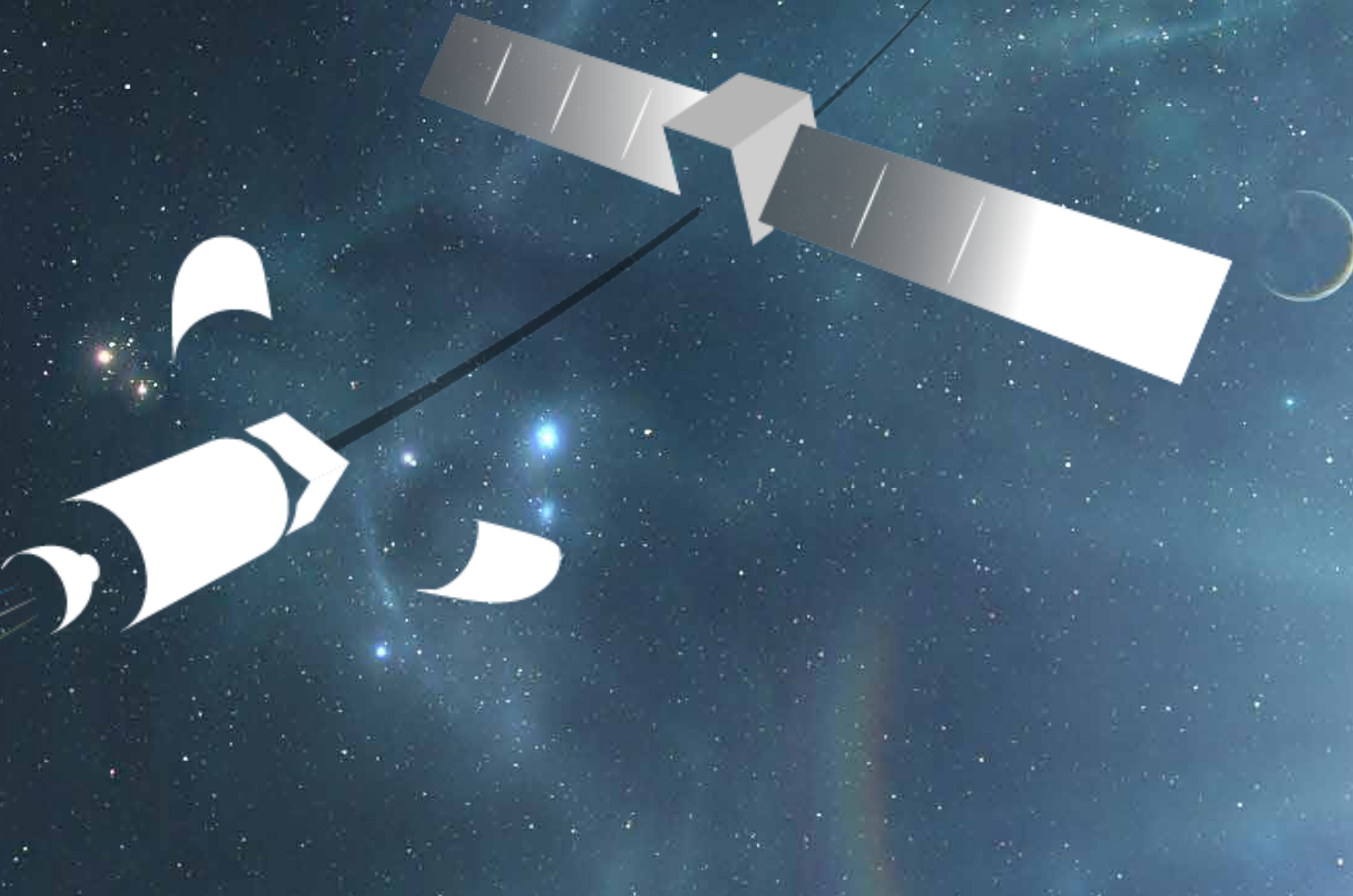


**ECSSMET**  
Germany 2021



# PROGRAMME

23<sup>RD</sup> – 25<sup>TH</sup> MARCH 2021





**DAY ONE**

**23<sup>RD</sup> MARCH 2021**



**09:00 – 10:00 | OPENING**

Opening Speech by Chair of the DLR Executive Board Walther Pelzer  
Opening Speeches by the Conference Chairmen Christian Hühne (DLR), Torben Henriksen (ESA), Pierre-Yves Tourneau (CNES)

**10:00 – 10:15 | BREAK FOR NETWORKING AT VIRTUAL COFFEE TABLES AND VISITING THE VIRTUAL EXHIBITION AND POSTER SESSION**

**10:15 – 10:45 | KEYNOTE 1 ON ARIANE 6**

Isabelle Rongier

**10:45 – 11:15 | KEYNOTE 2 ON SPACE DEBRIS**

Luisa Innocenti

**11:15 – 11:45 | KEYNOTE 3 ON FUTURE SPACE MISSIONS**

Gwenaëlle Aridon

**11:45 – 12:00 | BREAK FOR NETWORKING AT VIRTUAL COFFEE TABLES AND VISITING THE VIRTUAL EXHIBITION AND POSTER SESSION**

**12:00 – 13:00 | PODIUM DISCUSSION ON FUTURE CHALLENGES IN EUROPEAN SPACE ACTIVITIES**

Luisa Innocenti (ESA), Isabelle Rongier (ArianeGroup), Gwenaëlle Aridon (Airbus Defence & Space)  
Moderated by Tiziana Cardone (ESA)

**13:00 – 13:45 | BREAK FOR NETWORKING AT VIRTUAL COFFEE TABLES AND VISITING THE VIRTUAL EXHIBITION AND POSTER SESSION**

13:45 – 14:15

14:15 – 15:45

14:45 – 15:15

15:15 – 15:45

15:45 – 16:15

**SESSION 1**

**Thermo-Elastic Prediction**

Chair: Benoit Laine, Christian PUILLET

**Modelling Guidelines for Thermo-Elastic Analyses**

Alexander van Oostrum – ATG Europe B.V.  
Co-Authors: A. van Oostrum, A. Peman

**Quantifying Uncertainties in Thermo-Elastic Predictions**

Simon Appel and Alberto Peman – ATG-Europe / ESA  
Co-Authors: J. Wijker, A. van Oostrum

**Improvement of methodologies for thermo-elastic predictions and verification**

Luca Perachino – Thales Alenia Space  
Co-Authors: S. Behar-Lafenetre, J. D'Amico, M. Vaughan, S. Sablerolle, B. Laine

