2013 NIAC Spring Symposium

Chicago, IL - March 12-14, 2013

D R A F T

Tuesday, March 12

9:00	**Welcome & Overview**	*Jay Falker, NIAC Program Executive*
9:30	**Keynote Address**	*Jorge Arinez, Manager, Sustainable Manufacturing Systems, General Motors Global Research & Development* **Strategy and Innovation at GM Manufacturing Research**
10:30	**Poster Overview**	NIAC Phase II Fellows will briefly introduce their studies. Posters are available for viewing in Room CC12B.
10:45	**Break**	
11:00	*Marc Cohen, Marc M. Cohen, Architect* **Robotic Asteroid Prospector (RAP) Staged from L-1: Start of the Deep Space Economy**	
11:30	*David Kirtley, MSNW, LLC* **A Plasma Aerocapture and Entry System for Manned Missions and Planetary Deep Space Orbiter**	

12:00 **Lunch**

1:30	**Special Address**	*Bryan Wunar, Director, Center for the Advancement of Science Education, Chicago Museum of Science & Industry* **Education and Public Outreach: Inspiring the Next Generation**
2:00	*Geoffrey Landis, NASA GRC* **Venus Landsailing Rover**	
2:30	*Joseph Predina, ITT Space Systems, LLC* **NIST in Space: Better Remote Sensors for Better Science**	
3:00	**Break**	
3:30	*Robert Hoyt, Tethers Unlimited, Inc.* **NanoTHOR: Low-Cost Launch of Nanosatellites to Deep Space**	
4:00	*Babak Saif, NASA GSFC* **Atom Interferometry for detection of Gravity Waves-a**	
4:30	*Jeffrey Nosanov, NASA JPL* **Solar System Escape Architecture for Revolutionary Science (SSEARS)**	
5:00	Poster Session I	
5:30	**Adjourn**	

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Wednesday, March 13

9:00	**NIAC Plans and Announcements**	*Jay Falker, NIAC Program Executive*
9:45	**Special Address**	*Bob Cassanova, NIAC External Council Chair*
10:00	**Break**	
10:30	*Wayne Gellett, eSionic* **Solid State Air Purification System**	
11:00	*Gecheng Zha, University of Miami* **Silent and Efficient Supersonic Bi-Directional Flying Wing**	
11:30	**Special Address**	*Geza Gyuk, Director of Astronomy, Adler Planetarium* **Far Horizons: Democratizing Space Exploration from High Altitude Balloons to Asteroid Missions**

11:45 **Lunch**

1:30	*Adrian Agogino, NASA ARC* **Super Ball Bot - Structures for Planetary Landing and Exploration**
2:00	*Michael Flynn, NASA ARC* **Water Walls: Highly Reliable and Massively Redundant Life Support Architecture**
2:30	**Break**
3:00	*Leigh McCue, Virginia Polytechnic Institute & State University* **Exploration of Under-Ice Regions with Ocean Profiling Agents (EUROPA)**
3:30	*Robert Hoyt, Tethers Unlimited, Inc.* **SpiderFab: Process for On-Orbit Construction of Kilometer-Scale Apertures**
4:00	*Thomas Ditto, 3DeWitt LLC* **HOMES - Holographic Optical Method for Exoplanet Spectroscopy**
4:30	*Poster Session II + Ad Hoc Discussions*
5:30	**Adjourn**

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Thursday, March 14

9:00 **NIAC Q&A for Phase II and other topics** *Jay Falker, NIAC Program Executive*

9:30 *Marco Quadrelli, NASA JPL*
Orbiting Rainbows: Optical Manipulation of Aerosols and the Beginnings of Future Space Construction

10:00 *Gregory Lantoine, NASA JPL*
MAGNETOUR: Surfing Planetary Systems on Electromagnetic and Multi-Body Gravity Fields

10:30 Break

11:00 *Robert Winglee, University of Washington, Seattle*
Sample Return Systems for Extreme Environments

11:30 *Juan Arrieta, NASA JPL*
The Regolith Biters: A Divide-And-Conquer Architecture for Sample-Return Missions

12:00 Wrap-Up/Adjourn

NIAC Phase II Poster Sessions

P-1 **Duda, Kevin**
Variable Vector Countermeasure Suit (V2Suit) for Space Habitation and Exploration

P-2 **Short, Kendra**
Printable Spacecraft: Flexible Electronic Platforms for NASA Missions

P-3 **Khoshnevis, Behrokh**
ISRU-Based Robotic Construction Technologies for Lunar and Martian Infrastructures

