INTERNATIONAL SPACE MEDICINE SUMMIT 2016
November 3–6, 2016 • Rice University’s Baker Institute for Public Policy • Houston, Texas
About the Event

As we continue human space exploration, much more research is needed to prevent and/or mitigate the medical, psychological and biomedical challenges spacefarers face. The International Space Station provides an excellent laboratory in which to conduct such research. It is essential that the station be used to its fullest potential via cooperative studies and the sharing of equipment and instruments between the international partners. The application of the lessons learned from long-duration human spaceflight and analog research environments will not only lead to advances in technology and greater knowledge to protect future space travelers, but will also enhance life on Earth.

The 10th annual International Space Medicine Summit on November 3–6, 2016, will bring together the leading physicians, space biomedical scientists, engineers, astronauts, cosmonauts and educators from the world’s spacefaring nations for high-level discussions to identify necessary space medicine research goals as well as ways to further enhance international cooperation and collaborative research. All ISS partners will be represented at the summit.

The summit is co-sponsored by the Baker Institute Space Policy Program, Texas A&M University College of Engineering, Baylor College of Medicine and the Boeing Company.

Organizing Partners

Rice University’s Baker Institute for Public Policy

The mission of the Baker Institute is to help bridge the gap between the theory and practice of public policy by drawing together experts from academia, government, media, business and nongovernmental organizations. By involving policymakers, scholars and students, the institute seeks to improve the debate on selected public policy issues and to make a difference in the formulation, implementation and evaluation of public policy, both domestic and international. The Baker Institute is an integral part of Rice University, one of the nation’s most distinguished institutions of higher education. The efforts of Baker Institute fellows and affiliated Rice faculty focus on several ongoing research projects, details of which can be found on the institute’s website, www.bakerinstitute.org.

Baker Institute Space Policy Program

By virtue of a long-standing tradition of collaborative projects between NASA and Rice University, the Baker Institute Space Policy Program is distinctively positioned to influence the national and international debate on the future of manned and unmanned space exploration, commercial space efforts and international cooperation in space. Over 50 years ago, in a speech delivered at Rice University, President John F. Kennedy called for a great national effort to put a man on the moon by the end of the decade, declaring, “The exploration of space will go ahead, whether we join in it or not, and it is one of the great adventures of all time, and no nation which expects to be the leader of other nations can expect to stay behind in the race for space.” Today, America’s pre-eminent role in space is being challenged both internationally and domestically. Space policy has become a prominent and contentious public policy issue. The future of America’s space program is at a critical point in time; decisions are being made that will affect not only our national security but also our ability to successfully compete with other countries in the commercial use of space.
Texas A&M University College of Engineering

Engineering has been a part of Texas A&M University since its inception in 1876 as the Agricultural and Mechanical College of Texas. Today, the College of Engineering is the largest college on the Texas A&M campus, with more than 350 faculty members and more than 15,000 engineering students in our 14 departments. The college is consistently ranked among the nation’s top public programs and is also among the top universities in the number of National Merit Scholars, nationally recognized faculty and funded research.

As a major department within the Texas A&M University College of Engineering, Aerospace Engineering is among the top programs in the United States providing unique cutting-edge educational and research opportunities, including space exploration, national defense, air transportation, communications and sustainable energy. With an enrollment of nearly 500 undergraduate and 115 graduate students, we offer a modern curriculum that is balanced across the three principal disciplines of aerospace engineering: Aerodynamics and Propulsion, Dynamics and Control, and Materials and Structures. The program also benefits from strong connections to major aerospace industries, the Department of Defense and NASA.

Baylor College of Medicine

Baylor College of Medicine is committed to being a national leader in advancing human health through the integration of patient care, research, education and community service. The college pursues this mission by promoting patient care of the highest standard, advancing basic and clinical biomedical research, sustaining educational excellence, and fostering public awareness of health and the prevention of disease. Since its founding in 1900, Baylor has grown into an internationally respected medical and research institution. Baylor offers patient care services through several of its Texas Medical Center affiliate hospitals and clinics, with more than 152,000 inpatient visits and 2.2 million outpatient visits annually. The college has more than 70 research and patient-care centers and units. More information can be found on the school’s website, www.bcm.edu.