**Thermo-elastic test campaign in the frame of ESA activity „I-Meter“**

Philippe Baussart – Thales Alenia Space  
Co-Authors: S. Sablerolle

**Methodologies and uncertainties for the thermo-elastic verification of space instruments**

Stefano Lucarelli – Airbus Defence and Space  
Co-Authors: M. Pellizzari

**SESSION 2**

**ALM - Design Process**

Chair: Stefano Beretta, Bianca Maria Colosimo

**Development of Design Methods for AM including CAD Design, Optimisation, FEM Analysis and Manufacturing features**

Frédéric Duboeuf and Charles Chary – Siemens and Sonaca  
Co-Authors: E. Lemaire, A. Remouchamps, T. Van Eekelen, C. Chary, M. François, A. Vargalui, G. Rodrigues

**Implementation of Additive Manufacturing for spacecraft design**

Marco Mulser – OHB System AG  
Co-Authors: M. Samoil, C. Greve, P. Geißler, P. Vermeer, M. Lippert, C. Katzenschwanz, M. Meisnar, L. Pambaguian

**Development of ALM Technology for Space Structures An Opto-mechanical case study**

Bruno Barroqueiro – Active Space Technologies

**Development of Design Methods for AM including CAD Design / FEM Analysis / Manufacturing Features**

Armin Widhammer – OHB System AG  
Co-Authors: M. Meschenmoser, T. Sedlmaier, S. Senese, C. Katzenschwanz, M. Eick, R. Schwarz, S. Gruber, G. Rodrigues, S. Caeiro

**Methodology for hybrid part design using additive manufacturing and technological pairs for fast prototyping**

Robin Kromer – Arts et Métiers ParisTech  
Co-Authors: E. Gruhier, N. Perry, E. Lacoste

**SESSION 3**

**Buckling of Structures**

Chair: Christian Hühne, Andreas Kommer

**Experimental Investigation of the Buckling Process of a Cylindrical Composite Shell under Static Axial Loading**

Falk Odermann – DLR

**Sensitivity to measurement parameters of the vibration correlation technique to predict shell buckling loads - A numerical study**

Theodor Baciu – DLR  
Co-Authors: F. Franzoni, R. Degenhardt, M. A. Arbelo

**Benchmarking of vibration correlation technique for prediction of buckling load of cylindrical shells**

Kaspars Kalnins – Riga Technical University

**New formulation of buckling and post buckling for Composite panels with holes in Manufacturing Aerostructures**

Leonardo Liuzzi  
Co-Authors: P. Caracciolo

**Nondimensional buckling equations for launch vehicle structures design**

Ines Uriol Balbin – Delft University of Technology  
Co-Authors: C. Bisagni

**SESSION 4**

**Structural Architectures and Design**

Chair: Marina Wolff, Olaf Mierheim

**Mechanical justification of spacecraft components starting from interfaces - An end-to-end approach to establish, evaluate, track and exchange interface loads**

Robert Meitzner – ArianeGroup

**TAS-I experience in using Altair SimSolid solution for pressurized modules pre-design phase**

Stefano Destefanis – Thales Alenia Space  
Co-Authors: M. Bellini, G. Guglielminetti, G. Turinetti

**Design, Analysis, Manufacturing and Qualification of the Sentinel-4 Optical Instrument Module Structure**

Markus Geiss – OHB System AG  
Co-Authors: T. Ernst, M. Sauerbrey, C. Tschepe, H. Loew, M. Podehl

**Design and Manufacturing of JUICE J-Mag Calibration Alignment System JACS**

Fabian Preller – INVENT GmbH  
Co-Authors: T. Sdunnus, I. Rodrigues, J. Esteves

**When is an aluminum structure preferable over a sandwich structure?**

Els Lemmens – QinetiQ Space



16:30 – 17:00

**SESSION 5**  
**Thermo-Elastics - Disturbance in Optical Instruments**  
Chair: Simon Appel, Stéphanie Behar-Lafenetre

**Impact of the friction on the thermoelastic behavior of the SuperCam instrument**  
  
Damien Hoarau – MECANO ID  
Co-Authors: S. Orsingher, M. Heim

17:00 – 17:30

**End-To-End STOP analysis on PLATO TOU**  
  
James Etchells and Simon Blake – ATG-Europe / ESA  
Co-Authors: S. Appel, M. Rieder, T. Bandy, V. Cessa, D.Piazza

17:30 – 18:00

**PLATO Spacecraft: Thermo-Elastic Distortion Verification Concept and Demonstrator Tests**  
  
Jan Junker – OHB System AG

18:00 – 18:30

**FLEX FLORIS Instrument Optical Module Structure (IOMS)**  
  
Borja Provedo – Sener Aeroespacial  
Co-Authors: C. Borque, F. Del Campo

18:30 – 19:00

**BLAST: Black Laser Surface Treatment**  
  
Marko Piskacev – Azimut Space GmbH

**SESSION 6**  
**ALM - Certification, Requirments and Constraints**  
Chair: Christian Hühne, Tommaso Ghidini

**A Summary of NASA's Efforts for the Development of and Certification and Qualification of Additively Manufactured Hardware**  
  
Richard Russell – NASA

**Thermoplastics and additive manufacturing: from ground to out-of-earth application**  
  
Ugo Lafont – ESA - ESTEC  
Co-Authors: M. Costa, R. Rampini

**Requirement on AM part - Dynamic performance**  
  
Thomas Le Caillec – CITD Engineering and Technologies  
Co-Authors: L. Hernandez Alvarez, M. Garcia-Cosio Carrmena, M. E. Castaño, S. Laborde, D. Escolar, I. Ngan

**Effects of resistivity and emissivity of laser melted metals on the performance of the Super High Temperature Additive Manufactured Resistojet (STAR)**  
  
Christopher Ogunlesi – University of Southampton  
Co-Authors: F. Romei, M. Robinson, A. Hamilton, M. Kim

**Quality of AM polymer parts produced using a printer without build volume constraints in space environment**  
  
Anna Dauriskikh – Azimut Space GmbH  
Co-Authors: A. Sgambati, A. Baptista, L. Facciolati, E. Lallemand, A. Makaya, U. Lafont

