



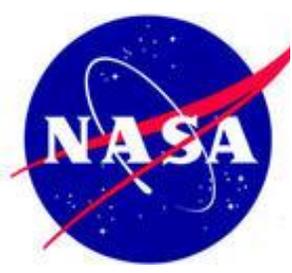
3rd Annual ISS Research and Development Conference



Discoveries, Applications and Opportunities

June 17-19, 2014

Hyatt Regency McCormick Place
2233 S. Martin L. King Drive
Chicago, Illinois 60616





**3rd Annual ISS Research and Development
Conference**
June 17-19, 2014
Hyatt Regency McCormick Place, 2233 Martin L. King Drive,
Chicago, Illinois 60616



The International Space Station (ISS) –

Scientific Laboratory
Technology Testbed
Orbiting Outpost
Galactic Observatory
Innovation Engine
Commercial Incubator
Student Inspiration
Exploration Stepping Stone

This conference focuses on ISS Research and Development — **Discoveries** in Microgravity Science; Discoveries in Space Science, Earth Science, Engineering and Education; **Applications** Benefitting Earth; Applications Enabling Technology and Exploration; and **Opportunities**.

This is the only annual gathering offering perspectives on the impressive breadth of research and technology development on the ISS – one stop for understanding the full suite of opportunities available now.

**Organized by the American Astronautical Society in cooperation with
the Center for the Advancement of Science in Space (CASIS) and NASA**

Sponsored by:



Gold Sponsor

LOCKHEED MARTIN



SPACE NEWS
INTERNATIONAL

Conference Executive Chairs

Walt Faulconer, Executive Vice President, AAS
Strategic Space Solutions, LLC
Columbia, Maryland

Duane Ratliff, Chief Operating Officer
Center for the Advancement of Science in Space
Melbourne, Florida

Conference Technical Co-Chairs

Dr. David B. Spencer, Vice President Technical, AAS
The Pennsylvania State University
University Park, Pennsylvania

Dr. Julie Robinson, ISS Program Scientist
NASA Johnson Space Center
Houston, Texas

Timothy Yeatman, M.D., Chief Scientist
Center for the Advancement of Science in Space
Melbourne, Florida

AAS Officers

President: Lyn Wigbels
Executive Vice President: Walt Faulconer
Vice President - Technical: David Spencer
Vice President - Programs: Harley Thronson
Vice President - Publications: Richard Burns
Vice President - Strategic Communications and Outreach: Mary Lynne Dittmar
Vice President - Membership: Larry Richardson
Vice President - Education: Lance Bush
Vice President - Finance: Paul Eckert
Vice President - International: Susan Irwin
Vice President - Public Policy: Edward Goldstein
Legal Counsel: Francesca Schroeder
Executive Director: Jim Kirkpatrick
Executive Assistant: Diane Thompson

Conference Planning Committee

Roz Clark, CASIS

Mary Lynne Dittmar, Dittmar
Associates

Marybeth Edeen, NASA JSC

Walt Faulconer, AAS

Kevin Foley, Boeing

Michael Hawes, Lockheed Martin

Rod Jones, NASA JSC

Jim Kirkpatrick, AAS

Justin Kugler, CASIS

Zigmond Leszczynski, Virginia

Comm. Space Flight Auth.

Stephanie Bednarek Orton,
SpaceX

Amelia Rai, NASA JSC

Duane Ratliff, CASIS

Larry Richardson, ULA

Julie Robinson, NASA JSC

Donna Shortz, NASA HQ

David Spencer, Penn State

Allyson Thorn, NASA JSC

Harley Thronson, NASA GSFC

Lyn Wigbels, AAS



**3rd Annual ISS Research and Development
Conference**
June 17-19, 2014
Hyatt Regency McCormick Place, 2233 Martin L. King Drive,
Chicago, Illinois 60616



Day 1

Monday, June 16, 2014

Welcome

6:00 pm **Welcome Reception at the Hyatt
Regency McCormick Place**
- Prairie Center
Join your colleagues in a casual setting
for light refreshments.



Save the Date!