P-4 **Whittaker, William**
Cavehopping Exploration of Planetary Skylights and Tunnels

P-5 **Strekalov, Dmitry**
Ghost Imaging of Space Objects

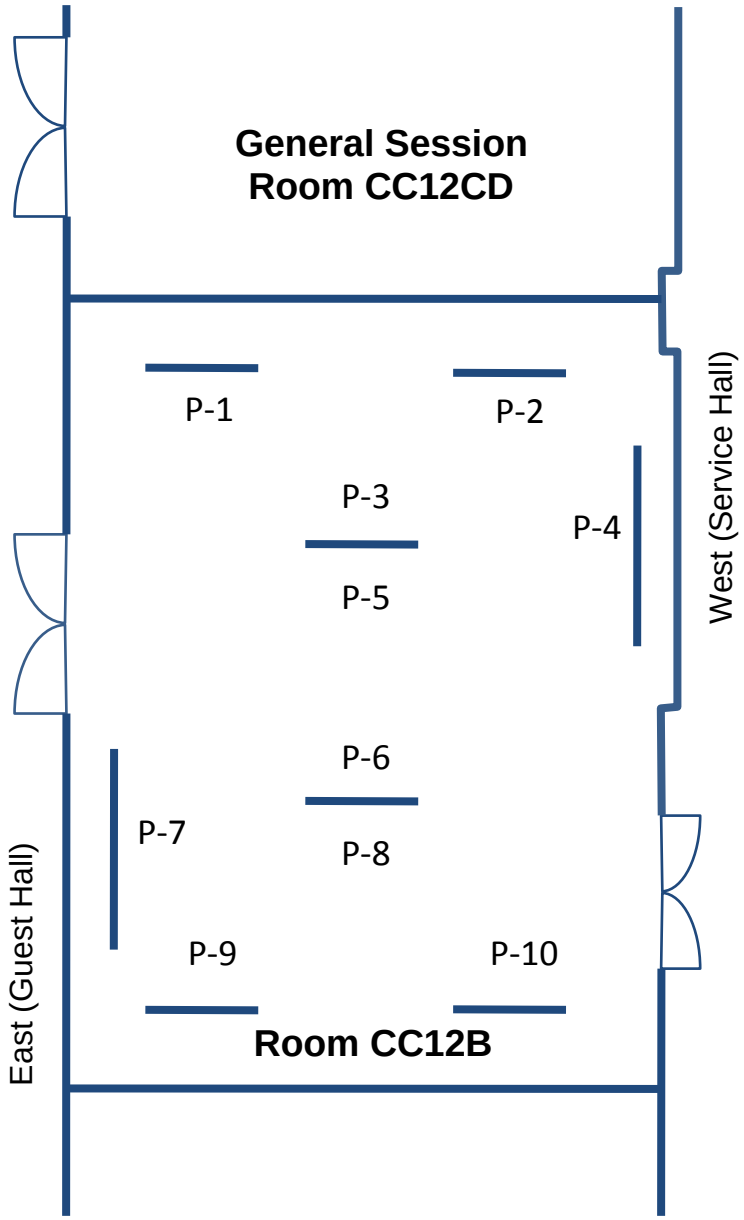
P-6 **Westover, Shayne**
Radiation Protection and Architecture Utilizing High Temperature Superconducting Magnets

P-7 **Miller, David**
High-Temperature Superconductors as Electromagnetic Deployment and Support Structures

P-8 **Slough, John**
The Fusion Driven Rocket: Nuclear Propulsion through Direct Conversion of Fusion Energy

P-9 **Ritter, Joe**
OCCAMS: Optically Controlled and Corrected Active Meta-material Space Structures

P-10 **Wie, Bong**
An Innovative Solution to NASA's NEO Impact Threat Mitigation Grand Challenge and Flight Validation Mission Architecture Development



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ABOUT NIAC:

The NASA Innovative Advanced Concepts (NIAC) Program supports early studies of visionary concepts that could one day "change the possible" in space and aeronautics. NIAC studies develop and assess revolutionary, yet credible, aerospace architecture, mission, and system concepts. They aim to enable far-term capabilities, and spawn exciting innovations to radically improve aerospace exploration, science, and operations.

NIAC also contributes to the Nation's leadership in key research and technology areas, and fosters outreach, education, and economic benefits. Part of the Space Technology Mission Directorate, NIAC is the most open-ended and far-reaching Program in NASA.