Boeing

Boeing Space Exploration, headquartered in Houston, is a leading provider of human spaceflight and space exploration systems and services. Since the dawn of the Space Age, Boeing has designed, developed, built and operated human and robotic space vehicles as well as supporting hardware. The Boeing legacy began with the X-15 hypersonic aircraft, spanned the Gemini, Mercury, Apollo, Skylab and Shuttle programs, and continues with today’s Space Launch System, International Space Station and Commercial Crew programs. As NASA’s prime contractor for the space station, Boeing provides research integration, key engineering support services, end-to-end subsystem management, sustaining operations, hardware and software integration, and maintenance for the utilization of the station by NASA and its international partners. The International Space Station is advancing scientific knowledge in Earth, space, physical and biological sciences, for the benefit of humanity.
Participating Organizations

Association of Air Medical Services (AAMS)
Association of American Medical Colleges (AAMC)
Association of Space Explorers (ASE)
Athena Global
Bauman Moscow State Technical University
(Bauman MSTU)
Baylor College of Medicine (BCM)
Boeing Space Exploration
Boise State University
Canadian Space Agency (CSA)
China Astronaut Research and Training Center (ACC)
Commonwealth Scientific and Industrial Research
Organisation (CSIRO)
Gagarin Cosmonaut Research and Training Center (GCTC)
German Aerospace Center (DLR)
European Space Agency (ESA)
Foundation for International Space Education (FISE)
Harvard University
Hawaii Space Exploration Analog & Simulation (HI–SEAS)
Henry Ford Health System (HFHS)
Indian Space Research Organization (ISRO)
Institute for Biomedical Problems (IBMP)
International Space School Educational Trust (ISSET)
Japan Aerospace Exploration Agency (JAXA)
Johns Hopkins School of Medicine
King’s College London
Lunar and Planetary Institute (LPI)
Massachusetts Institute of Technology (MIT)
The Methodist Hospital (TMH)
Moscow State University
The Museum of Flight
National Aeronautics and Space Administration (NASA)
National Institutes of Health (NIH)
National Space Biomedical Research Institute (NSBRI)
Rice University
Rice University’s Baker Institute for Public Policy
Russian Academy of Sciences (RAS)
Russian Federal Space Agency (ROSCOSMOS)
SciArt Exchange
Stanford University
Swansea University
Texas A&M University College of Engineering
Tietronix/Safetronix
UK Space Agency
Universities Space Research Association (USRA)
University College London (UCL)
University of Geneva
University of Houston (UH)
University of Maryland
University of Michigan
University on Delhi, India
University of Pennsylvania
University of Roma Tor Vergata
University of Southampton
University of Wollongong, Australia
The University of Texas Health Science Center at Houston
(UTHSC)
The University of Texas Medical Branch at Galveston
(UTMB)
The University of Texas Southwestern Medical Center
at Dallas (UTSW)
Wyle
Conference Agenda

Thursday, November 3

1800 Opening Reception
BioScience Research Collaborative, Rice University

Welcome, Introductions and Opening Remarks

0830 The Honorable Edward P. Djerejian
Director, Rice University’s Baker Institute for Public Policy

George W.S. Abbey
Senior Fellow in Space Policy, Rice University’s Baker Institute for Public Policy

Jeffrey Sutton
President and CEO, National Space Biomedical Research Institute

Opening Address
Introduction: George W.S. Abbey, Baker Institute

0845 Thomas Reiter
Director, Human Spaceflight and Operations, European Space Agency

Panel I — Lunar Exploration
Introduction: George W.S. Abbey, Baker Institute

0915 Moderator: Leroy Chiao, Astronaut

Panelists
Bonnie Dunbar, Astronaut
Oleg Kotov, Cosmonaut
Michael Lembeck, CEPStone LLC
Lee Morin, Astronaut
Thomas Reiter, ESA
Salizhan Sharipov, Cosmonaut
Thomas Stafford, Astronaut

Topics
• Current plans for the program and plans for international cooperation
• Future human spaceflight activities

Discussion and Summation

1045 Break

Friday, November 4

0800 Continental Breakfast

Opening Reception
BioScience Research Collaborative, Rice University
Panel II — Maximizing the Use of the International Space Station
Introduction: Jeffrey Sutton, NSBRI
1100 Moderators: Dan Burbank, Astronaut; and Oleg Kotov, Cosmonaut
Panelists
- Michael Barratt, Astronaut
- Joe Dervay, NASA
- Mark Mulqueen, Boeing
- Dava Newman, NASA
- Irina Ogneva, IBMP
- Bill Paloski, NASA
- Koichi Wakata, Astronaut