**SESSION 7**  
**Launchers**  
Chair: Marie Jaquesson, Joaquín Martín

**A Trade of Study for the Structure of the Callisto Vehicle Equipment Bay**  
  
Olaf Mierheim – DLR  
Co-Authors: L. Heinrich, T. Glaser, N. Lidon, F. Marteau, Y. Guerin, K. Pfaab, C. Serieys, C. Hühne

**Maturation of selected and promising CFRP-technologies for a representative future launcher upper stage demonstration**  
  
Marina Wolff – MT Aerospace AG

**Laser surface preparation before adhesive bonding on launcher structures – an overview of current developments**  
  
Michel Leroy – ArianeGroup  
Co-Authors: A. Mercier, E. Chauray, E. Del Olmo, M. Peron

**Analysis of mounting flux generated by flatness defect at the interface between two launcher structures**  
  
Kévin Mathis – CNES  
Co-Authors: T. Tafadjira, N. Amsing

**Interstages Structure Development with Out Of Autoclave Process for Future Launch Vehicles**  
  
Victor Diaz – Airbus Defence and Space  
Co-Authors: J. Vilanova, F. Lavelle, J. Bru

**SESSION 8**  
**Multifunctional Structures and Structural Health Monitoring**  
Chair: Daniel Stefaniak, Daniel Kaufman

**Structure-borne Ultrasonic Multi-Hop Sensor Network for Temperature Monitoring of Satellites (SUMSENS)**  
  
Krisztian Vajna – INVENT GmbH  
Co-Authors: K. Vajna, M. Koch, M. Brandt, S. Lingelbach

**Optical Fiber Sensor for Atmospheric Reentry Experiments**  
  
Emile Haddad – MPB Communications Inc.  
Co-Authors: K. Tagziria, H. Chen, F. Klinberg, A. Guelhan, B. Aissa, D. Barba, I. McKenzie

**Development of Modular Multifunctional Structure Panel**  
  
Christoph Tschepe – INVENT GmbH  
Co-Authors: F. Ruess, P. Marzai, S. Das

**Design and Manufacturing of a Multifunctional Highly Integrated Satellite Panel Structure**  
  
Zhuzhell Montano Rejas – DLR  
Co-Authors: R. Keimer, S. Geier, M. Lange, O. Mierheim, J. Petersen, A. Pototzky, J. Wolff





**DAY TWO**

**24<sup>TH</sup> MARCH 2021**



08:30 – 9:00

**SESSION 9**  
**In-Space Manufacturing**  
 Chair: Olaf Mierheim, Advenit Makaya

**In-Orbit Manufacturing and Assembly: a new game changer for Airbus**  
 Gwenaelle Aridon – Airbus Defence and Space  
 Co-Authors: A. Ardan-Ejarque, J.-B. Bernaudin, C. Figus, A. Lecossais

09:00 – 9:30

**AMoCSiS, on Orbit Manufacturing of Composite Truss Structures**  
 Thilo Glaser – DLR  
 Co-Authors: M. Richter, M. Rege, O. Mierheim

9:30 – 10:00

**Advanced concepts for ISRU based additive manufacturing of planetary habitats**  
 Belinda Rich – ESA - ESTEC  
 Co-Authors: H. Lökk

10:00 – 10:30

**SESSION 10**  
**Acoustics - Testing**  
 Chair: David Boban, Dario Di Maio

**Direct field acoustic test of European space hardware at system level of assembly**  
 Mariano Alvarez Blanco – Siemens Industry Software NV  
 Co-Authors: M. A. Blanco, V. Di Pietro, U. Musella, A. Ciriello, G. Bitetti, B. Peeters

**Derivation of stationary acoustic test condition equivalent to first passage load and cumulative fatigue damage during launch**  
 Shingo Shimazaki – JAXA  
 Co-Authors: Q. Shi

**Numerical pre-test analysis for multi-channel control strategies in environmental acoustic tests**  
 Alberto Garcia de Miguel – Siemens Industry Software NV  
 Co-Authors: M. A. Blanco, E. Matas, H. Beriot, J. Cuenca, I. C.S. Ngan, B. Peeters

**Experimental Correlation of DFAT® simulation**  
 Bryce Gardner – ESI Group  
 Co-Authors: A. Castel, C. Musser

**SESSION 11**  
**Structural Dynamics - Payload Isolation and Damping 1**  
 Chair: Andy Kiley, Eric Standarovski

**Payload comfort during Ariane 5 launches**  
 Aurélien Hot – CNES  
 Co-Authors: V. Le Gallo, J.-Y. Bacon, E. Sauvage

**INCAS for Payload Comfort**  
 Vincent Le Gallo – ArianeGroup  
 Co-Authors: N. Voisin, P. Camarasa

**INCAS : Numerical Validation of PID from Product to System Level**  
 Jaques Marchesini – INTES FRANCE  
 Co-Authors: P. Camarasa, L. Dastugue

**Isolation and damping systems for space application**  
 Gilles Carte – Thales Alenia Space  
 Co-Authors: G. Cournegay, F. Johansson, T. Demerville, A. Mróz, G. Rodrigues

**SESSION 12**  
**Deployable Structures - Solar Arrays and Deployable Subsystems**  
 Chair: Martin Hillebrandt, Thomas Sinn

**Deployable barrel for a cubesat’s optical payload**  
 Akash Yalagach – University of Auckland  
 Co-Authors: G. S. Aglietti, M. Honeth, S. Gensemer, O. Diegel

**New Deployable Light-weight and High-power Solar Paddle System with Thin-film Cells and In-orbit Small-scale Experiments**  
 Hideki Uchida – JAXA  
 Co-Authors: T. Sumita, M. Imaizumi, T. Kobayashi, N. Kaneko

**Prototype design and realization of a deployable telescope for small satellites using composite booms**  
 Gianluca De Zanet – University of Surrey  
 Co-Authors: J. Shore, A. Viquerat

**Development and Qualification of the EurostarNeo Solar Array**  
 Friedrich Schlerka – Airbus Defence and Space  
 Co-Authors: A. Übner, R. A. de la Fuente

10:30 – 10:45 | BREAK FOR NETWORKING AT VIRTUAL COFFEE TABLES AND VISITING THE VIRTUAL EXHIBITION AND POSTER SESSION

10:45 – 11:15

**SESSION 13**  
**Mechanical and Thermal Testing - Test Campaigns**

Chair: Paul-Eric Dupuit, Qinzhong Shi

**MTG Development and STM Mechanical Test Campaign**

Roberto Arena – Thales Alenia Space  
 Co-Authors: F. Dauton, L. Perrin, A. Obst, J. Champion