4th Annual International Space Station Research and Development Conference

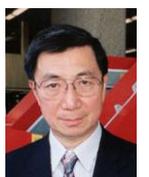
When: July 7-9, 2015
Where: Boston Marriott Copley Place
 Boston, Massachusetts (New Location)
Call for Papers: September 2014



Why should I use the ISS?

– Posters, Displays and Networking All Day in Prairie Center – WiFi compliments of CASIS

- 7:00 am** **Registration Opens** (Prairie Center Lobby)
with Continental Breakfast (Jackson Park Room)
- 7:00 am** **AAS Corporate Members Breakfast** (by invitation only)
with Mike Suffredini
- 8:00 am** **Welcome and Announcements** (Grant Park Room)
Lyn Wigbels, President of AAS
Recorded Opening Message from the Crew on the ISS
- 8:10 am** **Introduction**
John Elbon, Vice President and General Manager Space
Exploration, Boeing Defense, Space & Security
- 8:20 am** **Welcome Remarks**
Mayor Rahm Emanuel (invited)
- 8:30 am** **Keynote**
Mike Suffredini, Manager, ISS Program Office, NASA Johnson
Space Center
- 9:00 am** **Keynote**
Greg Johnson, President and Executive Director, Center for the
Advancement of Science in Space (CASIS)
- 9:30 am** **Keynote: Alpha Magnetic Spectrometer (AMS) Results and
Outlook for Data Through 2024**
Nobel Laureate Professor Samuel Ting, Massachusetts Institute
of Technology



10:05 am Break

10:20 am Plenary 1: Most Compelling Results from the ISS in 2013
Moderator: Julie Robinson, ISS Program Scientist, NASA Johnson Space Center



- *A Microfluidic, High Throughput Protein Crystal Growth Method for Microgravity* – Carl Carruthers, Jr., NanoRacks, LLC
- *Microgravity Arrests Host Immunity in vitro: Multi Omics Approach* – Nabarun Chakraborty, US Army Center for Environmental Health Research
- *Integrated Cardiovascular Results* – Jeffrey Hastings, University of Texas Southwestern Medical Center
- *Taking Consumer Product Design to Entirely New Heights* – Matthew Lynch, The Procter and Gamble Company

12:15 pm Luncheon (Jackson Park Room)
Speaker: Astronaut TBD
(with presentation of ISS Innovation Award for innovative use of ISS and Advancement of International Cooperation Award)

TBD

2:00 pm Research Disciplines From the Experts (Grant Park Room)

Life Sciences Changes in Microgravity

- *Cellular Level Changes*, Julie Robinson, ISS Program Scientist, NASA Johnson Space Center
- *Whole Organism Level Changes* – Tara Ruttley, ISS Associate Program Scientist, NASA Johnson Space Center



2:30 pm Physical Sciences Changes in Microgravity

- *Combustion and Fluid Physics* – Kirt Costello, ISS Assistant Program Scientist, NASA Johnson Space Center
- *Materials Science* – Martin Volz, Materials Science Principal Investigator, NASA Marshall Space Flight Center



3:00 pm ISS Orbit and Ground Track

- *Applicability for Earth Observation, Astrophysics and Heliophysics* – Rod Jones, ISS Research Integration Office Manager, NASA Johnson Space Center



3:15 pm Funding Options and Approaches

- Mike Read, Manager, ISS National Lab Office
- Sharon Conover, Manager, ISS NASA Research Office, NASA Johnson Space Center





3rd Annual ISS Research and Development Conference

June 17-19, 2014

Hyatt Regency McCormick Place, 2233 Martin L. King Drive,
Chicago, Illinois 60616

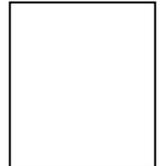


3:30 pm **Break**

3:45 pm **Plenary 2: Biotechnology, Health and Education**

Moderator: Emily Roberge, Scientific Research Analyst, CASIS

- *Microbes, Microgravity and Microvirulence* – Timothy Hammond, Duke University School of Medicine
- *Understanding the Effects of Long-Duration Space Flight on Astronaut Functional Task Performance* – Jacob Bloomberg, NASA Johnson Space Center
- *Zero Robotics: ISS Programming Challenge* – Alvar Saenz-Otero, Massachusetts Institute of Technology
- *Sally Ride EarthKAM (Earth Knowledge Acquired by Middle School Students)* – Karen Flammer, Sally Ride Science, Inc.



