication, integration, testing, flight validation, and application of these smart technologies.

B10. ISRU Thermal Control Technologies

Chair: Daniel Nguyen, NASA Goddard Space Flight Center, Greenbelt, MD, 301-286-6600, Daniel.H.Nguyen@nasa.gov

Co-Chair: TBD

In-situ Resource Utilization (ISRU) for lunar and other extraterrestrial missions will require novel concepts for thermal control of critical processes during various operations such as regolith handling and preconditioning, oxygen and propellant production, phase separation, and material heating. Relevant papers addressing the design, analysis, testing, and operation of thermal control technologies for regolith heating, reactors, condensers and evaporators, heat pipes, radiators, and cooling loops are solicited. Advanced concepts demonstrating low power, mass, and/or volume are especially of interest.

C. 2nd SYMPOSIUM ON ASTROSOCIOLOGY

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The astrosociology symposium focuses on topics common to the space community, though from a social-scientific perspective. That is, a strong consideration of how each topic relates to society, culture, and the individual – the traditional purview of the social and behavioral sciences, humanities, and the arts (hereafter referred to as the “social sciences” for brevity) -- defines astrosociology. A major theme of the symposium focuses on how traditional knowledge and findings of the social sciences, which normally focus on terrestrial matters, actually possess important applications for space exploration and related issues. Moreover, the direct application of social science research and theory-building in contemporary and future timeframes receive attention as vital components in the understanding of humanity’s efforts in space environments in terms of exploration, settlement, work, and recreation. Examination of the impact of space exploration on terrestrial societies and cultures receives attention in addition to that of humans in space.

Papers and presentations are solicited that address astrosociology themes, focusing on the topics described below.

C01. Astrosociology: Definition, Scope, and Relevance/Astrosociology in the Classroom

Chair: Jim Pass, Astrosociology Research Institute, Huntington Beach, CA, (714) 317-6169; jpass@astrosociology.org

Co-Chair: Simone Caroti, Purdue University, Department of Literature, West Lafayette, IN, (765) 426-4380; scaroti@purdue.edu

Papers are solicited that examine the definition, scope of coverage, and relevance of a relatively new social science field called astrosociology that focuses on the intersection between space and society. The purpose of this session is to introduce astrosociology to the audience in the context of (1) the general absence of the social sciences in space exploration and research and (2) the vital need for a coherent social science field as humanity moves to increase its presence in space in terms of its permanence, numbers of spacefarers, and distance from Earth. The scope of astrosociology represents a wide-ranging number of issues, but these issues have received little attention in the past even while their relevance to mainstream social life continues to increase. Additionally, papers are solicited that examine the issues related to the need for establishing astrosociology in existing programs and departments within both the social sciences and physical/natural sciences. It relates to a formal collaboration between the two major branches of science.

C02. Science Fiction and Scientific Actuality

Chair: Simone Caroti, Purdue University, Department of Literature, West Lafayette, IN, (765) 426-4380; scaroti@purdue.edu

Co-Chair: TBD

Papers are solicited that examine the relationship between science fiction and science. The astrosociological perspective looks at the two-way exchange between these fields, specifically at 1) the way science fiction absorbs current scientific discourse and casts it in a predictive model that tries to anticipate the human consequences of its potential fallout, and 2) the usefulness this speculative procedure can have for astrosociology, space exploration, and contributions toward the formation of spacefaring societies.

C03. Space Policy and Space Law in a Societal Context

Chair: Christopher M. Hearsey, Silver Spring, MD; (Phone); outer.space.analysis@gmail.com

Co-Chair: Thomas Gangale, OPS-Alaska, Petaluma, 707-773-1037; tég@ops-alaska.com

Papers are solicited that focus on issues that relate societal concerns concerning how space policy and law are developed and carried out from perspective oriented toward historical analysis, contemporary issues, and future possibilities. The astrosociological approach places space policy and law in a societal context that includes issues such as the cultural perspectives of different nations, cooperation

among nations to reach a consensus on space issues, and cooperative ventures in space. Conflict among nations and the militarization of space fall under the scope of this session as well.

