

Symposium Schedule

(Amended July 26, 2010)

Monday July 19 2010

6:00-8:00 pm	<i>Registration and Reception (Faculty Lounge, Room A 632)</i>
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Tuesday July 20 2010

8:00-9:00 am	<i>Registration (Atrium Amphitheater)</i>
9:00-9:15 am	<i>Welcoming Remarks</i>
9:15-10:50 am	<i>Atrium Amphitheater Chair: Roman Kezerashvili</i>
9:15-9:50 am	<i>History of Solar Sailing Flight Tests Louis Friedman¹ and James Cantrell² ¹The Planetary Society (USA) ²Strategic Space Development, Inc. (USA)</i>
9:50-10:10 am	<i>The Three-Step DLR-ESA Gossamer Road Map to Solar Sailing Franz Lura, Bernd Biering, Ulrich R.M.E. Geppert and R. Reinhard DLR, Institute for Space Systems (Germany)</i>
10:10-10:30 am	<i>GEOSAIL System Design for Demonstration of Solar Sailing in Earth Orbit Manfred Leipold, M. Macdonald, C. McInnes, S. Eckersley, P. Falkner and D. Agnolon Kayser-Threde GmbH (Germany)</i>
10:30-10:50 am	<i>Technology Requirements for Large, Ultralight Solar Sails Michael A. Brown US Naval research Laboratory (USA)</i>
10:50-11:10 am	<i>Coffee Break</i>

11:10-12:30 pm <i>Atrium Amphitheater</i> Chair: Junichiro Kawaguchi	
11:10-11:30 am	<p><i>Mission Analysis and Performance Comparison for an Advanced Solar Photon Thruster</i> Bernd Dachwald¹ and Patrick Wurm² ¹FH Aachen University of Applied Sciences (Germany) ²RWTH Aachen University (Germany)</p>
11:30-11:50 am	<p><i>Lightsail 1 – Flying on Light for Less</i> Jim Cantrell¹ and Louis Friedman² ¹Strategic Space Development Inc (USA) ²The Planetary Society (USA)</p>
11:50-12:10 pm	<p><i>Enhanced Heliostorm Mission Based on New Technology</i> Roy Young NASA Marshall Space Flight Center (USA)</p>
12:10-12:30 pm	<p><i>Lightsail</i> Chris Biddy Stellar Exploration (USA)</p>
12:30-1:30 pm	<p><i>Lunch</i> (Faculty Lounge, Room A 632)</p>
1:30-3:25 pm <i>Atrium Amphitheater</i> Chair: Louis Friedman	
1:30-2:05 pm	<p><i>Solar Power Sail - Hybrid Propulsion and its Applications</i> Junichiro Kawaguchi JAXA Space Exploration Center (Japan)</p>
2:05-2:25 pm	<p><i>World's First Demonstration of Solar Power Sailing by IKAROS</i> Osamu Mori, Yuichi Tsuda, Hiroataka Sawada, Ryu Funase, Takayuki Yamamoto, Takanao Saiki, Katsuhide Yonekura, Hirokazu Hoshino, Hiroyuki Minamino, Tatsuya Endo, Junichiro Kawaguchi and IKAROS Demonstration Team JAXA Exploration Center, Japan Aerospace Exploration Agency (Japan)</p>
2:25-2:45 pm	<p><i>Report on Deployment Solar Power Sail Mission of IKAROS</i> Hiroataka Sawada¹, Osamu Mori¹, Nobukatsu Okuizumi¹, Yoji Shirasawa², Hiraku Sakamoto³, Hiroshi Furuya³, Saburo Matunaga³ and Yasuyuki Miyazaki⁴ ¹JAXA Exploration Center, Japan Aerospace Exploration Agency (Japan) ²Tokyo University (Japan) ³Tokyo Tech (Japan) ⁴Nihon University (Japan)</p>