Topics
- Sharing facilities and data
- Cooperative research
- Effective utilization and sharing of crew time

Discussion and Summation

Luncheon
Introduction: Leroy Chiao, Astronaut
1230 Transmission from Space
Video Presentation
1300 Live Connection with Canadian Forces Arctic Research Station

Panel III — One-Year Mission
Introduction: Graham Scott, NSBRI
1330 Moderator: John Charles, NASA
Panelists
- Michael Barratt, Astronaut
- Stevan Gilmore, NASA
- Vadim Gushchin, IBMP
- Oleg Kotov, Cosmonaut
- Mikhail Kornienko, Cosmonaut
- Salizhan Sharipov, Cosmonaut

Topics
- Science planned and science accomplished
- Significant results
- Subsequent research planned for both sexes
- Possible future one-year and/or two-year studies

Discussion and Summation

1530 Break
Panel IV — Twin Studies
Introduction: John Charles, NASA
1545  Moderator: Michael Barratt, Astronaut
Panelists
  Mathias Basner, University of Pennsylvania School of Medicine
  Stevan Gilmore, NASA
  William Paloski, NASA
  Victor Schneider, NASA
  Graham Scott, NSBRI
  Scott Smith, NASA
  Michael Snyder, Stanford University
Topics
  • Research objectives and challenges
  • Ethical considerations relative to data
  • Results and lessons learned
  • Past lessons and results from twin studies
  • OMICS studies
Discussion and Summation
1700  Reception

Dinner and Evening Address
Introduction: Bonnie Dunbar, Astronaut
1730  Dimitris Lagoudas
  John and Bea Slattery Chair of Aerospace Engineering, Texas A&M University
Select pieces on display from the “Humans in Space” Youth Art Competition

The international **Humans in Space Youth Art Competition** encourages youth to “be inspired, creative and heard.” It asks them to think about the future of human spaceflight and to creatively communicate their ideas, and promises to make these ideas viewable worldwide. By including the next generation in the planning of the future, the competition aims to enhance their awareness, interest and support for human spaceflight and to allow their ideas to begin shaping the future now.

**International Competition — Opening November 2016**

**CineMars**, a partnership between NASA and the nonprofit SciArt Exchange, is a global short video and visual art competition inviting high school students, college students and early career professionals to visualize the Journey to Mars. Submissions will be judged by a team of cinematography and graphics industry professionals and astronauts. The winning entries will be screened on “opening night” at all NASA visitor centers, museum consortium members, and other interested venues.

To foster interest in your area about Mars exploration, please encourage local participation in the competition or offer to host an artwork exhibit. For more information, contact info@SciArtExchange.org.
Saturday, November 5

0800  Continental Breakfast

Panel V — Nutrition Considerations for Spaceflight
Introduction: Richard Jennings, UTMB
0830  Moderator: Nicole Stott, Astronaut
Panelists
- Leroy Chiao, Astronaut
- Grace Douglas, NASA
- Vickie Kloeris, NASA
- Oleg Kotov, Cosmonaut
- Douglas Paddon-Jones, UTMB
- Salizhan Sharipov, Cosmonaut
- Scott Smith, NASA
Topics
- Food as an effective countermeasure to the impacts of the space environment
- Potential food solutions for the countermeasure and psychological challenges associated with longer duration space exploration missions
Discussion and Summation
1000  Break

Panel VI — 50th Anniversary of the Gemini Program: Precursor to Apollo
Introduction: George W.S. Abbey, Baker Institute
1015  Moderator: Glynn Lunney, NASA
Panelists
- Charles Berry, NASA
- Bill Carpentier, Astronaut
- Gerry Griffin, Astronaut
- Thomas Stafford, Astronaut
Topics
- Challenges and achievements
- Lessons learned
- Contributions to the success of Apollo
Discussion and Summation