C04. Astrosociology and Astrobiology (and SETI)

Chair: TBD (contact Jim Pass, Astrosociology Research Institute, jpass@astrosociology.org)

Co-Chair: TBD

Papers are solicited that examine the relationship between astrosociology and astrobiology (as well as the Search for Extraterrestrial Intelligence, or SETI). Issues include the benefits of astrobiology and SETI to societies based solely on their very pursuit, philosophical issues about the possibility of life in the universe (including why we should seek out such life), how we should construct messages meant for an intelligent extraterrestrial species, and the impact of discovering extraterrestrial life (of any sort) on societies, their cultures, and social groups (such as religious groups). How does an astrosociological perspective enhance our understanding of humanity's quest to find extraterrestrial life?

C05. Planetary Defense and Societal Protection

Chair: (contact Jim Pass, Astrosociology Research Institute, jpass@astrosociology.org)

Co-Chair: TBD

Papers are solicited that address planetary defense in terms of its traditional approach (i.e., its focus on detection of threatening objects and defense of Earth), but the approach here is to place such traditional issues in the context of protecting societies and their cultures (in addition to individuals) should the detection or defense components fail. How much effort and resources should societies devote to ensuring that their traditional ways of life can continue with minimized disruption? How much preparation is prudent, how much is wasteful? What plans should politicians make to evacuate and protect their citizens? What types of cooperative relationships between nations should receive consideration? Such questions require attention by experts in the planetary defense field.

C06. Space Societies/The Settlement of Space Environments

Chair: Simone Caroti, Purdue University, Department of Literature, West Lafayette, IN, (765) 426-4380; scaroti@purdue.edu

Co-Chair: Jim Pass, Astrosociology Research Institute, Huntington Beach, CA, (714) 317-6169; jpass@astrosociology.org

Papers are solicited that examine the social environment in addition to the traditional attention to the physical environment (i.e., the habitat) based on an engineering and architectural approach provides the focus for this session. Why the social environment is largely ignored? Can the physical environment function properly while the social environment fails? A space settlement or colony should be thought of as a "space society," an astrosociological concept that acknowledges the reality that any settlement will function like a society with subcultures and social groups, and will become an increasingly social structure as additional individuals join it. Participants focus on what it will take for the social environment to function properly and how the two environments must successfully survive together.

C07. Technology Transfers and Spinoffs: How Space Technologies Improve Life on Earth

Chair: Douglas A. Comstock, Director, Innovative Partnerships Program (NASA HQ),
1 202 358-2221, doug.comstock@nasa.gov

Co-Chair: Daniel P. Lockney, Spinoff Editor, NASA Center for AeroSpace Information (CASI),
301-621-0224, Daniel.P.Lockney@nasa.gov

Papers are solicited that examine technology transfers and spinoffs from the nation's space program. The perspectives addressed could include technical, historical, social, economic, and legal. The session also seeks to frame the topic within the larger context of the space program by addressing the degree of importance and relevance of spinoffs relative to other space issues. To what degree can or should spinoffs be used to justify the space program? Can similar technologies develop without a space program? What is the public perception and/or importance of spinoffs? How are space technologies currently being used to assist developing countries and in what other ways might they be used? Examples of technology transfer and spinoffs will accompany discussions.

C08. Spacefaring Societies

Chair: Jim Pass, Astrosociology Research Institute, Huntington Beach, CA, (714) 317-6169; jpass@astrosociology.org

Co-Chair: TBD

Papers are solicited that examine the future of social change in terrestrial societies, which can be addressed in terms of the very real possibility of moving from post-industrial social structures to spacefaring societal structures. Current nations that possess spaceflight abilities are considered “space-capable” societies. The term “spacefaring society” is reserved for an ideal type of social system in which space becomes a central aspect of everyday life and infused into its various social institutions and larger cultures of societies. Issues include the steps societies may take in moving toward the spacefaring society ideal type as well as what characteristics spacefaring societies may possess. How far along is the United States, for example, on the continuum toward a spacefaring society?