2:45-3:05 pm	<p><i>H²-Reversal Trajectory: a New Mission Application for High-Performance Solar Sails</i></p> <p>G. Mengali, A.A. Quarta, D. Romagnoli and C. Circi University of Pisa (Italy) German Aerospace Center (Germany) University of Rome (Italy)</p>
3:05-3:25 pm	<p><i>Coffee Break</i></p>
3:25-5:05 pm	<p><i>Atrium Amphitheater</i> Chair: Bong Wie</p>
3:25-3:45 pm	<p><i>Performance Analysis of an Attitude Control System for Solar Sails Using Sliding Masses</i></p> <p>Christina Scholz¹, Daniele Romagnoli² and Bernd Dachwald¹ ¹FH Aachen University of Applied Sciences (Germany) ²German Aerospace Center – Institute of Aerospace Systems (Germany)</p>
3:45-4:05 pm	<p><i>Solar Sail Attitude Control Using a Combination of a Feedforward and a Feedback Controller</i></p> <p>D. Romagnoli and T. Oehlschlägel German Aerospace Center, Institute of Space Systems (Germany)</p>
4:05-4:25 pm	<p><i>The Solar Sail Materials (SSM) Project: Status of Activities</i></p> <p>F. Dalla Vedova¹, H. Henrion², M. Leipold³, Th. Giro⁴, R. Vaudemont⁵, Th. Belmonte⁶, K. Fleury⁷ and O. Le Couls⁸ ¹LuxSpace ²ULg/GDtech ³Kayser-Threde ⁴CRP Gabriel Lippmann ⁵CRP Henri Tudor ⁶INPL-LSGS ⁷CSL ⁸Astrium-EADS</p>
4:25-4:45 pm	<p><i>Oscillation-Free Attitude Controller Design for Spinning Solar Sail “IKAROS” and Its Flight Results</i></p> <p>Ryu Funase¹, Yoji Shirasawa², Yuya Mimasu³, Yoshinobu Okano⁴, Yuichi Tsuda¹, Takanao Saiki¹, Osamu Mori¹ and Junichiro Kawaguchi¹ ¹JAXA Space Exploration Center, Japan Aerospace Exploration Agency (Japan) ²The University of Tokyo (Japan) ³Kyushu University (Japan) ⁴Tokyo Metropolitan University (Japan)</p>
4:45-5:05 pm	<p><i>FeatherSail - The Next Generation Nano-class Sail Vehicle</i></p> <p>Dean Alhorn NASA George C. Marshall Space Flight Center (USA)</p>
6:30 pm	<p><i>Banquet</i></p> <p><i>Restaurant: Bubby’s Brooklyn, 1 Main Street</i></p>

Wednesday July 21 2010

9:00-10:35 am <i>Atrium Amphitheater</i> Chair: Manfred Leipold	
9:00-9:35 am	<i>Status of Solar Sail Technology Within NASA</i> Les Johnson NASA George C. Marshall Space Flight Center (USA)
9:35-9:55 am	<i>TRL Assessment of the NASA 20-Meter System Ground Demonstrators</i> Roy Young and Charlie Adams NASA Marshall Space Flight Center (USA)
9:55-10:15 am	<i>Initial Design and Simulation of the LightSail-1 Attitude Determination and Control System</i> Matt Nehrenz Stellar Exploration, Inc. (USA)
10:15-10:35 am	<i>Description of a Realistic Solar Sail and Comparison to an Ideal Sail</i> Bruce Campbell NASA Goddard Space Flight Center (USA)
10:35-10:55 am	<i>Coffee Break</i>
10:55-12:15 pm <i>Atrium Amphitheater</i> Chair: Bernd Dachwald	
10:55-11:15 am	<i>Studies on the utilization of solar sail in lunar exploration</i> Zhao YuHui, Zhang Wei, Hou XiYun and Liu Lin Nanjing University (China)
11:15-11:35 am	<i>The Hoop Solar-Photon Sail and Extrasolar Travel</i> Gregory L. Matloff New York City College of Technology (USA)
11:35-11:55 am	<i>U3P Solar Sail Education with French Students</i> Adão Delehelle, Guy Pignolet, Jean-Yves Prado and Michael Pignolet-Hanna U3P - Union pour la Promotion de la Propulsion Photonique (France)
11:55-12:15 pm	<i>Analysis on Membrane Deployment Dynamics of solar power sail "IKAROS"</i> Yoji Shirasawa ¹ , Osamu Mori ² , Nobukatsu Okuizumi ² , Hirotaka Sawada ² , Yasuyuki Miyazaki ³ , Hiraku Sakamoto ⁴ , Hiroshi Furuya ⁴ and Saburo Matsunaga ⁴ ¹ The University of Tokyo (Japan) ² Japan Aerospace Exploration Agency (Japan) ³ Nihon University (Japan) ⁴ Tokyo Institute of Technology (Japan)
12:15-1:15 pm	<i>Lunch</i> (Faculty Lounge, Room A 632)

