NASA INSTITUTE FOR ADVANCED CONCEPTS

8th Annual Meeting

October 17-18, 2006
Tucson Marriott® University Park
880 E Second Street
Tucson, Arizona 85719 USA
Phone: 1-520-792-4100
Fax: 1-520-882-4100
8:00 - 8:30AM  Registration and Light Breakfast

8:30 - 9:00AM  Welcome: NIAC Overview
Robert Cassanova, NIAC Director
Diana Jennings, NIAC Associate Director
NIAC Overview, Introduction of New NIAC Phase I Fellows & NIAC Student Fellows

9:00 - 10:00AM  Keynote Speaker: William Pomerantz, Director of Space Projects, X PRIZE Foundation

10:00 - 10:30AM  BREAK

10:30 - 12:00PM  NIAC STATUS REPORTS:
Webster Cash, University of Colorado Boulder
“New Worlds Imager”

Roger Angel, Steward Observatory, University of Arizona
“A Deep Field Infrared Observatory Near the Lunar Pole”

12:00 - 1:00PM  BUFFET LUNCH

1:00 - 2:00PM  Keynote Speaker: Sean Carroll, California Institute of Technology

2:00 - 2:45PM  NIAC STATUS REPORTS:
Elizabeth McCormack, Bryn Mawr College
“Investigation of the Feasibility of Laser Trapped Mirrors”

2:45 - 3:15PM  BREAK

3:15 - 4:45PM  NIAC STATUS REPORTS:
Young Bae, Bae Institute
“A Contamination-Free Ultrahigh Precision Formation Flight Method Based on Intracavity Photon Thrusters and Tethers: Photon Tether Formation Flight”

Jim Bickford, Draper Laboratory, Inc.
“Extraction of Antiparticles Concentrated in Planetary Magnetic Fields”

4:45 - 5:15PM  Grand Visions Discussion

5:45 - 7:30PM  RECEPTION:
Viewing of NIAC Phase I & Student Award Posters
Tour of the University of Arizona Mirror Lab
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<td>8:00 - 8:45 AM</td>
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<td>8:45 - 9:00 AM</td>
<td>Welcome: Robert A. Cassanova, NIAC Director</td>
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| 9:00 - 10:00 AM | Keynote Speaker: Anthony Tether, Director  
              | Defense Advanced Research Projects Agency                                                              |
| 10:00 - 10:30 AM | BREAK                                                                                                 |
| 10:30 - 11:15 AM | NIAC SUCCESS STORY:  
                        | Newman, Massachusetts Institute of Technology  
                        | “Astronaut Bio-Suit System for Exploration Class Missions”                                               |
| 11:15 - 12:00 PM | NIAC STATUS REPORT:  
                       | Wendy Boss & Amy Grunden, NC State University  
                       | “Redesigning Living Organisms for Mars”                                                                    |
| 12:00 - 1:00 PM | BUFFET LUNCH                                                                                           |
| 1:00 - 1:30 PM | Paul Mexcur, NASA SBIR/STTR Program  
                    | “NASA Funding Opportunities”                                                                            |
|               | Bob Scaringe, AVG Communications  
               | “Advanced Concept Marketing”                                                                             |
| 1:30 - 3:00 PM | NIAC STATUS REPORTS:  
                        | Nestor Voronka, Tethers Unlimited, Inc.  
                        | “An Architecture of Modular Spacecraft with Integrated Structural Electrodynamic Propulsion (ISEP)”   |
|               | Mason Peck, Cornell University  
               | “Lorentz-Actuated Orbits: Electrodynamic Propulsion Without A Tether”                                    |
| 3:00 - 3:30 PM | BREAK                                                                                                 |
| 3:30 - 5:00 PM | NIAC STATUS REPORTS:  
                        | Steven Dubowsky, Massachusetts Institute of Technology  
                        | “Microbots for Large-Scale Planetary Surface & Subsurface Exploration”                                    |
|               | Brian Gilchrist, University of Michigan  
               | “Scalable Flat-Panel Nanoparticle MEMS/NEMS Propulsion Technology for Space Exploration in the 21st Century” |
| 5:00 PM - Until | OPEN DISCUSSION & ADJOURNMENT                                                                         |
The following Phase I Concepts began development through a NIAC contract in September, 2006. Each of these investigators has a poster at the NIAC 8th Annual Meeting. Informal discussions are encouraged with the investigators during the scheduled breaks, luncheons and the reception.