C09. Medical Astrosociology

Chair: (contact Jim Pass, Astrosociology Research Institute, jpass@astrosociology.org)

Co-Chair: TBD

Papers are solicited that expand the traditional approach associated with space biomedicine by focusing on social-scientific issues consistent with disciplines such as psychology, social psychology, sociology, and anthropology. Behavioral health, operational psychology, medical sociology, and medical anthropology serve as common analogous models on Earth. In space environments, issues related to medical astrosociology capture larger issues as well. Ethical dilemmas may include compromises between providing the best healthcare for one person and ensuring the welfare of the rest of the crew/population. How do the various space agencies handle the relationship between biomedical operational and social scientific issues in the context of contemporary missions within nations and across nations? What is the evolution of the relationship between biomedical operations and social scientific issues over time, from the beginning of spaceflight and into the future?

C10. Overview Effect

Chair: (contact Jim Pass, Astrosociology Research Institute, jpass@astrosociology.org)

Co-Chair: TBD

The papers solicited in this session should explore the idea of the overview effect (simplistically, the effect an image of Earth from outside has on our perception of humanity’s role within a cosmic context) as the first true astrosociological experience in mankind’s history. Coffee-table books of HST pictures of the universe; newsreels featuring footage of the ISS, the space shuttles, and astronauts on a spacewalk; movies and TV series; multimedia educational packages for children; software planetariums; all these packets of information bring home to our overwhelmingly planet-bound, barely planet-wide civilization the sense of a larger context, as well as a certain awareness of the presence of a much wider territory than the one we are used to considering. To some extent, this awareness shapes public perception of the human adventure into space – how and why we should go out, what the consequences might be, and what this endeavor might entail in terms of shaping our existential perspectives. How does the real view from space differ from Earthbound perspectives? From an astrosociological viewpoint, what role has the overview effect played in shaping space-related social dynamics? Is it possible to guide such a role, and steer it so it can help us deliver the first true astrosociological message to the human collective?

C11. Space and Society: a Cultural History of the Space Age, 1900-2009

Chair: (contact Jim Pass, Astrosociology Research Institute, jpass@astrosociology.org)

Co-Chair: TBD

The papers in this session should focus on mapping out the social relevance of the history of the first space age. So far, we have largely perceived this history as a very contained phenomenon, the almost exclusive province of the astronauts, technicians and administrators who more or less directly brought it about. But the world at large watched the rockets fly, looked at Neil Armstrong and others walk on the Moon, and gazed at the first pictures of Earth seen from outside. The history of the space age is everybody’s history, and astrosociology should examine it to identify its shape and characteristics. What were the dreams of its fathers, and how were these dreams fulfilled – or denied? What meaning did the exploration of space have, not for the astronaut or the rocket scientist,

but for the taxpayer and the man on the street? How will the experience gathered from studying this meaning help us shape a new meaning for a new space age?

C12. Cosmic Political Economy

Chair: (contact Jim Pass, Astrosociology Research Institute, jpass@astrosociology.org)

Co-Chair: TBD

Papers for this session should address issues related to the political economy of space environments as described here. Cosmic political economy projects the academic study of production, buying and selling, and their relations with law, custom, and government, into the environment of outer space. As an interdisciplinary field, it draws on many distinct academic schools, including political science and economics, as well as international relations, sociology, and history, and also considers the enabling and constraining effects of aerospace technology.

We welcome ideas for additional session topics.