5:30 pm **Networking Reception with Posters and Displays**
Special Guest Charlie Bolden, NASA Administrator (invited)
(Prairie Center)

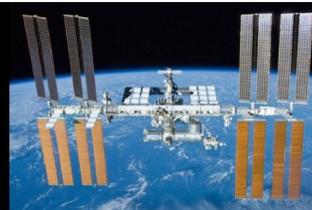


sponsored by





3rd Annual ISS Research and Development Conference
June 17-19, 2014
 Hyatt Regency McCormick Place, 2233 Martin L. King Drive,
 Chicago, Illinois 60616



Day 3

Wednesday, June 18, 2014

What the ISS offers and how to get in

**– Posters, Displays and Networking All Day in Prairie Center –
 WiFi compliments of CASIS**

7:00 am Registration (Prairie Center Lobby)
with Continental Breakfast (Jackson Park Room)
sponsored by



7:00 am AAS 2nd Corporate Members Breakfast (by invitation only)
 with William Gerstenmaier

8:00 am Plenary 3: ISS - Pathway to Mars (Grant Park Room)
 Moderator: Sam Scimemi, Director, International Space Station,
 NASA Headquarters

- *ISS Science and Exploration* – Gale Allen, NASA Deputy Chief Scientist, NASA Headquarters
- *ISS Technology and Exploration* – David Miller, NASA Chief Technologist, NASA Headquarters
- *ISS to Mars Exploration* – William Gerstenmaier, Associate Administrator, Human Exploration and Operations Mission Directorate, NASA Headquarters
- James Reuther, Deputy Associate Administrator, Space Technology Mission Directorate, NASA Headquarters



9:30 am Break *sponsored by*



10:00 am Parallel Technical Session 1 (see page 13 for details)

Room	Grant Park	Hyde Park A	Hyde Park B	Adler	Burnham B-C
Subject:	<i>ISS External Capabilities</i>	<i>ISS Internal Capabilities</i>	<i>Earth and Space Science</i>	<i>Biology and Biotechnology</i>	<i>Technology Demonstration 1</i>
Session Chair:	Bridget Ziegelaar	Steve Huning	Steve Volz	Emily Roberge	Ryan Stephan
Speaker 1	Bridget Ziegelaar	Brett Willman	James Goodman	Araceli Espinosa-Jeffrey	Matthew Abrahamson
Speaker 2	Andrew Lalich	Melanie Bodiford	Jagan Ranganathan	Joseph Irudayaraj	Niki Werkheiser
Speaker 3	Carlos Soares	Ginger Flores	Leonard Kramer	Karen Jonscher	Henry de Groh III
Speaker 4	Phillip Callen	Robert Corban	Akinori Saito	Kasthuri Venkateswaran	Kevin Duda
Speaker 5	Penny Roberts	Steven Huning	Jeffrey VanLooy	Ye Zhang	

12:15 pm ISS Luncheon (Jackson Park Room)

With special guest, *John Grunsfeld, Associate Administrator, Science Mission Directorate, NASA Headquarters*



sponsored by



1:45 pm Plenary 4 – Top Engineering Development and Technology Maturation Focusing on Commercial and Exploration Applications (Grant Park Room)

Moderator: George Nelson, Manager ISS Technology Demonstration Office, NASA Johnson Space Center



- *Liquid Sloshing Behavior in Microgravity with Application to Spacecraft Propulsion Systems* – Gabriel Lapilli, Florida Institute of Technology
- *Space Experiment for In-Flight Testing of a Laser Communications System on the Russian Segment of the ISS* – Vladimir Grigoriev, Systems of Precision Instrument Making
- *Amine Swingbed Payload Technology Demonstrations* – Jeff Sweterlitsch, NASA Johnson Space Center

3:15 pm Break *sponsored by*



3:30 pm Parallel Technical Session 2 (see pages 14-15 for details)