1:15-3:10 pm	<i>Atrium Amphitheater</i> Chair: Timothy Van Sant
1:15-1:50 pm	<i>Recent European Advances in Solar Sail Technologies and Fresh Plans for a Gossamer Structure In-Orbit Deployment of DLR in collaboration with ESA</i> Manfred Leipold Kayser-Threde GmbH (Germany)
1:50-2:10 pm	<i>The Polar Meteorologist's Dream Machine: Artificial LaGrange Orbit Satellite Applications Via Arctic and Antarctic Composite Imagery</i> Matthew A. Lazzara University of Wisconsin-Madison (USA)
2:10-2:30 pm	<i>Solar Sails in Artificial Lagrange Orbits as Environmental Remote Sensing Platforms</i> Alex Coletti ¹ , Ben Diedrich ² and Pat Mulligan ² ¹ SM Resources Corp. (USA) ² NOAA/NESDIS (USA)
2:30-2:50 pm	<i>Practical Systems Design for an Earth Magnetotail Monitoring Solar Sail Mission</i> Vaios Lappas ¹ , Giovanni Mengali ² , Alessandro Quarta ² , Jesus Gil-Fernandez ³ , Tilo Schmidt ⁴ and Bong Wie ⁵ ¹ University of Surrey (UK) ² University of Pisa (Italy) ³ GMV (Spain) ⁴ HTS (Germany) ⁵ Iowa State University (USA)
2:50-3:10 pm	<i>Solar Sails for NOAA Operational Space Weather and Communications Applications</i> Ben Diedrich and Pat Mulligan NOAA/NESDIS (USA)
3:10-3:25 pm	<i>Ground Demonstration of a Retractable Solar Sail for Satellite Agility</i> Jeremy A. Banik Space Vehicles Directorate Air Force Research Laboratory (USA)
6:00-9:00 pm	<i>Excursion: Evening Tour of New York City</i>
6:00-7:30 pm	Public Event with the Planetary Society <i>Solar Sailing: Pathway to the Stars</i> (Atrium Amphitheater)