David Akin, University of Maryland, College Park
"Development of a Single-Fluid Consumable Infrastructure for Life Support, Power, Propulsion, and Thermal Control"

Roger Angel, University of Arizona
"Practicality of a Solar Shield in Space to Counter Global Warming"

Devon Crowe, Physical Sciences, Incorporated
"Self-Deployed Space or Planetary Habitats and Extremely Large Structures"

Tom Ditto, Dewitt Brothers Tool Company
"Primary Objective Grating Astronomical Telescope"

Robert Hoyt, Tethers Unlimited
"Reduction of Trapped Energetic Particle Fluxes in Earth and Jovian Radiation Belts"

Mason Peck, Cornell University
"In-Orbit Assembly of Modular Space Systems with Non-Contacting, Flux-Pinned Interfaces"

Joe Ritter, University of Hawaii
"Large Ultra-Lightweight Photonic Muscle Telescope"

Matthew Silver, Intact Labs, LLC
"Bio-Electric Space Exploration"

John Slough, University of Washington
"Plasma Magnetic Shield for Crew Protection"

Guillermo Trotti, Trotti and Associates, Incorporated
"Extreme eXPeditionary Architecture (EXP-Arch): Mobile, Adaptable Systems for Space and Earth Exploration"

George Williams, Ohio Aerospace Institute
"Spacecraft Propulsion Utilizing Ponderomotive Forces Organization"
The following NIAC Student Fellows will be presenting posters at the 8th Annual Meeting. Informal discussions are encouraged with the investigators and their academic advisors during the scheduled breaks, luncheons and the reception. The winners of the NIAC Student Fellows Prize for Academic Year 2006-2007 are as follows:

**J. Michael Burgess, University of Alabama, Huntsville**
"Advanced Grazing Incidence Neutron Imaging System"

**Daniella Della-Guistina, University of Arizona**
"The Martian Bus Schedule: An Innovative Technique for Protecting Humans on a Journey to Mars"

**Jonathan Sharma, Georgia Institute of Technology**
"START: Utilizing Near-Earth Asteroids with Tether Technologies"

**Floris van Breugel, Cornell University**
"Evolution of a Scalable, Hovering Flapping Robot"

**Rigel Woida, University of Arizona**
"The Road to Mars"
KEYNOTE SPEAKERS:

William J. Pomerantz  
Director of Space Projects, X PRIZE Foundation

Mr. Pomerantz currently serves as the Director of Space Projects for the X PRIZE Foundation. He holds a BA in Earth and Planetary Sciences from Harvard University. He served as a Research Associate in the NASA Academy at Goddard Space Flight Center, NASA’s premiere leadership training program. After graduating from the Academy, Mr. Pomerantz worked as a planetary geologist studying Martian geology in the lab of James Head, III at Brown University for one year before leaving to earn his MS in Space Studies at the International Space University (ISU).

After graduating from ISU, Mr. Pomerantz worked as an Analyst at the Futron Corporation, an aerospace consultancy based in Bethesda, Maryland. At Futron, he participated in a number of research projects, ranging from launch demand analysis for the Federal Aviation Administration to commercial development research for the Florida Spaceport Authority. In July of 2005, Mr. Pomerantz took the position of Director of Space Projects at the X PRIZE Foundation, where he currently manages all of the Foundation's new prizes in the field of aerospace, totaling more than $2.5 million in total prize money. Additionally, Mr. Pomerantz serves as the Foundation's sole representative in Washington, DC, performing many government relations tasks.

Mr. Pomerantz is also the co-founder and editor of SpaceAlumni.com, an online news and networking tool for young space professionals around the world. In 2006, Mr. Pomerantz was selected to serve on a National Research Council (NRC) Federal Advisory Committee producing a report on "Meeting the Workforce Needs for the National Vision for Space Exploration". Additionally, he is an officer of the Space Generation Foundation, a Vice President of the NASA Academy Alumni Association, and sits on the Steering Committee for the Space Exploration Alliance. Mr. Pomerantz has been an invited lecturer at a number of institutions and conferences, including the Smithsonian's National Air and Space Museum and George Washington University's Space Policy Institute.

