INTERNATIONAL SPACE MEDICINE SUMMIT 2017
November 2–5, 2017 • 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 11th annual International Space Medicine Summit on Nov. 2–5, 2017, brings 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 are represented at the summit.

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

Organizing Partners

Rice University’s Baker Institute for Public Policy

The mission of Rice University’s 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 in a nonpartisan manner and to make a difference in the formulation, implementation and evaluation of public policy, both domestic and international. The Baker Institute is ranked No. 4 among university-affiliated think tanks in the world. 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 preeminent 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.
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.

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 its 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.
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)
CEPStone LLC
Center for the Advancement of Science in Space (CASIS)
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)
International Space University
Japan Aerospace Exploration Agency (JAXA)
Johns Hopkins School of Medicine
KBRwyle
King’s College London
Lawrence Berkeley National Laboratory
Lone Star Flight Museum
Lunar and Planetary Institute (LPI)
Massachusetts Institute of Technology (MIT)
Mayo Clinic Arizona
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)
Norwegian Centre for Space-related Education (NAROM)
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 (TAMU)
Texas A&M University College of Engineering
Texas A&M University at Galveston
Texas Health Resources
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)
Conference Agenda

Thursday, November 2

1800   Opening Reception  
   James A. Baker III Hall, Rice University

Friday, November 3

0800   Continental Breakfast

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  
   Director, Center for Space Medicine, Baylor College of Medicine

Opening Address
Introduction: George W.S. Abbey, Baker Institute
0855   Michael E. Fossum  
   Vice President, Texas A&M University; and COO, Texas A&M University at Galveston

Panel I — Lunar Exploration
Introduction: George W.S. Abbey, Baker Institute
0915   Moderator: Leroy Chiao, Astronaut

Panelists
   Jean-Loup Chretien, Astronaut  
   Bonnie J. Dunbar, Astronaut  
   Oleg Kotov, Cosmonaut  
   Michael Lembeck, CEPStone LLC  
   Donald Pettit, Astronaut  
   Harrison Schmitt, Astronaut  
   William Shepherd, Astronaut  
   Boris Shishkov, ROSCOSMOS  
   Paul Spudis, LPI

Topics
   • Lunar exploration and international cooperation  
   • Private companies and their role in supporting lunar exploration

Discussion and Summation

1045   Break
Panel II — Maximizing the Use of the International Space Station
Introduction: Jeffrey Sutton, BCM

1100 Moderators: Dan Burbank, Astronaut; and Inesa Kozlovskaya, IBMP

Panelists
- Michael Barratt, Astronaut
- Bonnie J. Dunbar, Astronaut
- Gregory Johnson, CASIS
- Oleg Kotov, Cosmonaut
- Bill Paloski, NASA
- Donald Pettit, Astronaut
- Julie Robinson, NASA
- Katherine Rubins, Astronaut
- Vasily Savinkov, ROSCOSMOS
- Koichi Wakata, Astronaut
- David Wolf, Astronaut

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

Discussion and Summation

Luncheon and Address
Introduction: George W.S. Abbey, Baker Institute
1230 Video Presentation — “Apollo 17: On the Shoulders of Giants”

Harrison Schmitt
Astronaut, Apollo 17

Panel III — One-Year Mission
Introduction: Jeffrey Sutton, BCM
1330 Moderator: Jennifer Fogarty, NASA

Panelists
- Michael Barratt, Astronaut
- Steve Gilmore, NASA
- Vadim Gushchin, IBMP
- Bill Paloski, NASA

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 — New Frontiers in Space Medicine
Introduction: Jeffrey Sutton, BCM

**Moderator:** Michael Barratt, Astronaut

**Panelists**
- Becky Blue, Mayo Clinic Arizona
- Tarah Castleberry, BCM
- Leroy Chiao, Astronaut
- Jonathan Clark, BCM
- Bonnie J. Dunbar, Astronaut
- Richard Jennings, UTMB
- Oleg Kotov, Cosmonaut
- James M. Vanderploeg, BCM
- Guillaume Weerts, ESA

**Topics**
- Assuring safety for participants with medical deficits
- Crew standards
- Effects related to mission duration

**Discussion and Summation**

1800 Reception

**Dinner and Evening Address**
Introduction: Bonnie J. Dunbar, Astronaut

**Dimitris Lagoudas**  
John and Bea Slattery Chair of Aerospace Engineering, Texas A&M University

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Select pieces on display from the Humans in Space Youth Art Competition, courtesy of SciArt Exchange (www.SciArtExchange.org)

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.

