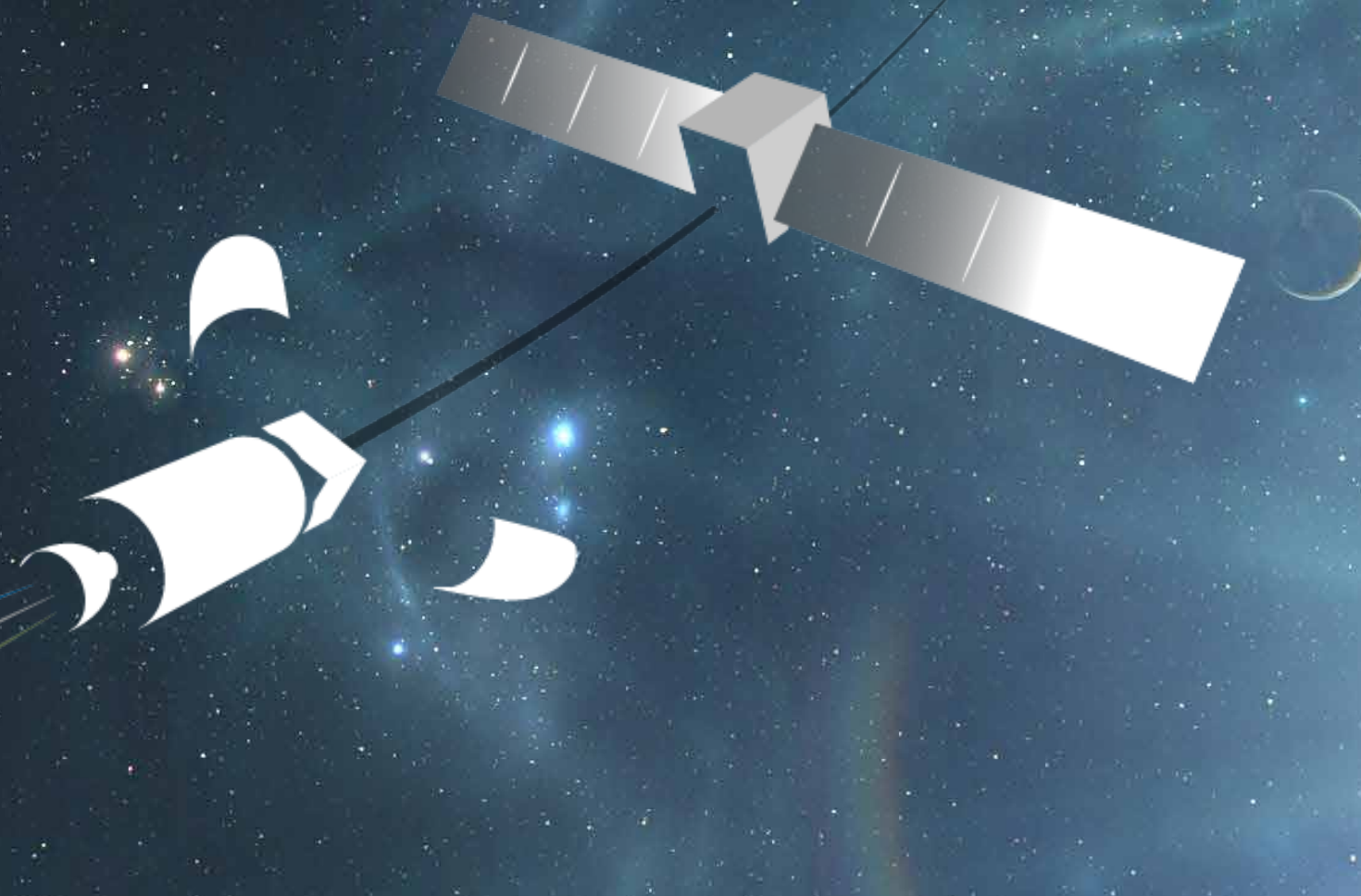


ECSSMET
Germany 2021



PROGRAMME

23RD – 25TH MARCH 2021



DAY ONE

23RD MARCH 2021

09:00 – 10:00 | OPENING

Opening Speech by Chair of the DLR Executive Board Anke Kaysser-Pyzalla
Opening Speeches by the Conference Chairmen Christian Hühne (DLR), Torben Henriksen (ESA), Pierre-Yves Tournéau (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 – 14:00 | BREAK FOR NETWORKING AT VIRTUAL COFFEE TABLES AND VISITING THE VIRTUAL EXHIBITION AND POSTER SESSION