Luncheon and Address
Introduction: George W.S. Abbey, Baker Institute
1145  Charles F. Bolden, Jr.
Administrator, NASA
Panel VII — Radiation
Introduction: Jeffrey Sutton, NSBRI
1300  Moderator: Graham Scott, NSBRI
Panelists
  Michael Barratt, Astronaut
  Susan Bloomfield, Texas A&M University
  Jeff Chancellor, Texas A&M University
  Dorit Donoviel, NSBRI
  Jeffrey Jones, BCM
  Eddie Semones, NASA
Topics
  • Increased risks with mission lengths
  • Mitigating risks
  • Shielding for protection and countermeasures
  • Long-term radiation effects on brain performance
Discussion and Summation

1415  Break

Panel VIII — Education and STEM Advances
Introduction: George W.S. Abbey, Baker Institute
1430  Moderators: Karl Doetsch, Athena Global; and Bonnie Dunbar, Astronaut
Panelists
  Olga Bannova, UH
  Heather Domjan, UH
  Francisco Fusco, FISE
  Amanda Hackler, NSBRI
  Michael Lembeck, CEPStone LLC
  Jancy McPhee, SciArt Exchange
  Andrew Turnage, ASE
Topics
  • Stimulating interest in science and engineering education
  • Benefits of an international educational program
  • Catalysts for creating young students' interest in science and engineering
  • Benefits and opportunities for student exchange programs
  • SPHERES
Discussion and Summation
Panel IX — Cooperative Use of Analogs
Introduction: Graham Scott, NSBRI

1500 Moderator: Nicole Stott, Astronaut

Panelists
- Michael Barratt, Astronaut
- David Dinges, NSBRI
- Vadim Gushchin, IBMP
- Oleg Kotov, Cosmonaut
- Graham Scott, NSBRI

Topics
- Application of remote expeditions to human performance
- Necessity for high fidelity and realistic analogs to simulate spaceflight

Discussion and Summation

Discussion Groups
The discussion groups provide an opportunity for all participants to collaborate with a group leader on an assigned topic. Each group will be tasked with developing a written report on their topic, to be presented Sunday morning. Your group assignment can be found on your name tag. If you do not find a letter on your name tag, please check with our staff.

1600 Group A
Cooperative Research
Team Leaders: Dan Burbank, Astronaut; and Oleg Kotov, Cosmonaut

Group B
Cooperative Use of Analogs
Team Leader: Graham Scott, NSBRI

Group C
Education
Team Leaders: Karl Doetsch, Athena Global; and Bonnie Dunbar, Astronaut

Reception and Dinner
Introduction: George W.S. Abbey, Baker Institute

1800 Bonnie Dunbar
Director, Institute of Engineering Education and Innovation, Texas A&M Engineering Experiment Station (TEES)

Music by Rice University's Shepherd School of Music Ensemble
Sunday, November 6

0830  Continental Breakfast

Discussion Group Reports
0900  
**Group A**
Cooperative Research

**Group B**
Cooperative Use of Analog

**Group C**
Education

Closing Remarks
1100  
**Jeffrey Sutton**
President and CEO, National Space Biomedical Research Institute

**George W.S. Abbey**
Senior Fellow in Space Policy, Rice University’s Baker Institute for Public Policy
Humans in Space Art Program
Youth Art Competition

The international competition invites young people to think about the future of human spaceflight and creatively communicate their ideas. In return, we promise to make their ideas viewable worldwide. By including the next generation in the planning of the future, the competition enhances their awareness, interest in and support for human spaceflight and allows their ideas to begin shaping the future now.

[www.SciArtExchange.org]

Found Life
Himaprabal Goud, 15 years old, India

2nd Planet With Life/
1st Landing On Another Planet/
A City On Another Planet
Emilian Ailenoi, 16 years old, Romania

BEAM: Base Exploration Aboard Moon
Emily Miedema & Abby Bull,
12 years old, Canada

The Prospector
Frank Shiner, 15 years old, USA

Conquest
Georgi Lomakin, 18 years old, Russian Fed.

Zero-G Aquatics
Rachel Liu, 14 years old, USA

Future Space In My Eye
Huen Wai Ko, 18 years old, Hong Kong

Space: Biologists’ Future
Maria Sotnikova, 14 years old, Russian Fed.

Next Ways of Transportation in Space
Kei Wakisaka, 14 years old, Japan

Cherish Your Origination
Arsla/Boeld/Münch, 16, Germany