See the last page in this program for information about Project Mars, an international competition hosted by SciArt Exchange in collaboration with NASA.
Saturday, November 4

0800 Continental Breakfast

Panel V — Genomics and Spaceflight
Introduction: Richard Jennings, UTMB
0830 Moderator: Michael Barratt, Astronaut

Panelists
Jennifer Fogarty, NASA
Craig Kundrot, NASA
Smith Johnson, NASA
Mike Roberts, CASIS
Katherine Rubins, Astronaut
Vladimir Sychev, IBMP
Virginia Wotring, BCM

Topics
• Overview of NASA GeneLab project
• Contribution of ’omics studies to human research goals
• Enabling precision medicine for space crews
• Performing genomic experiments in the ISS laboratory
• Ethical issues in astronaut genomic studies

Discussion and Summation

1000 Break

Panel VI — Apollo: Lessons Learned
Introduction: George W.S. Abbey, Baker Institute
1015 Moderator: Milt Heflin, NASA

Panelists
Bill Carpentier, NASA
Robert Holkan, NASA
Richard Scheuring, NASA
Harrison Schmitt, Astronaut
John Stonesifer, NASA
Chester Vaughan, NASA

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
1215

**Gregory H. Johnson**  
President and Executive Director, Center for the Advancement of Science in Space (CASIS)

**Michael Roberts**  
Deputy Chief Scientist, CASIS

Panel VII — Radiation
Introduction: Leroy Chiao, Astronaut
1315  
**Moderator:** Jeffrey Sutton, BCM

Panelists  
Becky Blue, Mayo Clinic Arizona  
Thomas Budinger, Lawrence Berkeley National Laboratory  
Keith Cengel, University of Pennsylvania  
Jeff Chancellor, TAMU  
Vadim Gushchin, IBMP  
Jeffrey Jones, BCM

Topics  
- Increased risks with mission lengths  
- Mitigating risks  
- Shielding for protection and countermeasures  
- Effects of long-term radiation 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 J. Dunbar, Astronaut

Panelists  
Francisco Fusco, FISE  
Arne Hansen, NAROM  
Michael Lembeck, CEPStone LLC  
Jancy McPhee, SciArt Exchange  
Douglas Owens, Lone Star Flight Museum  
Andrew Turnage, ASE  
Chris Welch, International Space University

Topics  
- Stimulating interest in science and engineering education  
- Benefits of an international educational program  
- Benefits and opportunities for student exchange programs  
- SPHERES

Discussion and Summation
Panel IX — Cooperative Use of Analogs

Introduction: Richard Jennings, UTMB

Moderator: Leroy Chiao, Astronaut

Panelists
- Michael Barratt, Astronaut
- David Dinges, University of Pennsylvania
- Luca Parmitano, Astronaut
- Vadim Gushchin, IBMP
- Oleg Kotov, Cosmonaut
- William Shepherd, Astronaut

Topics
- Application of remote expeditions to human performance in space
- 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.

Group A  Cooperative Research
Team Leaders: Dan Burbank, Astronaut; and Inesa Kozlovskaya, IBMP

Group B  Cooperative Use of Analogs
Team Leader: Leroy Chiao, Astronaut

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

Reception and Dinner

Introduction: George W.S. Abbey, Baker Institute

Donald Pettit
Astronaut, ISS Expedition 6, 30 and 31; Space Shuttle Endeavor (November 2008)
Sunday, November 5

0830  Continental Breakfast

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

  **Group B**
  Cooperative Use of Analogs

  **Group C**
  Education

Closing Remarks
1100  
  **Jeffrey Sutton**
  Director, Center for Space Medicine, Baylor College of Medicine

  **George W.S. Abbey**
  Senior Fellow in Space Policy, Rice University’s Baker Institute for Public Policy
The Project Mars Competition is Now Open!

www.ProjectMarsCompetition.org

In collaboration with NASA, SciArt Exchange presents the international Project Mars Competition: your chance to tell the story of human exploration of deep space through film and graphic art.

Entries are due Aug. 31, 2018, and will be judged by film and graphics industry professionals, including the director of “Rogue One: A Star Wars Story.”

Winning entries will be screened on an opening night at NASA visitor centers, NASA museum consortium members, micro cinemas and other interested venues in Fall 2018. Top films will win $10,000, and top posters will win $1,500.

Visit www.SciArtExchange.org and sign up on our mailing list to learn more about us!