14:00 – 14:30

14:30 – 15:00

15:00 – 15:30

15:30 – 16:00

SYMPOSIUM 1
“I-Meter” - Thermo-Elastic Prediction

Quantifying Uncertainties in Thermo-Elastic Predictions

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

SESSION 1
ALM - Manufacturing

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

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

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

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

SESSION 2
Lattice Structures

GEMSTONE project – Anisogrid lattice structures for launcher applications

Adrián García Martínez – CNES

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

Testing local attachments of cylindrical lattice spacecraft structures

Kelly Matthews – ATG Europe
Co-Authors: L. Pavlov, R. Telford, B. Murray, B. Smeets

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 3
Structural Dynamics - Payload Isolation and Damping 1

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. Cournegey, F. Johansson, T. Demerville, A. Mróz, G. Rodrigues

SESSION 4
Test Facilities and Test Platforms

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

Metamorphosys – 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 5
Thermo-Elastics - Disturbance in Optical Instruments

Impact of the friction on the thermoelastic behavior of the SuperCam instrument

Damien Hoarau – MECANO ID
Co-Authors: S. Orsingher, M. Heim

16:45 – 17:15

End-To-End STOP analysis on PLATO TOU

Simon Appel – ATG-Europe / ESA
Co-Authors: J. Etchells, S. Blake, M. Rieder, T. Bandy, V. Cessa, D.Piazza

17:15 – 17:45

PLATO Spacecraft: Thermo-Elastic Distortion Verification Concept and Demonstrator Tests

Jan Junker – OHB System AG

17:45 – 18:15

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

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

18:15 – 18:45

FLEX FLORIS Instrument Optical Module Structure (IOMS)

Borja Provedo – Sener Aeroespacial
Co-Authors: C. Borque, F. Del Campo

SESSION 6
ALM - Certification

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 Carmena, M. E. Castaño, S. Laborde, D. Escolar, I. Ngan

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

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

A Trade of Study for the Structure of the Callisto Vehicle Equipment Bay

Lars Heinrich – DLR
Co-Authors: O. Mierheim, T. Glaser, N. Lidon, F. Marteau, Y. Guerin, K. Pfaab, C. Serieys, C. Hühne

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

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

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

SESSION 8
Structural Dynamics - Payload Isolation and Damping 2

Vibroacoustic metamaterials for structural vibration reduction in launcher components

Daria Manushyna – Fraunhofer Institute LBF
Co-Authors: N. Deschauer, H. Atzrodt, S. Peretto, 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

Experimental Testing of Isolation Platform for Micro-Vibrations Induced by Reaction Wheels

Vicente Lafarga – Université Libre de Bruxelles
Co-Authors: M. Verma, G. Rodrigues, F. Liebold, R. Seiler, C. Collette

SESSION 9
Test Facilities - TVAC

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 Moey – 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

The background of the slide is a vibrant space scene. It features a view of Earth's horizon from space, with a bright blue atmospheric glow. In the upper right, a bright star or galaxy core emits a powerful light, creating a lens flare and illuminating a blue nebula. A crescent moon is visible in the upper right, and a comet streaks across the dark sky in the middle left. The overall color palette is dominated by blues and whites.

DAY TWO

24TH MARCH 2021

08:30 – 9:00

SYMPOSIUM 2
In-Space Manufacturing

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

AMoCSiS, on Orbit Manufacturing of Composite Truss Structures

Thilo Glaser – DLR
Co-Authors: M. Richter, M. Rege, O. Mierheim

Advanced concepts for ISRU based additive manufacturing of planetary habitats

Belinda Rich – ESA - ESTEC
Co-Authors: H. Lökk

09:00 – 9:30

9:30 – 10:00

10:00 – 10:30

SESSION 10
Acoustics - Testing

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
Space Debris - Risk, Mitigation and Design for Demise

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

Space debris impact risk assessments for CubeSat structures

Esfandiar Farahvashi – etamax space GmbH
Co-Authors: J. Rodmann, K. D. Bunte

SESSION 12
Deployable Structures - Inflatables and Membrane Structures

Folding Technique of Inflatable Conical Structures

Nico Reichenbach – University of Auckland
Co-Authors: T. Sinn, T. Lund, J. Cater, N. Rattenbury, M. Pietras, G. Aglietti