**EUCLID STM Mechanical Test Campaign**

Laura Trittoni – Thales Alenia Space  
 Co-Authors: P. Bastia, S. Destefanis, L. Praticò, F. Quagliotti, R. Ullio

**Environmental and shock testing of a Pinpuller for Hold Down and Release Mechanisms**

Kai Zajac – RUAG Space Germany GmbH  
 Co-Authors: C. Raum, F. Gäde, G. Dybek

**Structural tests of a cordierite mirror**

Shogo Kusabe – JAXA  
 Co-Authors: K. Kitamoto, T. Kamiya, K. Yanagase, S. Shimazaki, A. Inoue, T. Mizutani, T. Kimura

**Thermal-Vacuum Qualification Testing of the Metop-SG ICI OGCT**

Daniel Döring – IABG mbH  
 Co-Authors: D. Winter, P. Hein, K. Pike, M. Bergadà, A. Murk

11:15 – 11:45

11:45 – 12:15

12:15 – 12:45

12:45 – 13:15

**SESSION 14**  
**Acoustics - Analysis Methods**

Chair: David Boban, Mariano Alvarez Blanco

**Large displacement acoustic analysis of structures using local nonlinear forces**

Christian Puillet – CNES  
 Co-Authors: A. Hot

**Virtual SEA vibro-acoustic response prediction of the IXV space hardware exposed to acoustic diffuse random field**

Markus Brandstetter – Hexagon | Free Field Technologies  
 Co-Authors: R. Baudson, S. Destefanis, M. Bellini, R. Baudson

**A Quick Method for Space Component Vibroacoustic Analysis Using Normal Mode Wavenumber Transform**

Koki Sato – JAXA  
 Co-Authors: D. Todaka, Q. Shi

**Ray Tracing Model of Liftoff Acoustics**

Chad Musser – ESI Group  
 Co-Authors: B. Gardner, A. Medji, C. Harasewycz, M. Maeder, S. Marburg

**Launch Sound Level Characterization**

Mara Escartí Guillem – COMET Ingeniería  
 Co-Authors: J. N. Mocholí, P. Barriuso, V. Sánchez, R. Picó, F. Simó, S. Hoyas, M. Chimeno, E. Roibás, M. Escartí, V. Romero, N. Jimenez, A. Cebrecos, M. Lázaro

**SESSION 15**  
**Shock - Prediction, Modelling and Test**

Chair: Andy Kiley, Philippe Corberand

**VESTA test exploitation**

Estelle Raynal – CNES  
 Co-Authors: O. Deslandes

**Prediction and Adjustment Method of the Shock Response Spectrum for Spacecraft Instruments Shock Test**

Yanagase Keiichi – JAXA  
 Co-Authors: T. Fukuda, T. Iwasa, Y. Obata

**PyroShock Impact Modeling using Statistical Energy Analysis**

Etienne Cavro – Airbus Defence and Space  
 Co-Authors: P.-E. Dupuis, F. Vidal-Mata, G. Borello, E. Raynal

**Satellite and subsyste shock inputs derivation by finite element analysis**

Jurij D'Amico – Thales Alenia Space

**Verification of impact models for pyroshock simulation**

Ian Horsfall – RAL Space  
 Co-Authors: D. Rippington, J. Knott, A. Alvino

**SESSION 16**  
**Deployable Structures - Inflatables and Membrane Structures**

Chair: Martin Richter, Graham Coe

**Deployable Passive de-Orbit Sails Subsystem for Constellations and Scientific Satellites**

Daniel Stelzl – HPS GmbH  
 Co-Authors: H. G. Hemme

**Embedded Structural Health Sensors for Inflatable Space Habitats**

Osgar Ohanian – Luna Innovations Incorporated  
 Co-Authors: N. A. A. Rahim

**Inflatable Systems for Aerobraking and Aerocapture**

Pedro Loureiro – Eptune Engineering  
 Co-Authors: P. Carneiro

**Stowing and deployment strategies applied for different membranes in space applications**

Patric Seefeldt – DLR  
 Co-Authors: T. Wippermann, F. Y. Bartsch, M. Sznajder, T. Spröwitz, A. Riemer

**Passive damped deployment of full composite structures**

José Nieto – COMET Ingeniería  
 Co-Authors: J. Fayos, Á. Pipó

13:15 – 14:00 | BREAK FOR NETWORKING AT VIRTUAL COFFEE TABLES AND VISITING THE VIRTUAL EXHIBITION AND POSTER SESSION



14:00 – 14:30

**SESSION 17**  
**Lattice Structures**

Chair: Steffen Niemann, Joaquín Martín

**GEMSTONE project – Anisogrid lattice structures for launcher applications**

Adrián García Martínez – CNES

14:30 – 15:00

**Development of a satellite central cylinder using uninterrupted pre-preg fibre-placed lattice structures**

Robert Telford – ATG Europe

Co-Authors: L. Pavlov, B. Smeets, B. Murray, K. Matthews

15:00 – 15:30

**Testing local attachments of cylindrical lattice spacecraft structures**

Kelly Matthews – ATG Europe

Co-Authors: L. Pavlov, R. Telford, B. Murray, B. Smeets

15:30 – 16:00

**A low cost and very lightweight small launcher interstage, using pre-preg composite grid-stiffened technology**

Camille Cheyrou – ATG Europe

Co-Authors: L. Pavlov, B. Smeets, C. Cheyrou

**SESSION 18**  
**ALM - Printing Process and In-situ Monitoring**

Chair: Johannes Gumpinger, Rick Russell

**Distortion prediction in Scalmalloy® parts**

Lidia Hernandez Alvarez – CiTD Engineering &amp; Technologies

Co-Authors: A. García, M. G. Cosio, J. Grumpinger, F. Lasagni

**Functionality integration by Additive Manufacturing**

Sebastien Lani – CSEM

Co-Authors: N. Hendricks, L. Kiener, F. Cosandier, G. Perruchoud, H. Saudan

**In-situ monitoring of AM for space structures: exploration of novel strategies for defect detection in complex shapes**