Room	Grant Park	Hyde Park A	Hyde Park B	Adler	Burnham B-C
Subject:	<i>Opportunities</i>	<i>SCaN Payload Results and Applications</i>	<i>Tech Demo – SPHERES</i>	<i>Earth Science Data for Everyone</i>	<i>Education</i>
Session Chair:	Rod Jones	Richard Reinhart	Andres Martinez	William Stefanov	Ken Shields
Speaker 1:	Steve Volz	François Lassere	Bruno Alvisio	Darryl Keith	Frank Bauer
Speaker 2:	Angel Otero	Robert McGwier	Terry Fong	William Stefanov	Alli Westover
Speaker 3:	Craig Kundrot	Richard Reinhart	Andres Martinez	V. Savorskiy	Florence Gold
Speaker 4:	George Nelson	David Robison	Timothy Setterfield	MUSES	Patricia Mayes
Speaker 5:	Duane Ratliff	Dean Schrage	Andrew Zimdars	Howard Eisen	Johannes Weppler

5:30 pm AAS ISS Utilization Technical Committee Meeting (Dusable Room)

6:00 pm Networking Reception with Posters and Displays (Prairie Room)



3rd Annual ISS Research and Development Conference
June 17-19, 2014
 Hyatt Regency McCormick Place, 2233 Martin L. King Drive,
 Chicago, Illinois 60616



How to use the ISS and make a business out of it

WiFi compliments of



7:30 am Continental Breakfast (Grant Park Room)

8:30 am Plenary 5 – Top Discoveries in Microgravity (Grant Park Room)
Moderator: Brad Carpenter, Chief Scientist, Space Life and Physical Sciences, NASA Headquarters

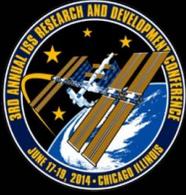


- *Global Lightning and Sprite Measurements on Japanese Experiment Module Exposed Facility (JEM-GLMIS): First Qualitative Nadir Observations of Lightning and Transient Luminous Events* – Mitsuteru Sato, Hokkaido University
- *Breathing Modes in Cellular Interface Pattern Formation* – Rohit Trivedi, Iowa State University
- *Materials International Space Station Experiment (MISSE): Overview, Accomplishments and Future Needs* – Kim de Groh, NASA Glenn Research Center

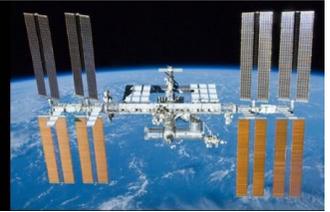
10:00 am Break

10:15 am Parallel Technical Session 3 (see page 16 for details)

Room	Grant Park	Hyde Park A	Hyde Park B	Jackson Park A
Subject:	<i>Integration Process</i>	<i>Human Research</i>	<i>Technology Demonstration 2</i>	<i>Upcoming Capabilities</i>
Session Chair:	Ryan Prouty	Craig Kundrot	George Nelson	Ken Shields
Speaker 1:	Ryan Prouty	Jessica Duda	Terry Fong	Matthew Lera
Speaker 2:	Rajib Dasgupta	Jeff Hawks	Evelyne Orndoff	Howard Levine
Speaker 3:	Dave Brueneman	Albert Nechaev	Jeff Sheehy	Dario Castagnolo
Speaker 4:	Carmen Price	Jojo Sayson	Eugene Skelton	Dan O'Connell
Speaker 5:	Joel Montalbano	Graham Scott	Mike Piszczor	Timon Clements



**3rd Annual ISS Research and Development
Conference**
June 17-19, 2014
Hyatt Regency McCormick Place, 2233 Martin L. King Drive,
Chicago, Illinois 60616



12:15 pm Working Lunch with Panel (Grant Park Room)
“Getting There and Back”

Moderator: Phil McAlister, Director, Commercial Spaceflight
Development, NASA Headquarters



- Orbital Sciences Corporation – Frank Culbertson
- SpaceX – Adam Harris
- Sierra Nevada Corporation – John Olson
- Boeing – John Elbon
- Blue Origin – Erika Wagner