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

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

SESSION 13
Mechanical and Thermal Testing - Test Campaigns 1

MTG Development and STM Mechanical Test Campaign

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

Launch Environmental Testing Results of Electro-Optical Payload for Earth Observation Satellite Suitable for Various Launchers

Soomin Woo – Satrec Initiative
Co-Authors: M. Joo, D. Hwang, J. Kim, M. Kang

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

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

10:45 – 11:15

11:15 – 11:45

11:45 – 12:15

12:15 – 12:45

12:45 – 13:15

SESSION 14
ALM - Multifunctional Structures

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

Antonia Simone – Thales Alenia Space
Co-Authors: S. Ferroni, R. Ullio, S. DeStefanis, M. Marzot

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

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

Luigi Rutigliano – Thales Alenia Space
Co-Authors: M. Chiampi, S. Ferroni

SESSION 15
Acoustics - Analysis Methods

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

Romain Baudson – Hexagon | Free Field Technologies
Co-Authors: S. Destefanis, M. Bellini, M. Brandstetter, 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 Ltoff Acoustics

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

Launch Sound Level Characterization

José Nieto Mocholí – COMET Ingeniería
Co-Authors: 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 16
Shock - Prediction, Modelling and Test

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

Paul-Eric Dupuis – Airbus Defence and Space
Co-Authors: E. Cavro, 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. Ripington, J. Knott, A. Alvino

SESSION 17
Deployable Structures - Solar Arrays and Deployable Subsystems

Deployable barrel for small optical payloads

Guglielmo Aglietti – University of Auckland
Co-Authors: M. Honeth

Development and Qualification of the EurostarNeo Solar Array

Friedrich Schlerka – Airbus Defence and Space
Co-Authors: A. Übner, R. A. de la Fuente

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

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

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

SESSION 18
Mechanical and Thermal Testing - Test Campaigns 2

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

Validation and Tests of Electromagnetic Separation System for a Spherical Satellite

Gao Zijue – Tsinghua University

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

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

14:00 – 14:30

**SYMPOSIUM 3
Solar Sailing**

**Full Scale Flat Floor Testing of a 500 m²
Class Solar Sail Deployer**

Martin Richter – DLR
Co-Authors: M. Straubel, D. Müller, J. M. Fernandez

14:30 – 15:00

**Technology Demonstrator of a highly
scalable Solar Sail based on a 6U-Cubesat**

Martin Hillebrandt – DLR

15:00 – 15:30

Recent Solar Sail Developments

15:30 – 16:00

**SESSION 19
ALM - Printing Process**

**Laser surface preparation before adhesive
bonding on launcher structures – an
overview of current developments**

Michel Leroy – CITD Engineering & Technologies
Co-Authors: A. García, M. G. Cosio, J. Grumpinger, F. Lasagni

Distortion prediction in Scalmalloy® parts

Lidia Hernandez Alvarez – CSEM
Co-Authors: N. Hendricks, L. Kiener, F. Cosandier, G. Perruchoud,
H. Saudan

**SESSION 20
Thermal Design**

BLAST: Black Laser Surface Treatment

Marko Piskacev – Azimut Space GmbH

**Modelling Guidelines for Thermo-
Elastic Analyses**

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

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

Peter Jens Hein – IABG mbH
Co-Authors: D. Winter, D. Döring

Cryogenic Adhesive Testing

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

**SESSION 21
Deployable Structures - Activities within
ESA's ADEO Drag Sail**

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

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

**How to Improve the Reliability of Space
Debris Risk and Vulnerability Analyses of
Deployable Space Structures**

Karl Dietrich Bunte – etamax space GmbH
Co-Authors: M. E. Zander, S. Meyer, A. Miller

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

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

Drag sail membrane design and life test

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

**SESSION 22
Thermal Testing - Measurement Methods**

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

Wesley Bond – NPL

Thermal Wireless Sensors Development

Paul-Eric Dupuis – Airbus Defence and Space
Co-Authors: N. Chauvet, C. Corberand, S. Polino, J. Marti, V. Frard