Matteo Bugatti – Politecnico di Milano

Co-Authors: B. M. Colosimo

**Methodology for Additive Manufacturing Part Design using Region Connection and In-Situ Analysis Data**

Robin Kromer – University of Bordeaux

Co-Authors: A. Lahutte, J. M. Agullo, C. Arvieu, E. Lacoste

**SESSION 19**  
**Structural Dynamics - Payload Isolation and Damping 2**

Chair: Christian Puillet, Stefano Destefanis

**Vibroacoustic metamaterials for structural vibration reduction in launcher components**

Daria Manushyna – Fraunhofer Institute LBF

Co-Authors: N. Deschauer, H. Atzrodt, S. Perfetto, M. Droste

**Assessment of Damping Behavior in Additive Manufacturing for Space Hardware Application**

Benjamin Braun – Space Structures GmbH

Co-Authors: L. Pompa, J. Moritz, A. Brandao, L. Pambaguian

**Design and test of damped support struts for optomechanical instruments**

Floris van Kempen – TNO

Co-Authors: J. de Vreugd, F. van der Knaap, W. Crowcombe, W. Jonker, A. Maaskant, M. Distelbrink, H. Pronk

**Qualification of damping elastomer familie for passive isolators**

Tony Demerville – SMAC

**SESSION 20**  
**Deployment Experiments in DLR's next Parabolic Flight Campaign**

Chair: Marco Straubel, Tiziana Cardone

**Full Scale Flat Floor Testing of a 500 m<sup>2</sup> Class Solar Sail Deployer**

Martin Richter – DLR

Co-Authors: M. Straubel, D. Müller, J. M. Fernandez

**CTM Boom Deployment Mechanism with Integrated Boom Root Deployment for Increased Stiffness of the Boom-to-Spacecraft Interface**

Marco Straubel – DLR

Co-Authors: C. Hühne

**Integrated and Distributed Membrane Structures for Deployable Space Applications - An early design approach**

Martin Zander – DLR

Co-Authors: D. R. Müller, J. Völker, M. K. Chamberlain, W. K. Belvin, K. Wilkie, C. Hühne

**On Orbit Deployment of the Eu:CROPIS Solar Panel by GFRP Tape Spring Hinges**

Olaf Mierheim – DLR

Co-Authors: T. Glaser, F. Orłowski, S. Kottmeier, C. Hühne

**16:00 – 16:15 | BREAK FOR NETWORKING AT VIRTUAL COFFEE TABLES AND VISITING THE VIRTUAL EXHIBITION AND POSTER SESSION**



16:15 – 16:45

**SESSION 21  
Thermal Testing**

Chair: Alf Schneider, Benoit Laine

**Development of a metrology enabled thermal imager for thermal vacuum testing**

Wesley Bond – NPL

16:45 – 17:15

**Thermal Wireless Sensors Development**

Noellie Chauvet – Airbus Defence and Space  
Co-Authors: P.-E. Dupuis, C. Corberand, S. Polino, J. Marti, V. Frard

17:15 – 17:45

**Automated Thermal Cycling for Thermal Vacuum Chamber**

Rémi Lamande – Airbus Defence and Space  
Co-Authors: P.-E. Dupuis, V. Sayoux

17:45 – 18:15

**Spectrum Matters - Infrared Radiation Devices in Thermal Vacuum Testing**

Daniel Winter – IABG mbH  
Co-Authors: P. J. Hein, D. Döring

18:15 – 18:45

**Cryogenic Adhesive Testing**

Marco Leitwein – KRP Mechatec GmbH  
Co-Authors: K. Reiling, P. Janik, C. Zauner

**SESSION 22  
ALM - Advanced Manufacturing and Multifunctional Structures**

Chair: Laurent Pambaguian, Erich Neubauer

**ESA advanced manufacturing technology initiative**

Thomas Rohr – ESA  
Co-Authors: A. Norman, T. Ghidini

**A review of Additive Manufacturing for Space Applications: challenges and perspectives**

Marco Grasso – Politecnico di Milano  
Co-Authors: B. M. Colosimo, J. Gumpinger, T. Ghidini

**Realization and Verification of a Compliant Mechanism produced by Additive Manufacturing**

Christoph Wilsnack – Fraunhofer IWS  
Co-Authors: A. A. Cubillo, V. Robiner, C. Melzer, J. Richter, E. C. Paul, P. Zaltron, M. Riede, E. Lopez, F. Brueckner, C. Leyens

**Characterization of a multifunctional component realized by AM**

Massimo Chiampi – Thales Alenia Space  
Co-Authors: L. Rutigliano, S. Ferroni

**Modular approach to noise reduction in manned module by using additive manufacturing**

Stefano Destefanis – Thales Alenia Space  
Co-Authors: A. Simone, S. Ferroni, R. Ullio, M. Marzot

**SESSION 23  
Structural Dynamics - Analysis Methods, Modelling and Modal Survey**

Chair: Ivan Ngan, Vincent Le Gallo

**Representing uncertainty in space structures through a random block matrix approach**

Vladimir Yotov

**Dynamic Analysis of FE Models with Fluid Cavities for Improved Correlation with Vibration Tests**

Nicolas Roy – Top Modal  
Co-Authors: T. Brault

**Dynamic Analysis of Parameterized Models using Residual Modes**

Nicolas Roy – Top Modal  
Co-Authors: T. Brault, T. Larroque

**Impact of PCB Modal Finite Element Model Parameters on Ariane 5 Shock Response Spectrum Analysis**

Uday Hasmukh Kalyani – Institute of Technology Carlow  
Co-Authors: M. Wylie

**Modal Survey Test of the Bartolomeo platform**

Julian Sinske – DLR  
Co-Authors: K. Soal

**SESSION 24  
Deployable Structures - Booms and Mechanisms**

Chair: Martin Zander, Alexander Ihle

**Large Deployable Boom for Very Large Deployable Antennas**

Stephan Endler – HPS GmbH

**Development of deployable RWI and LP-PWI mechanisms for JUICE mission - quality and product assurance aspects.**

Maciej Ossowski – Astronika  
Co-Authors: M. Borys, P. Palma, Ł. Wiśniewski, M. Tokarz, T. Kuciński, E. Ryszawa, K. Bochra, M. Duda, J. Grygorczuk

**Experimental characterization of viscoelastic material properties and numerical implementation for estimating long-term stowage behavior of DLR's CFRP booms**

Sebastian Meyer – DLRI  
Co-Authors: M. Hillebrandt, C. Hühne

**Commercially Off The Shelf (COTS) Small and NanoSat Release Mechanisms and Deployable Structures enabling advanced NewSpace missions**

Thomas Sinn – DcubeD  
Co-Authors: T. Lund, A. Titz, J. Gruber, H. G. Hemme, M. Geiss, M. Pietras