2:00 pm Entrepreneurship on the ISS – Case Studies

Moderator: Duane Ratliff, Chief Operating Officer and NASA
Liaison, CASIS



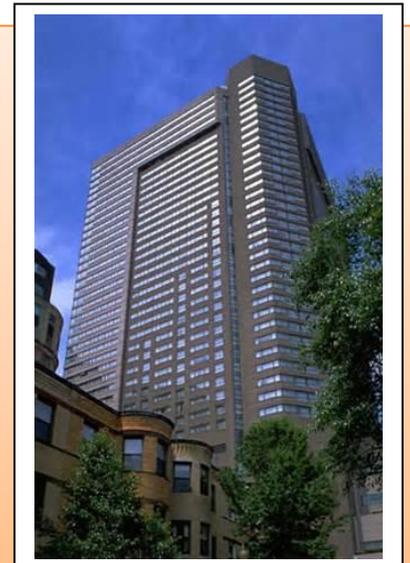
- D-Orbit – Luca Rossetini
- Benevolent Technologies – Jeremy Jo
- Kentucky Space – Kris Kimel
- Zero Gravity Solutions – Rich Godwin
- HNu-Photonics – Dan O’Connell

4:30 pm Adjourn

See You Next Year!

**4th Annual International Space
Station Research and Development
Conference**

When: July 7-9, 2015
Where: Boston Marriott Copley Place
Boston, Massachusetts (New Location)
Call for Papers: September 2014
www.astronautical.org
Abstracts Due: March 1, 2015



Details - Parallel Technical Sessions

Day 3, Wednesday June 18, 2014

10:00AM – 12:00PM Parallel Technical Session One

Grant Park	Hyde Park A	Hyde Park B	Adler	Burnham B-C
ISS External Capabilities	ISS Internal Capabilities	Earth and Space Science	Biology and Biotechnology	Technology Demonstration 1
Chair: Bridget Ziegelaar	Chair: Steve Huning	Chair: Steve Volz	Chair: Emily Roberge	Chair: Ryan Stephan

ISS External Capabilities – Bridget Ziegelaar, NASA Johnson Space Center

- *External Platforms – Columbus, JEM-EF, ELCs*; Bridget Ziegelaar, NASA Johnson Space Center
- *Earth Pointing Approaches and Best Practices*; Andrew Lulich, United Space Alliance
- *ISS External Contamination Environment for Space Science Utilization*; Carlos Soares, Boeing
- *Robotics Transfer and Interfaces*; Phillip Callen, NASA Johnson Space Center
- *ISS Data and Communications Systems: Current Capabilities and Future Possibilities*; Penny Roberts, NASA Johnson Space Center

ISS Internal Capabilities – Steve Huning, NASA Johnson Space Center

- *ISS Data and Communications Systems: Current Capabilities and Future Possibilities*; Brett Willman, NASA Johnson Space Center
- *Operations Services*; Melanie Bodiford, NASA Marshall Space Flight Center
- *ExPRESS, WOLF and MSG Platforms*; Ginger Flores, NASA Marshall Space Flight Center
- *Integrated Fluids and Combustion Racks and Microscope Capabilities*; Robert Corban, NASA Glenn Research Center
- *JEM A/L Capabilities*; Steve Huning, NASA Johnson Space Center

Earth and Space Science – Steve Volz, NASA Headquarters

- *A Web-Enabled Geospatial Data Processing System*; James Goodman, HySpeed Computing
- *ISERV Pathfinder – Operations and Statistics*; Jagan Ranganathan, Universities Space Research Association
- *Ionosphere Plasma State Determination in Low Earth Orbit from ISS Plasma Monitor*; Leonard Kramer, The Boeing Company
- *ISS-IMAP: Ionosphere, Mesosphere, Upper Atmosphere, and Plasmasphere Mapping Mission*; Akinori Saito, Kyoto University
- *ISS Agricultural Camera (ISSAC): Land Cover Research using a Three Band Camera*; Jeffrey VanLooy, University of North Dakota

Biology and Biotechnology – Emily Roberge, CASIS

- *Short Exposure of Neural Cells to Simulated Microgravity Impacts Cell Proliferation, Cell Migration and Lineage Progression*; Araceli Espinosa-Jeffrey, The University of California, Los Angeles
- *Effects of Stimulated Microgravity on the Epigenetic Landscape of 5-methylcytosine and 5-hydroxymethylcytosine in Lymphoblastoid Cells*; Joseph Irudayaraj, Purdue University