**Automated Thermal Cycling for Thermal
Vacuum Chamber**

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

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

16:15 – 16:45

**SESSION 23
Buckling of Structures**

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

Falk Odermann – DLR

16:45 – 17:15

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

17:15 – 17:45

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

Kaspars Kalnins – Riga Technical University

17:45 – 18:15

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

Paola Caracciolo

Co-Authors: E. Skukis, G. Jekabsons, O. Ozolins

18:15 – 18:45

Nondimensional buckling equations for launch vehicle structures design

Ines Uriol Balbin – Delft University of Technology

Co-Authors: C. Bisagni

**SESSION 24
ALM - Design Process**

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

Frédéric Duboeuf – Siemens

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

**SESSION 25
ALM - In-situ Process Monitoring**

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

Elise Gruhier – Arts et Métiers ParisTech

Co-Authors: R. Kromer, N. Perry, E. Lacoste

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: Politecnico di Milano B. M. Colosimo

In-situ analysis during Laser Beam Melting with an open-architecture lab-bench

Robin Kromer – University of Bordeaux

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

**SESSION 26
Deployable Structures - Booms and Mechanisms**

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

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

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

Passive damped deployment of full composite structures

José Nieto – COMET Ingeniería

Co-Authors: J. Fayos, Á. Pipó

**SESSION 27
Microvibrations - Prediction, Modelling and Test**

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

Emmanuel Onillon – CSEM

Co-Authors: L. Rossini, Y. J. Regameys, G. Carte

Modelling of a cryogenic coller for micro vibration predictions

Gilles Carte – Thales Alenia Space

Co-Authors: V. De Gaudemaris, E. Onillon, G. Ladurée

MTG-I STM Microvibration test campaign

Fredrik Johansson – Thales Alenia Space

Co-Authors: M. Sghedoni, G. Ladurée, J. Champion

Novel bearing test setup and the variability in bearing disturbances

Cameron Hodge – Surrey Space Centre

Co-Authors: A. Stabile, G. Aglietti, G. Richardson

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

Pascal Erne – Kistler Instrumente AG

Co-Authors: B. Zwolinski



DAY THREE

25TH MARCH 2021

08:30 – 9:00

09:00 – 9:30

9:30 – 10:00

10:00 – 10:30

SYMPOSIUM 4
Virtual Testing and Qualification

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

SESSION 28
ALM - Materials

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

Lucia Pigliaru – ESA
Co-Authors: 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

SESSION 29
Composites - Failure

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

Numerical simulation and experimental investigation on interfacial damage and failure of honeycomb structure with embedded parts

Tao Liu – Shanghai Fudan University
Co-Authors: T. Liu, M. Chen, H. Ou, Y. Yang, Y. Lou

SESSION 30
Analysis and Design

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

Angelo Stio – Thales Alenia Space
Co-Authors: 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 31
Structural Dynamics - Modal Survey

Modal Survey Test of the Bartolomeo platform

Julian Sinske – DLR
Co-Authors: K. Soal

Ariane 6 Lower Stage Aft Bay modal Survey Test

Stéphane Muller – ArianeGroup

Dynamic test stand specification to run modal and shock test on Ariane 6 Vulcain aft-bay

Pierre-Alain Dandonneau – ArianeGroup
Co-Authors: V. Rossé

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

10:45 – 11:15

SESSION 32
ALM - Part Design 1

Static assessment of AISi10Mg parts produced by SLM

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

11:15 – 11:45

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

11:45 – 12:15

Study for the re-design, additive manufacturing and qualification approach of a representative secondary structure bracket for the European Service Module (ESM)

Gandolfo Di Vita – ESA
Co-Authors: A. Amaldi, S. Caeiro, G. Rodrigues, G. Sinnema, P. Palmieri, L. Rutigliano, H. Larsen, E. Matre

12:15 – 12:45

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. Dürnhöfer, R. Srama, S. Klünkner

12:45 – 13:15

Never additive came so far

Lidia Hernandez Alvarez – CITD Engineering & Technologies
Co-Authors: M. G. C. Carmena, J. Vilanova, A. Perišan

SESSION 33
Advanced Materials

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

ESA advanced manufacturing technology initiative

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

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 34
Hybrid Materials

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

Stefan Kögl – University of Applied Sciences Northwestern Switzerland FHNW
Co-Authors: N. Gradwohl, S. Krucker, H.-P. Gröbelbauer, M. Geissmann

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

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

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

Interlayer Structure And Mechanical Properties Of Continuous Carbon-Fibres Reinforces Aluminium Matrix Composites