Thursday July 22 2010

9:00-10:35 am <i>Atrium Amphitheater</i> Chair: Malcolm Macdonald	
9:00-9:35 am	<i>Using a Solar Sail Mission to Test Fundamental Physics</i> Roman Kezerashvili New York City College of Technology (USA)
9:35-9:55 am	<i>Sailing between the Earth and Sun</i> Ariadna Farres and Angel Jorba Universitat de Barcelona (Spain)
9:55-10:15 am	<i>Novel Low Energy Pathways for Solar Sailing</i> Edward Belbruno Princeton University and Innovative Orbital Design, Inc. (USA)
10:15-10:35 am	<i>Solar Sailing and solar power generation by "Roller Reefing"</i> Frank Ellinghaus Sinzheim (Germany)
10:35-10:55 am	<i>Coffee Break</i>
10:55-12:35 pm <i>Atrium Amphitheater</i> Chair: Edward Belbruno	
10:55-11:15 am	<i>Mission Performance Evaluation for Solar Sails using a Refined SRP Force Model with Variable Optical Coefficients</i> Andreas Borggräfe ¹ and Bernd Dachwald ² ¹ RWTH Aachen University (Germany) ² FH Aachen University of Applied Sciences (Germany)
11:15-11:35 am	<i>Numerical Methods to Generate Solar Sail Trajectories</i> Geoffrey G. Wawrzyniak and Kathleen C. Howell Purdue University (USA)
11:35-11:55 am	<i>Physical and Numerical Stability in the Simulated Pitch Slew of a Tow of Square Sails</i> Gyula Greschik TentGuild Engineering Co. (USA)
11:55-12:15 pm	<i>Spinning Solar Sail Steering via Spin Rate Control</i> Yuya Mimasu ¹ , Michihiro Matsumoto ² , Ryu Funase ² , Yuichi Tsuda ² , Osamu Mori ² and Jun'ichiro Kawaguchi ² ¹ Kyushu University (Japan) ² Japan Aerospace Exploration Agency (Japan)
12:35-1:35 pm	<i>Lunch</i> <i>(Faculty Lounge, Room A 632)</i>

1:35-3:10 pm <i>Atrium Amphitheater</i> Chair: Les Johnson	
1:35-2:10 pm	<i>Solar Sail Mission Applications and Future Advancement</i> Eur Ing Malcolm Macdonald and Colin McInnes University of Strathclyde (UK)
2:10-2:30 pm	<i>CubeSail: A Low Cost Small Cubesat Mission for Solar Sailing and Deorbiting LEO Objects</i> V. Lappas, L. Visagie, N. Adeli, T. Theodorou, J. Fernandez, H. Steyn, O. Le Couls and M. Perren University of Surrey (UK) Stellnbosch University (South Africa) EADS-Astrium
2:30-2:50 pm	<i>A Nanosatellite Mission to Assess Solar Sail Performance in LEO</i> Kieran A. Carroll ¹ , Henry Spencer ² , Robert E. Zee ³ and George Vukovich ⁴ ¹ Gedex Inc. (Canada) ² SP Systems (Canada) ³ University of Toronto (Canada) ⁴ Canadian Space Agency (Canada)
2:50-3:10 pm	<i>Attitude Control of the CubeSail Solar Sailing Spacecraft in Low Earth Orbit</i> Andrew Pukniel ¹ , Victoria Coverstone ¹ , Rodney Burton ² and David Carroll ² ¹ University of Illinois at Urbana-Champaign (USA) ² CU Aerospace, LLC (USA)
3:10-3:30 pm	<i>Coffee Break</i>
3:30-5:20 pm <i>Atrium Amphitheater</i> Chair: Roman Kezerashvili	
3:30-3:50 pm	<i>Interstellar Heliopause Probe – System Design of a Challenging Mission to 200 AU</i> Manfred Leipold, V. Lappas, A. Lyngvi, P. Falkner, H. Fichtner and S. Kraft Kayser-Threde GmbH (Germany)
3:50-4:10 pm	<i>Project Icarus: Solar Sail Technology for the Icarus Interstellar Mission</i> Pat Galea Project Icarus (UK)
4:10-4:30 pm	<i>Deflecting APOPHIS with a flotilla of Solar Sails</i> Jean-Yves Prado, Olivier Boisard, Alain Perret, Guy Pignolet Union pour le Promotion de la Propulsion Photonique (France)
4:30-4:50 pm	<i>A Near Term Pole-Sitter using Hybrid Solar Sail Propulsion</i> Matteo Ceriotti and Colin McInnes University of Strathclyde (UK)
4:50-5:20 pm	<i>Panel Discussion</i>