D. 1st SYMPOSIUM ON HIGH-FREQUENCY GRAVITATIONAL WAVES

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The Symposium on High-Frequency Gravitational Waves (HFGWs) provides a forum for discussions pertaining to the means of detecting and generating HFGWs and their practical application. Papers on HFGWs may encompass the high-frequency (100 kHz to 100 MHz), very high frequency (100 MHz to 100 GHz), and ultra high frequency (greater than 100 GHz) bands all referred to as HFGWs and should concentrate on the means for evolving this technology. Fourteen laboratory High-Frequency Gravitational Wave (HFGW) generators (or transmitters) have been proposed in the past 45 years in peer-reviewed journal articles. Ten different HFGW detectors (or receivers) have been proposed since 1978, as reported in peer-reviewed journal articles, and three of them actually built. Thus HFGW generation and detection are paramount interest areas for the Symposium. Specific interests also include (but are not limited to) the description of HFGWs in conventional space-time, applications to astrophysics, communication, nuclear effects, surveillance and remote movement of massive objects. Concepts may be either theoretical or based upon actual experiments or fabricated devices and should include rigorous, logical, scientific support and plausible assumptions and/or data to validate the fundamental aspects of the presented papers. Examples of appropriate papers from the literature concerning High-Frequency Gravitational Waves can be found at: <http://www.gravwave.com/docs/HFGW%20References.pdf>.

Papers and presentations are solicited that address HFGW themes, focusing on the following topics:

D01. Detectors/Receivers

Chair: Gary V. Stephenson, Seculine Consulting, Redondo Beach, Ca, (425) 443-8651; seculine@gmail.com

Co-chair: Andrew Beckwith, Menlo Park, California, (650) 322-6768, rwill9955b@yahoo.com

Papers are solicited that involve the detection of HFGWs having frequencies above 100 kHz. Research results concerning either HFGW detectors in operation or theoretical ones in the development or planning stage are welcome. Application of superconductors, back-action analyses, new detection theories, relic HFGW detectors, etc.. would also be valuable contributions to be presented.

D02. Generators/Transmitters

Chair: Robert M L Baker, Jr., Playa del Rey, CA, (310) 823-4143; drrobertbaker@gravwave.com

Co-chair: Gary V. Stephenson, Seculine Consulting, Redondo Beach, Ca, (425) 443-8651; seculine@gmail.com

Papers are solicited that involve the laboratory generation of HFGWs having frequencies above 100 kHz. Research results concerning theoretical HFGW generators and transmitters are welcome. Application of superconductors to high-gain HFGW transmitter antennas utilizing HFGW optics, nuclear generation and transmitter/receiver systems would also be valuable contributions to be presented.

D03. Applications to Cosmology/Astrophysics

Chair: Andrew Beckwith, Menlo Park, California, (650) 322-6768, rwill9955b@yahoo.com

Co-chair: Giorgio Fontana, University of Trento, Trento, Italy, +390461883906; giorgio.fontana@unitn.it

Since observation of high-frequency relic gravitational waves (HFRGWs) will provide vital information about the birth of the Universe and its early dynamical evolution as well as enable significant direct inferences to be drawn about the value of the Hubble parameter of the early universe and the cosmological scale factor, papers concerning these applications are solicited. Other astrophysical applications involve the entropy growth of the early Universe, an ability to rule out alternatives to inflation theories, to

pinpoint the energy scale at which inflation took place and to provide clues about the symmetries underlying new physics at the highest energies, would also be most valuable contributions to be presented.

D04. Applications to the Global Anti-Terrorism

Chair: Robert M L Baker, Jr., Playa del Rey, CA, (310) 823-4143; drrobertbaker@gravwave.com

Co-chair: R. Clive Woods, Louisiana State University, Electrical & Computer Engineering Department, Baton Rouge, La, (225) 578-8961; cwoods@lsu.edu.

Papers are solicited that apply HFGW technology to defeat global terrorism. Examples include, but are not limited to: secure (low probability of intercept or LPI) communications to and among our anti-terrorism assets including deeply submerged submarines; surveillance through and into various structures, underground and underwater installations to observe weapons of mass destruction or WMDs, caches of weapons and ammunition, terrorist command and control centers, etc. ; remote HFGW force-field generators to displace missile warheads, defeat anti-satellite systems, interfere with weapon systems of all varieties, etc. Also papers dealing with potential WMDs that include remote nuclear-event generation in order to anticipate and defend against them would be valuable contributions.

D05. Commercial Applications of HFGWs

Chair: R. Clive Woods, Louisiana State University, Electrical & Computer Engineering Department, Baton Rouge, La, (225) 578-8961; cwoods@lsu.edu.