- *Of Mice and Microgravity: Does spaceflight alter metabolic function?*; Karen Jonscher, University of Colorado Anschutz Medical Campus
- *ISS Environmental Microbiome – A Genetic Approach to Elucidate Microbial Inventories of ISS Filter Debris*; Kasthuri Venkateswaran, NASA Jet Propulsion Laboratory
- *Interphase Chromosome Conformation and Chromatin-chromatin Interactions in Human Epithelial Cells Cultured under Different Gravity Condition*; Ye Zhang, Wyle

Technology Demonstration 1 – Ryan Stephan, NASA Johnson Space Center

- *The Optical Payload for Lasercomm Science (OPALS): Results from Early Operations*; Matthew Abrahamson, NASA Jet Propulsion Laboratory
- *3D Printing In Zero-G ISS Technology Demonstration*; Niki Werkheiser, NASA Marshall Space Flight Center
- *Coatings for Rubber Seals to Prevent Adhesion and Damage from the Space Environment*; Henry de Groh III, NASA Glenn Research Center
- *Wearable Control Moment Gyroscopes: A Technology Enabler for Space Exploration Missions*; Kevin Duda, Draper Laboratory

3:30PM – 5:30PM Parallel Technical Session Two

Grant Park	Hyde Park A	Hyde Park B	Adler	Burnham B-C
Opportunities	SCaN Payload Results and Applications	Tech Demo – SPHERES	Earth Science Data for Everyone	Education
Chair: Rod Jones	Chair: Richard Reinhart	Chair: Andres Martinez	Chair: William Stefanov	Chair: Ken Shields

Opportunities – Rod Jones, NASA Johnson Space Center/TBD, CASIS

- *Science Mission Directorate Opportunities*; Steve Volz, NASA Headquarters
- *Space Life and Physical Sciences Opportunities*; Angel Otero, NASA Headquarters
- *Human Research Program Opportunities*; Craig Kundrot, NASA Johnson Space Center
- *Technology Demonstration Opportunities*; George Nelson, NASA Johnson Space Center
- *CASIS Opportunities*; Duane Ratliff, CASIS

Space Communication and Navigation (SCaN) Payload Results and Applications – Richard Reinhart, Glenn Research Center

- *International Disruption Tolerant Networking Tests Using the Space Link Extension Protocol for Ground Connectivity*; François Lassere, Centre National d’Etudes Spatiales (CNES)
- *Signal Classification and Interference Mitigation in the Unique Space Environment*; Robert McGwier, Virginia Polytechnic Institute and State University
- *Unique Aspects of Software Defined Radios Operating in Space as Experiment on ISS*; Richard Reinhart, Glenn Research Center
- *ISS Orbit Determination with a Multi-Frequency Software-Defined GPS Receiver*; David Robison, NASA Jet Propulsion Laboratory
- *ISS Truss Flexure Measurement applying Ka-Band Closed-Loop Tracking*; Dean Schrage, ZIN Technologies Inc.

Technology Demonstration – Synchronized Position, Hold, Engage, Reorient, Experimental Satellites (SPHERES) – Andres Martinez, NASA Ames Research Center

- *Using the ISS as a Testbed for Iterative Control Development for Electromagnetic Formation Flight*; Bruno Alvisio, Massachusetts Institute of Technology
- *Development and Testing of the Smart SPHERES Telerobotic Free-Flyer*; Terry Fong, NASA Ames Research Center
- *SPHERES National Lab Facility - Available to Conduct Research*; Andres Martinez, Ames Research Center
- *Iterative Testing of Vision Based Navigation in Microgravity using SPHERES and VERTIGO aboard the ISS*; Timothy Setterfield, Massachusetts Institute of Technology
- *Real-Time Joint Teleoperation of Multiple Robotic Space Platforms*; Andrew Zimdars, Lockheed Martin Space Systems Co.