Grazyna Mozdzen – Aerospace & Advanced Composites GmbH
Co-Authors: M. Scheerer, F. Weigel, S. Ucsnik, J. Reiter, A. Großalber

Metal Matrix Composites for Space Applications

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

SESSION 35
Structural Architectures

MetOp-SG: Development of the Satellite Structure for Dual Mission and Small Serial Production

Antonio Di Carlo – RUAG Space
Co-Authors: N. Larue, L. Scolamiero

A family concept for small body landers based on MASCOT

Michael Lange –
Co-Authors: C. Grimm, J. T. Grundmann, T.-M. Ho, C. Hühne, C. Lange, O. Mierheim

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 Developments of Nanosat Structures

Sairajan Kolasseri Kuttappan – ISRO

When is an aluminum structure preferable over a sandwich structure?

Els Lemmens – QinetiQ Space

SESSION 36
Mechanical Testing - Prediction and Verification

A method for synthesizing the spatial properties of a spacecraft for CLA purposes

Corinna Cerini – University of Auckland
Co-Authors: M. Remedía, G. Aglietti

The cost-effective improvement strategy for spacecraft structure test verification

Yuyang Wang – ISSE, CAST
Co-Authors: F. Gao, H. Chai

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

Angelo Costantino – QinetiQ Space

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

14:00 – 14:30

SYMPOSIUM 5
ALM - Fatigue

Benchmark of a software for fatigue assessment of AM components

Stefano Beretta – Politecnico di Milano

14:30 – 15:00

IAdvanced 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

Luca Patriarca – Politecnico di Milano
Co-Authors: S. Beretta

15:30 – 16:00

SESSION 37
Bolted Joints and Inserts

Topology Optimization of Sandwich Panel Inserts with Anisotropic Behavior

Sven Kluger – OHB System AG

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

SESSION 38
Composites - Materials

Carbon Fibres and Pre-impregnated Materials for Space Applications

Nuno Rocha – INEGI

New developments on composite materials for space

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

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: DTU Space National Space Institute

SESSION 39
Structural Analysis - Methods and Tools

The structural analyses and test correlation of the Radio Wave Instrument (RWI) in ESA JUICE Mission

Mateusz Duda – Astronika Sp. Z o.o
Co-Authors: M. Duda, M. Tokarz, S. Jarzynka, P. Palma, E. Ryszawa, Ł. Wiśniowski, M. Ossowski, T. Kuciński, J. Grygorczuk

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

Analysis of mounting flux generated by flatness defect at the interface between two launcher structures

Kévin Mathis – CNES
Co-Authors: T. Tafadjira, N. Amsing

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

Robert Meitzner – ArianeGroup

SESSION 40
Structural Dynamics - Analysis Methods and Modelling

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, T. Larroque

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 Kalayani – Institute of Technology Carlow
Co-Authors: M. Wylie

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

16:15 – 16:45

SESSION 41
ALM - Part Design 2

Optical Bench Mounts Designed with Topology Optimization for Additive Manufacturing

Philip Werk – ESA - ESTEC
Co-Authors: G. Rodrigues

16:45 – 17:15

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

17:15 – 17:45

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

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

17:45 – 18:15

Design and Vibration Testing of ALM Reaction Wheel Bracket

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

18:15 – 18:45

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

Philippe Guy – Icam
Co-Authors: G. Pommatau, M. A. Pérez, A. Hot

SESSION 42
Materials - Ceramics

Ceramic ALM for space applications

Nicolas Rousselet – 3DCERAM

Additive manufacturing of silicon nitride

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

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

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

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 43
Composites - Manufacturing

METOP SG - MWI reflectors design for manufacturing with CFRP

Amaia Yaraz – 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

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 44
Multifunctional Structures and Structural Health Monitoring

Structure-borne Ultrasonic Multi-Hop Sensor Network for Temperature Monitoring of Satellites (SUMSENS)

Jesper de Wit – 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

Composite Grid Structure with Embedded Fiber Optic Sensing Capability

Ilan Weissberg – Israel Aerospace Industries

SESSION 45
Mechanical Testing - Force Control in Vibration Testing

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 in force limited vibration testing

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

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

Christoph Zauner – 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

BLAST: Black Laser Surface Treatment

Marko Piskacev – Azimut Space GmbH

New Generation High Pressure Tanks for Space Applications

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