Co-chair: Robert M L Baker, Jr., Playa del Rey, CA, (310) 823-4143; drrobertbaker@gravwave.com

Papers are solicited that describe potential applications of HFGWs to the commercial market place. These applications may be theoretical but should be practical and commercially realizable given suitable likely advances in technology. Possible subjects include, but are not limited to: radioactive waste-free nuclear energy production, propulsion, and HFGW optics and communication systems.

D06. Theoretical HFGW Research

Chair: Giorgio Fontana, University of Trento, Trento, Italy, +390461883906; giorgio.fontana@unitn.it.

Co-chair: R. Clive Woods, Louisiana State University, Electrical & Computer Engineering Department, Baton Rouge, La, (225) 578-8961; cwoods@lsu.edu.

One of the revolutionary concepts introduced by the theory of Special Relativity is recognizing that time is a full-featured dimension on a par with space. We solicit papers on theories for modeling gravitational waves in the full four-dimensional manifold of General Relativity and in a multidimensional universe. Generation and detection by physical transducers and propagation in space-time and Euclidean space (Hyperspace) should be the main topics of the contributions. In addition, the analysis of non-linear propagation effects would be of great interest for applications. Lorentzian or Euclidean approaches to space-time are of interest, including comparisons between the two formalisms. Gravitational waves in Gravitoelectromagnetic models of gravity are also accepted, including 3+1 formulations derived from General Relativity, 4+1 formulations derived from Euclidean Relativity and Dark Matter.

E. MEETING ON FUTURE DIRECTIONS IN SPACE SCIENCE AND TECHNOLOGY

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The Meeting on Future Directions in Space Science and Technology seeks to promote the dream of space exploration by providing a venue for basic research and current technology developments currently underway in various areas of space science and technology that could prove beneficial in the near future. In any integrated space vehicle, there are a large number of independent and interdependent systems that are needed to accomplish mission success. In some cases, there are engineers and scientists that work with fine focus to produce prototypes of high fidelity subsystems (such as navigation or propulsion) that are relevant for next generation spacecraft; while in other cases, teams of engineers and scientists work diligently and carefully to incorporate the latest cutting-edge subsystems into an integrated spacecraft tailor built to accomplish a specific other-worldly task. In all cases, it is critical that engineers and scientists alike be keenly aware of the trade space of available hardware and technology at their disposal so as to allow them to focus their efforts on the real technical innovation challenges.

This meeting is still in planning.

Those wishing to prepare and chair a session, please contact the program chair or co-chairs above.

Papers and presentations are solicited but not limited the following areas of interest:

- Robotic systems to be used in unmanned and manned space exploration are of interest. Terrestrial robotic systems that could be adapted (and how) to space use are of interest. Intelligent systems used to diagnose and disposition the health status of integrated vehicle systems is also of interest.
- Proximity operations sensor systems to be used to facilitate rendezvous and docking of two orbital spacecraft are of interest.
- Guidance, Navigation, and Control systems to be used beyond the Global Positioning System halo are of interest.
- Environmental Control and Life Support Systems for manned spaceflight are of interest.
- Communications systems are of interest.
- Prototype approaches for accomplishing space science and technology objectives supporting advanced spacecraft development are of interest.
- Avionic systems development for manned space flight is of interest.

Also of interest are discussions on:

- Future propulsion science and technologies for space flight beyond the Earth/Lunar system. These should address the fundamental high-impact issues of current and future propulsion systems on the access and utilization of space, or the areas of science and technology requiring basic research breakthroughs for such ideas to be viable.
- Other sciences and technologies required for exploration outward from the Earth/Lunar system.
- Future directions of space utilization within government, industry, academia and private programs to include but not limited to colonization.

Sessions will be developed from the submitted papers and presentations into the following focused areas:

- Scientific and technology foundations,
- Basic research areas originating from government, industry, academia and private research programs, and
- Public education.

The chairs have final authority on what is presented in their conference.