Earth Science Data for Everyone – William Stefanov, NASA Johnson Space Center

- *Smart Phone Application Development for Coastal and Ocean Monitoring using Hyperspectral Imager for the Coastal Ocean (HICO) Imagery*; Darryl Keith, Environmental Protection Agency
- *ISS Data Collection For Disaster Response*; William Stefanov, NASA Johnson Space Center
- *Earth Observation Experiments on the Russian Segment of the ISS*; Victor Savorskiy, Kotelnikov's Institute of Radioengineering and Electronics of Russian Academy of Sciences
- *MUSES*; TBD
- *RapidScat*; Howard Eisen, NASA Jet Propulsion Laboratory

Education – Ken Shields, CASIS

- *Amateur Radio on the ISS (ARISS)---Inspiring and Educating Youth through Direct Connections with the ISS Crew*; Frank Bauer, AMSAT-NA
- *CASIS National Design Challenge Pilot Project*; Alli Westover, CASIS
- *High School Students United with NASA to Create Hardware (HUNCH) Extreme Science Program*; Florence Gold, Texas A&M University
- *NanoRacks Education*; Patricia Mayes, NanoRacks, LLC
- *Columbus Eye and Other Educational Activities during Alexander Gerst's Mission to the ISS*; Johannes Wepler, German Aerospace Center (DLR)

Day 4, Thursday June 19, 2014

10:15AM – 12:15PM Parallel Technical Session Three

Grant Park	Hyde Park A	Hyde Park B	Jackson Park A
Integration Process	Human Research	Technology Demonstration 2	Upcoming Capabilities
Chair: Ryan Prouty	Chair: Craig Kundrot	Chair: George Nelson	Chair: Ken Shields

Integration Process – Ryan Prouty, NASA Johnson Space Center

- *Payload Integration Template and Improvements*; Ryan Prouty, NASA Johnson Space Center
- *Safety Process*; Rajib Dasgupta, NASA Johnson Space Center

- *Requirements and Verification*; Dave Brueneman, Boeing
- *Operations Integration*; Carmen Price, NASA Marshall Space Flight Center
- *Question and Answer/ Help Session*; Joel Montelbano, NASA Johnson Space Center

Human Research – Craig Kundrot, NASA Johnson Space Center

- *Enhanced Dynamic Load Sensors for ISS (EDLS-ISS)*; Jessica Duda, Aurora Flight Sciences
- *In Vivo Porcine Tests Towards Noninvasive ICP Monitoring*; Jeff Hawks, University of Nebraska-Lincoln
- *Biomedical Studies At Orbital Stations And Their Terrestrial Application*; Albert Nechaev, Institute for Biomedical Problems of the Russian Academy of Sciences
- *Back Pain Mechanisms on the ISS: a preliminary report*; Jojo Sayson, The University of California San Diego
- *Twin Sons – A Pilot Demonstration ISS Study, As a First Step To Personalized Medicine in Space*; Graham Scott, National Space Biomedical Research Institute

Technology Demonstration 2 – George Nelson, NASA Johnson Space Center

- *Crew-controlled Surface Telerobotics from the ISS*; Terry Fong, NASA Ames Research Center
- *Pre-Flight Advanced Clothing Study*; Evelyne Orndoff, NASA Johnson Space Center
- *Space Technology Mission Directorate (STMD) Results on the ISS*; Jeff Sheehy, NASA Headquarters
- *Raven Rendezvous and Proximity Operations Sensor Experiment*; Eugene Skelton, Lockheed Martin
- *On-Orbit Measurement of Next Generation Space Solar Cell Technology on the ISS*; Mike Piszczor, NASA Glenn Research Center

Upcoming Capabilities – Ken Shields, CASIS

- *Fruit Fly Lab: A Hardware Suite with Flight Heritage Developed to Support Drosophila Research On-board ISS*; Matthew Lera, Lockheed Martin
- *Life Science Hardware Available for Use on ISS*; Howard Levine, NASA Kennedy Space Center
- *Fluid Science Laboratory (FSL) in the COLUMBUS Module of ISS*; Dario Castagnolo, Telespazio
- *Stem Cell Microfluidic Incubator with Imaging*; Dan O'Connell, nanoPoint
- *TBD*; Timon Clements, Kentucky Space