Dr. Anthony J. "Tony" Tether, Director,  
Defense Advanced Research Projects Agency (DARPA)

Dr. Anthony J. Tether was appointed as Director of the Defense Advanced Research Projects Agency (DARPA) on June 18, 2001. DARPA is the principal Agency within the Department of Defense for research, development, and demonstration of concepts, devices, and systems that provide highly advanced military capabilities. As Director, Dr. Tether is responsible for management of the Agency's projects for high-payoff, innovative research and development. Until his appointment as Director, DARPA, Dr. Tether held the position of Chief Executive Officer and President of The Sequoia Group, which he founded in 1996. The Sequoia Group provided program management and strategy development services to government and industry. From 1994 to 1996, Dr. Tether served as Chief Executive Officer for Dynamics Technology Inc. From 1992 to 1994, he was Vice President of Science Applications International Corporation's (SAIC) Advanced Technology Sector, and then Vice President and General Manager for Range Systems at SAIC. Prior to this, he spent six years as Vice President for Technology and Advanced Development at Ford Aerospace Corp., which was acquired by Loral Corporation during that period. He has also held positions in the Department of Defense, serving as Director of DARPA's Strategic Technology Office in 1982 through 1986, and as Director of
the National Intelligence Office in the Office of the Secretary of Defense from 1978 to 1982. Prior to entering government service, he served as Executive Vice President of Systems Control Inc. from 1969 to 1978, where he applied estimation and control theory to military and commercial problems with particular concentration on development and specification of algorithms to perform real-time resource allocation and control. Dr. Tether has served on Army and Defense Science Boards and on the Office of National Drug Control Policy Research and Development Committee. He is a member of the Institute of Electrical and Electronics Engineers (IEEE) and is listed in several Who’s Who publications. In 1986, he was honored with both the National Intelligence Medal and the Department of Defense Civilian Meritorious Service Medal. Dr. Tether received his Bachelor's of Electrical Engineering from Rensselaer Polytechnic Institute in 1964, and his Master of Science (1965) and Ph.D. (1969) in Electrical Engineering from Stanford University.

Sean Carroll
California Institute of Technology, Department of Physics

Sean Carroll is a Senior Research Associate at the California Institute of Technology. He received his Ph.D. from Harvard University, and has served as a postdoctoral researcher at the Center for Theoretical Physics at MIT and the Institute for Theoretical Physics at the University of California, Santa Barbara, and on the faculty of the University of Chicago. His research ranges over a number of topics in theoretical physics, focusing on cosmology, field theory, particle physics, and gravitation. Issues addressed by this research include the nature of dark matter and dark energy, the connection of cosmology to quantum gravity and string theory, and whether the early universe underwent a period of inflationary expansion. Carroll has written a graduate textbook, "Spacetime and Geometry: An Introduction to General Relativity", published by Addison-Wesley. He has been awarded fellowships from the Sloan and Packard foundations, as well as the MIT Graduate Student Council Teaching Award.
The NIAC is proud to announce that its 8th Annual Meeting will be held at the Tucson Marriott University Park in Tucson, Arizona on October 17-18, 2006. All are invited to attend this meeting, which will feature presentations from NIAC's Fellows and Student Fellows, and keynote speeches from experts in aeronautics and space exploration.

**MEETING SITE**
The host hotel, Tucson Marriott University Park is located at 880 E. Second Street, Tucson, Arizona 85719, 520-792-4100, 520-882-4100 fax, http://marriott.com/property/propertypage/TUSUP
Rooms are available at a discounted rate of $115.00 (plus tax) available until 5:00 PM, **September 14, 2006**. For reservations, call the hotel directly at 520-792-4100. When making your reservation, please refer to the meeting name: *NASA Institute for Advanced Concepts Annual Meeting*. Guests will receive the discounted rate and will also receive discounts on leisure services, the Starr Pass Golf Course and local restaurants.

**GETTING THERE**
The closest airport is the Tucson International Airport, less than 10 minutes away by car. For maps and directions please see: http://marriott.com/property/factsheet/tusup

**MEETING REGISTRATION**
Deadline: Friday, **October 6, 2006**. Attendees can register for the meeting by contacting Katherine Reilly at kreilly@niac.usra.edu with their name, affiliation, email address, telephone number and specific dates of attendance. There is no charge for registration.