**Add flexibility in your System with Compliant Mechanisms build by Additive Manufacturing**

Lionel Kiener – CSEM  
Co-Authors: H. Saudan, F. Cosandier, G. Perruchoud, V. Pejchal, S. Lani





**DAY THREE**

**25<sup>TH</sup> MARCH 2021**



08:30 – 9:00

**SESSION 25**  
**ALM - Materials**  
Chair: Stéphanie Behar-Lafenetre, Guillermo Requena

**Characterization and predictive modelling of 3D printed Scalmalloy lattice structures**

Ludovic Barriere – IRT Saint Exupery  
Co-Authors: M. Suard, J. D'Add, B. Filloux, S. Perusin, F. Montredon, P. Lhuissier, P. Brammer

**New 3D printed magnetic materials**

Miriam Ferrara – University of Rome Tor Vergata  
Co-Authors: L. Pigliaru, M. Rinaldi, C. Allegranza, L. Paleari, T. Rohr, T. Ghidini, F. Nanni

**Mechanical properties of bulk metallic glasses produced by additive manufacturing**

Etienne Bonnaud – SWERIM AB

**Cold Spray Additive Manufacturing**

Jan Kondas – Impact Innovations GmbH  
Co-Authors: R. Singh, M. Meinicke, C. Bauer, L. Loidl, L. Holzgaßner

09:00 – 9:30

9:30 – 10:00

10:00 – 10:30

**SESSION 26**  
**Analysis and Design**  
Chair: Werner Konrad, Els Lemmens

**Exomars: TAS Study to simulate the Rover Egress for Martian Explorations, based on a Flexible Multibody Approach**

Gabriele Vasile – Thales Alenia Space  
Co-Authors: A. Stio, S. Portigliotti, M. Bellini

**Application of spectral fatigue methods under various stress ratios**

Michal Vorel – ArianeGroup GmbH  
Co-Authors: M. Parmar

**Process for automated mesh from DMU**

Marie Bourdeaud'hui – Airbus Defence and Space

**Lifetime Estimation of Fatigue Damage under Acoustic Environment by the Pre-informative of Vibration and Acoustic Test**

Takafumi Kajikawa – JAXA  
Co-Authors: Q. Shi

**SESSION 27**  
**Space Debris - Risk, Mitigation and Design for Demise**  
Chair: Rafael Bureo-Dacal, Christian Puillet

**Statistics of thin structures perforated area caused by Micro-Meteoroids and Orbital Debris**

Christian Puillet – CNES

**New Demise Technology Concepts of Spacecraft Structural Joints**

Martin Sauerbrey – INVENT GmbH  
Co-Authors: M. Fittock, A. Gibbings, J. Beck, A. Flinton, T. Lips, T. Schleutker, V. Liedtke, T. Soares

**Study on Harpooning a Metal Anchor to Free-Falling Rotating Targets for Capturing Space Debris**

Hiroaki Tanaka – National Defense Academy of Japan

**SESSION 28**  
**Virtual Testing and Qualification**  
Chair: Javad Fatemi, Shumit Das

**Virtual thermal vacuum test based on the combination of thermal and ray tracing modelling**

Anton Filatov – Ushio Europe BV  
Co-Authors: I. Nagorski, P. Smirnov

**Re-engineering the Engineering Processes for Space Product Development**

Javad Fatemi – Airbus Defence and Space  
Co-Authors: G. Poort

**Qualification of the Vega-C Inter-stage 1/2 Structure by Simulation**

Gerard Poort – Airbus Defence and Space  
Co-Authors: J. Fatemi

10:30 – 10:45 | BREAK FOR NETWORKING AT VIRTUAL COFFEE TABLES AND VISITING THE VIRTUAL EXHIBITION AND POSTER SESSION



10:45 – 11:15

**SESSION 29**  
**ALM - Part Design 1**

Chair: Bianca Maria Colosimo, Andy Norman

**Static assessment of AlSi10Mg parts produced by SLM**

Luca Patriarca – Politecnico di Milano  
Co-Authors: G. Minerva, S. Foletti, S. Beretta

**Development of a Structural Design Process Chain for Opto-Mechanical Components with Consideration of Additive Manufacturing**

Matthias Meschenmoser – OHB System AG  
Co-Authors: A. Widhammer

**Material Characterization and Topology Optimization for the Additive Manufacturing of an Aluminum Structure of the DESTINY+ Dust Analyzer**

Ariane Exle – University of Stuttgart  
Co-Authors: S. Hümbert, V. Dügmeçi, D. Jauch, C. Dürnhofer, R. Srama, S. Klinkner

**Never additive came so far**

Marta García-Cosío – CITD Engineering & Technologies  
Co-Authors: L. Hernandez Alvarez, J. Vilanova, A. Perifan

**The structural assessment of sandwich panels with 3D printed cores for spacecraft applications**

Adrian Dumitrescu – University of Southampton  
Co-Authors: S. Walker, F. Romei, A. Bhaskar

11:15 – 11:45

11:45 – 12:15

12:15 – 12:45

12:45 – 13:15

**SESSION 30**  
**Advanced Materials**

Chair: Tommaso Ghidini, Christian Durin

**Long term storage guidelines for the METOP-SG satellites**

Lucia Pigliaru – ESA  
Co-Authors: H. Fischer, P. Janik, T. Rohr, C. Semprimoschnig, T. Ghidini

**Effects of vacuum-UV and near-UV irradiation on polymeric materials using deuterium lamp and xenon lamp**

Aekjira Kuyyakanont – Kyushu Institute of Technology  
Co-Authors: N. Ohashi, A. Sobieski, N. Takumi, M. Iwata

**Towards safer space suits with self-healing materials**

Laura Pernigoni – Politecnico di Milano  
Co-Authors: A. M. Grande

**Lightweight All-CFRP Struts with Near Zero CTE**

Niels Christian Jessen – DTU Space National Space Institute  
Co-Authors: D. Ljubicic, K. Petersen, S. Møller Pedersen

**Variable Emittance VO2 Thin-Film Smart Radiator Device for Passive Thermal Control of Space Systems**

Emile Haddad – MPB Communications Inc.  
Co-Authors: R. Kruzelecky, P. Murzoniak, K. Tagziria, I. Sinclair, G. Schinn, J.-F. Thibault, E. Choi, B. LeDrogoff, M. Chaker