SYMPOSIUM SPEAKERS (in agenda order):

Jorge Arinez
Group Manager, Manufacturing Systems Research Lab
General Motors Global Research & Development

Dr. Jorge Arinez is a Group Manager in the Manufacturing Systems Research Lab at GM Global Research and Development. His main responsibilities involve defining and managing portfolios of advanced manufacturing technology projects that can be successfully transferred from research into production. He has also led the development of innovative research projects which have been implemented throughout GM's global manufacturing operations. These projects have resulted in the invention of new analytical tools for real-time monitoring and control of production and quality with a focus on energy efficiency and sustainability of manufacturing systems.

Bryan Wunar
Director, Center for the Advancement of Science Education Museum of Science and Industry

Bryan Wunar is currently the Director of Community Initiatives in the Center for the Advancement of Science (CASE) at the Museum of Science and Industry in Chicago. Mr. Wunar leads the Museum's strategic efforts to engage youth, families and communities in science learning experiences focused on developing science literacy and preparing the next generation to consider STEM careers. Mr. Wunar joined the staff of the Museum of Science and Industry in 2005 serving as the Director of Teaching and Learning, providing leadership for the Museum's programming to support improved science education for students, teachers, schools, and communities in the Chicago area. He has served as Senior Director of the Science and Mathematics Curriculum Program at the Education Development Center, Inc. (EDC) in Boston, the Associate Vice President for Education and Programs at Chicago's Adler Planetarium & Astronomy Museum, and as the Director of the Alliance for Community Education at Loyola University Chicago.

Mr. Wunar's work and research has focused on bridging informal and formal science education to extend learning beyond the classroom. He has served as Principal Investigator (PI) and Project Director on numerous federal grants

from the U.S. Department of Education, NASA, and NSF, including his current role as PI on the NSF funded project entitled, *Using Informal Explorations of Living Phenomena to Enhance Science Learning*. He holds a B.S. in Biology, M.A. in Curriculum and Instruction, graduate certification in Philanthropy and Non-Profit Management, and has completed all coursework toward a Ph.D. in Educational Psychology, all from Loyola University Chicago.

Bob Cassanova
Chair, NIAC External Council

Dr. Robert Cassanova is currently a consultant to private research organizations and government agencies. He was the Director of the NASA Institute for Advanced Concepts (NIAC) located in Atlanta, Georgia from February 1998 to August 2007. The NIAC was focused on the development of revolutionary, advanced systems and architectures in the fields of aeronautics and space. The NIAC was an independent institute sponsored by NASA and contracted through the Universities Space Research Association. Dr. Cassanova coordinated the operation of NIAC at the highest levels of NASA HQ and the NASA Centers. He is the recipient of the NASA Public Service Medal for exceptional contributions to the Mission of NASA. The NIAC team, including members from USRA, ANSER Corporation and NASA received the NASA Group Achievement Award. Dr. Cassanova expanded on the synergisms of art and science to build a highly acclaimed organization that encourages visionary investigators to explore revolutionary concepts stretching the possibilities of future scientific breakthroughs. Prior to becoming the Director of NIAC, Dr. Cassanova was Director of the Aerospace and Transportation Laboratory in the Georgia Tech Research Institute (GTRI). While in GTRI and in the School of Aerospace Engineering at Georgia Tech, he performed research in biofluid mechanics, solar thermal energy, acoustics, combustion and rarefied gas dynamics. He career also includes research in rocket plume testing and high altitude hypersonic flight at the Arnold Engineering Development Center in Tullahoma, Tennessee. He remains a dedicated creator of black and white photographic images on silver gelatin paper produced in a conventional, wet chemical darkroom. Dr. Cassanova has a serious passion for photography and integrates the visualization process for science and art into his lectures on revolutionary creativity.

His photography has been exhibited in the American Center for Physics, Ridderhoff-Martin Gallery, Annie D. Boykin Gallery, Hobson Pittman Memorial Gallery and the American Embassy in Lima, Peru. A sampling of his photographs can be viewed on the website: http://www.robertcassanova.com.

Geza Gyuk
Director of Astronomy & Space Exploration, Adler Planetarium & Astronomy Museum

Dr. Geza Gyuk is Director of Astronomy & Space Exploration at the Adler Planetarium in Chicago, IL. He is a member of the international VERITAS collaboration, which built and operates the world's most sensitive TeV gamma-ray observatory. As part of Adler's AVAST group, he also studies the composition of V-type (basaltic) asteroids, thought to be remnants of larger proto-planetary objects. Gyuk leads Adler's *Far Horizons* program, which is building a community of amateurs, students and volunteers who design, build, and operate space exploration missions.