The following are some session topics in work. These will be updated as new sessions are developed.

E01. Enabling Technologies for Lunar/Mars Surface Science

Chair: Pamela E. Clark, NASA – GSFC, Greenbelt, MD 20771, 301-286-7457, pamela.e.clark@nasa.gov

Co-Chair: TBD

Papers and presentations are solicited that examine technologies that will enable lunar surface sciences activities that support the development of a lunar outpost architecture meeting the published goals and objectives of the scientific community. Of interest, but not limited to, are discussions on the:

- Development of surface instrument packages capable of operating autonomously with stand-alone power systems whether delivered robotically or by a human crew, in particular those that could give a) early measurements of the atmosphere, radiation, field, charged particle, and dust interactions on local and global scales, and b) global scale geophysical data.
- Support (e.g., via navigation, communication, robotics) for EVA and IVA science/exploration activities on the Lunar/Mars surface.
- Development of tools and instruments for use by crew during EVA and IVA science/exploration activities.

E02. Nuclear Technologies for Lunar/Mars Missions

Chair: Michael G. Houts, NASA – MSFC, Huntsville, AL, 256-544-8136; Michael.houts@nasa.gov

Co-Chair: TBD

Fission surface power (FSP) could potentially provide abundant, continuous, cost-effective power for any surface location that may be needed to accomplish the more difficult NASA exploration missions on the moon, Mars, and other destinations envisioned in the 2020s and beyond. In addition, nuclear thermal propulsion could potentially enable sustainable exploration throughout the inner solar system.

Papers and presentations are solicited that examine nuclear technologies for both energy and propulsion applications in space.

E03. Advanced Concepts for Lunar/Mars/Beyond Missions

Chair: TBD

Co-Chair: TBD

Papers and presentations are solicited that examine advanced in-space concepts being considered by the government agencies, industry and academia not address elsewhere.

This is specifically placed for papers or presentations from NASA's centers' advanced concepts groups to discuss their current and planned future concepts programs/studies.

W1. WORKSHOP ON FUTURE ENERGY SOURCES

Program Chair

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The Workshop on Future Energy Sources seeks to integrate current, emerging and future energy sources for space exploration with Earth applications, including their issues of public interest.

Papers and presentations are solicited that examine basic research and theories for conventional (e.g., fusion), non-conventional (e.g., bio-fuels) and more speculative future energy sources (e.g., quantum fluctuations, dark energy, gravity, wide frequency EM, etc.).

Papers and presentations are also solicited that address the fundamental high-impact issues of future energy sources, such as their economics versus alternatives, breakthroughs in energy source or conversion efficiency and sustainability.

Examples of the above include (but are not limited to):

- Future Earth based bio-fuels (from various plants) could eventually find their way into terra-forming of Mars or other planets and moons or in planet/moon base labs for creating usable energy (fuels and oxygen) for both spacecraft and ground based systems. (These bio-fuels can also be extended to in-space medical purposes.)
- Space Solar Power (SSP) system for future terrestrial usage can be extended to other forms of in-space applications.
- New or re-engineered fusion or fission devices could provide safe nuclear energy sources for heating and electrical power for Earth and space applications. Of specific interest, but not limited to are advanced fusion or fission energy concepts for enabling detailed exploration and utilization of the lunar surface.
- More speculative future energy sources that stretch our imaginations and could fundamentally rewrite the history of Earth and space energy systems. Concepts and ideas should be derived from experimental or accepted scientific observations from peer-reviewed sciences such as Astronomy and be rooted in theoretical physics or a variation thereof. Theoretical papers and presentations should discuss the means to experimentally test them - due to the paper size limitation; this can be done in two papers/presentations.

Sessions will be developed from the submitted papers and presentations into the following focused areas:

- Scientific and technology foundations,
- Basic research areas originating from government, industry, academia and private research programs, and
- Public education.

The workshop chairs have final authority on what is presented in their workshop. It is suggested that authors wishing to submit papers on the "More speculative Future Energy Sources" discuss this with the workshop chairs before submitting their abstract to SPESIF.

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