**SESSION 31**  
**Composites - Materials and Failure**

Chair: Marie Jaquesson, Donato Girolamo

**Carbon Fibres and Pre-impregnated Materials for Space Applications**

Nuno Rocha – INEGI

**New developments on composite materials for space**

Olivier Damiano and Quentin-Arthur Poutrel – Thales Alenia Space  
Co-Authors: L. Cornillon, F. Tournilhac, J. Hamerlak, S. Appel, S. Das, U. Lafont

**Metal Matrix Composites for Space Applications**

Ralf Becker – TISICS Ltd. Titanium Composites  
Co-Authors: S. Kyle-Henney

**Delamination growth analysis of T700/M21 components and Paris law derivation from vibration fatigue testing**

Dario Di Maio – University of Twente  
Co-Authors: M. Peluzzo, D. De Bono, E. Amsterdam

**Assessment and validation of Puck's failure criterion for CFRP composites under cryogenic thermo-mechanical loading**

Jörg Hohe – Fraunhofer-Institut für Werkstoffmechanik  
Co-Authors: M. Schober, K.-P. Weiss, S. Appel

**SESSION 32**  
**Mechanical Testing - Prediction, Verification and Control**

Chair: Matteo Appolloni, Nicholas Roy

**Analysis of Beat Frequency Vibration Characteristics of Active Flight Section of Satellite-Rocket Combination**

Jiantao Zhu – China Academy of Space Technology  
Co-Authors: W. Ma

**Analysis and Correction of Abnormal Signal in the Measurement of Shock Response of Pyro-shock**

Jiantao Zhu – China Academy of Space Technology  
Co-Authors: W. Ma

**Advanced tool for on-board units input levels prediction and comparison**

Angelo Costantino – QinetiQ Space

**Force limited sine testing: comparison of different techniques for 3 projects: PROBAV and P200-STM (microsatellites) and EUCLID Baffle**

Els Lemmens – QinetiQ Space  
Co-Authors: N. Roy

**Development of a new method on force limited vibration test**

Ali R. Kolaini – Jet Propulsion Laboratory California Ins  
Co-Authors: A. Derkevorkian



14:00 – 14:30

**SESSION 33**  
**ALM - Fatigue**  
Chair: Christian Hühne, Nicola Cersullo

**Benchmark of a software for fatigue assessment of AM components**

Stefano Beretta – Politecnico di Milano

14:30 – 15:00

**Advanced Fatigue Analysis of Additive Manufactured Parts Including Process-induced Defects and Artefacts**

Nicolas Lammens – Siemens Digital Industry Software  
Co-Authors: M. Schulz, S. Straesser, H. Erdelyi

15:00 – 15:30

**Orientation-dependent fatigue properties of 'as-built' surfaces for Ti6Al6V produced by SLM**

Stefano Beretta – Politecnico di Milano  
Co-Authors: L. Barricelli, L. Patriarca, M. Riccio

15:30 – 16:00

**Influence of Internal Defects and Post Thermal Treatments on the Mechanical Performance of AS7G06 Samples Manufactured by Additive Power Bed Laser Beam Melting**

Olivier Quenard – ICAM  
Co-Authors: P. Guy, M. Perez, M. Abad, A. Votie, S. Begoc, F. Montredon

**SESSION 34**  
**Materials - Ceramics**  
Chair: Guillermo Requena, Ralf Usinger

**Additive manufacturing of silicon nitride**

Stéphanie Behar-Lafenetre – Thales Alenia Space  
Co-Authors: P. Grasset, L. Cornillon, N. Louh, M. Villemaire, C. Schick

**Ceramic space structures sizing and verification: investigations and handbook development**

Stéphanie Behar-Lafenetre – Thales Alenia Space  
Co-Authors: N. Louh, P. Grasset, A. Pavageau, J. Steiner, M. Such Taboada

**Silicon nitride structural parts for space applications**

Stéphanie Behar-Lafenetre – Thales Alenia Space  
Co-Authors: N. Louh, U. Schenderlein, D. Haas, L. Cornillon, K. Berroth

**Improved lightweight highly stiff ceramic materials and production routines for passive structures in optical avionics and space instruments**

Karl Berroth – FCT Ingenieurkeramik GmbH  
Co-Authors: D. Haas, U. Schenderlein

**SESSION 35**  
**Microvibrations - Prediction, Modelling and Test**  
Chair: Patrick Camarasa, Graham Coe

**Modelling of a cryogenic cooler for micro vibration predictions**

Gilles Carte – Thales Alenia Space  
Co-Authors: V. De Gaudemaris, E. Onillon, G. Ladurée

**Stepper motor and Cryo-Cooler modelling towards micro-vibration analysis**

Emmanuel Onillon – CSEM  
Co-Authors: L. Rossini, Y. J. Regameys, G. Carte

**Practical considerations in multicomponent force measurement for mechanism-exported force and torque (EFT) testing**

Pascal Erne – Kistler Instrumente AG  
Co-Authors: B. Zwolinski

**SESSION 36**  
**Test Facilities and Test Platforms**  
Chair: Tom Sprowitz, Daniel Kaufman

**Verification of Magnetic Requirements of Solar Orbiter Space Craft by In Situ Measurements**

Holger Kuegler – IABG mbH  
Co-Authors: M. Pudney

**Competence Center Optics - IABG's new thermo-optical test facility**

Eric Hodai – IABG mbH  
Co-Authors: M. Friemel, B. Söllner

**Test facility for cryogenic mechanical testing**

Federico Zühlke – ET EnergieTechnologie  
Co-Authors: B. Strauß, J. Bär

**Metamorphosis – the mobile space testing facility prototype development**

Sergey Kravchenko – CRYOGENIC AND VACUUM SYSTEMS, Ltd  
Co-Authors: S. Kravchenko, N. Panova, N. Kileshov

**16:00 – 16:15 | BREAK FOR NETWORKING AT VIRTUAL COFFEE TABLES AND VISITING THE VIRTUAL EXHIBITION AND POSTER SESSION**





16:15 – 16:45

**SESSION 37**  
**ALM - Part Design 2**

Chair: Benoit Bonvoisin, Gonçalo Rodrigues

**Manufacturing and Qualification of Additive Manufactured Connector Brackets for Solar Array Drive Mechanism**

Christian Melzer – RUAG Space Germany  
Co-Authors: A. A. Cubillo, S. Wismer, T. Müller, W. Baumann

16:45 – 17:15

**3D Metal Printed Polarization Reconfigurable Horn Antenna with Meshed Structure for Space Satellite Communication Applications**

Wei Zhang and Daniel Butcher – Swansea University  
Co-Authors: S. Milward, N. Lavery, A. Mehta, H. Zhou, B. Falkner, S. Singh

17:15 – 17:45

**Design and Vibration Testing of ALM Reaction Wheel Bracket**

Mehmet Emin Badir – TÜBİAK UZAY  
Co-Authors: A. Özdemir, Ş. Ötenkaya, O. Yılmaz

17:45 – 18:15

**Modelling and Test Correlation of Space Structures Including Aluminium Micro-Lattices Manufactured by Additive Powder Bed Laser Beam Melting**

Gilles Pommatau – Icam  
Co-Authors: P. Guy, M. A. Pérez, A. Hot,

18:15 – 18:45

**Comparison of feedstock materials (wire and powder) for manufacturing of 3D structures using the Plasma Metal Deposition (PMD) process**

Erich Neubauer – RHP Technology GmbH  
Co-Authors: E. Neubauer, L. Pambaguian, E. Ariza, J. Meuthen

**SESSION 38**  
**Composites - Manufacturing**

Chair: Victor Díaz, Chiara Bisagni

**METOP SG - MWI reflectors design for manufacturing with CFRP**

Amaia Yarza – Airbus Defence and Space  
Co-Authors: P. Cortes, F. Arevalo, C. B. Mangas, J. Sesmero

**Composite Hardware Assessment & Review for Implementation in Space Manned Applications (CHARISMA)**

Roberto Ullio – Thales Alenia Space  
Co-Authors: T. Zbyněk, S. Das

**Challenges of integrating supercapacitors into space structures for space qualification**

Sebastian Geier – DLR  
Co-Authors: J. Petersen, V. Iyer, P. Wierach

**PROBA-3 occulter disk manufacturing development**

Irene De Moreta – Airbus Group  
Co-Authors: V. B. Juzgado, A. Salio Fernandez

**Development and verification of a new manufacturing process for X-ray and gamma-ray imaging grids**

Stefan Kögl – KOEGL Space GmbH  
Co-Authors: N. Gradwohl, S. Krucker, H.-P. Gröbelbauer, M. Geissmann

**SESSION 39**  
**Joints and Inserts**

Chair: Ralf Usinger, Rafael Bureo-Dacal

**Hyperjoints as high strength metal/composite joining technology for lightweight launchers**

Paul Van Der Sypt – ArianeGroup  
Co-Authors: M. Leroy, J.-P. Leard

**Development Methodology for Structural Analysis Software Tools - With an Insert & Fastener Analysis Tool as Showcase**

Erwin Dekens – OHB System AG  
Co-Authors: T. Papenhausen, N. Riva

**Bolted joints in composite laminates: efficient structural analysis**

Minh Nguyen-Hoang – Technical University Darmstadt  
Co-Authors: W. Becker

**Development of sandwich panel insert to withstand thermomechanical loading**

Tomáš Raška – OHB Czechspace s.r.o.  
Co-Authors: O. Krepl, A. Wyen

**Development of Linear Friction Welding to Add External Features to Spacecraft and Launchers Systems**

Andrew Norman – ESA  
Co-Authors: J. Gandra, J.-P. Bonnafé, R. Bellarosa

**SESSION 40**  
**Test Facilities - TVAC**

Chair: Steve Roose, Alf Schneider

**Contaminants analysis comparative in thermal vacuum tests between conventional and TQCM techniques. Advantages, disadvantages and recommendations for testing Space units.**

Graciano Martínez Fuente – INTA  
Co-Authors: G. M. Fuente, J. M. Urteaga, Y. Parrón González

**An Effective Lost Cost Cryo-Hybrid Cleaning Process for Thermal Vacuum Chambers**

Cem Omur – RAL Space  
Co-Authors: J. Gallagher

**LED based Solar Simulator for thermal vacuum test of a spacecraft**

Anton Filatov – Ushio Europe BV  
Co-Authors: I. Nagorski

**The New Motion System of the ESA/ESTEC Large Space Simulator**

Remko Moeys – ESA  
Co-Authors: R. Messing

**Thermoelastic deformation measurements in the ESA ESTEC Phenix facility**

Attila Jasko – RHEA System BV  
Co-Authors: M. Appolloni, S. Sablerolle, R. Vink, G. Casarosa

**18:45 – 19:15 | CLOSING SESSION**

Christian Hühne, Torben Henriksen, Pierre-Yves Tourneau



The background of the slide is a vibrant space scene. It features a bright sun on the right side, creating a lens flare effect. A comet streaks across the dark sky in the upper left. In the lower left, the curved horizon of Earth is visible, with the Moon in the background. The overall color palette is dominated by deep blues and purples, with bright white and yellow from the sun.

# POSTER SESSIONS



**Optimization of the Sun Simulator's primary Mirror shape towards astigmatism compensation**

Anton Filatov – Ushio Europe BV  
Co-Authors: I. Nagorski, S. Sablerolle, R. Vink

**Environmental Test Facilities of Standard und Non-Standard Space Systems Testing at DLR**

Tom Sprowitz – DLR

**New cryogenic thermal vacuum testing facilities**

Marco Leitwein – KRP Mechatec GmbH

**Damping behaviour of Ni-Ti auxetic structures manufactured by Selective Laser Melting**

Antonio Grande – Politecnico di Milano  
Dept. Aerospace Science and Technology  
Co-Authors: A. Nespoli, L. Erbea, P. Bettini F. Passaretti

**Mycospace: novel mycotic materials for future space missions**

Alessandra Benedetti – Politecnico di Milano  
Co-Authors: L. Pernigoni, A. M. Grande, L. Di Landro, G. Janszen

**Integrated design of structure subsystem & TCS for Leo narrowband communication satellite**

Duan Xiao – LEOBIT Technology Co., Ltd.  
Co-Authors: X. Junhua, X. Hang

**Design optimization of long-scale deployable mast structure considering thermally induced disturbance**

Tomoyuki Miyashita – Waseda University Modern Mechanical Engineering  
Co-Authors: S. Shimizu, K. Ishimura

**End To End Testing And Validation**

Louis Hanna – Etamax Space GmbH  
Co-Authors: J.-C. Berton

**New Generation High Pressure Tanks for Space Applications**

Antonia Simone – Thales Alenia Space  
Co-Authors: S. Das, S. Ferroni

**Inherent limitations of water-based binders when printing regolith under Martian conditions**

Reza Hedayati – Delft University of Technology  
Co-Authors: V. Stulva, S. van der Zwaag