esmats 2025

21st European Space Mechanisms and Tribology Symposium

PROGRAM

SEPTEMBER 24-26, 2025
Lausanne, Switzerland

almatech csem EPFL esa

WELCOME ADDRESS

For the fourth time since its first edition, the European Space Mechanisms and Tribology Symposium (ESMATS) returns to Switzerland. On the banks of Lake Geneva, in the region of watchmakers, fine wine and Olympic headquarters, ESMATS will be held in Lausanne in September 2025.

The largest conference in Europe on space mechanisms and tribology, organised every other year in a different European country, gathers an ever increasing amount of space specialists around crucial aspects of satel-lites. For the 2025 edition we are expecting over 300 attendees from 120 different companies and 24 different countries.

In the country famous for precision mechanisms, specialists will have the opportunity to discuss antenna deployment and pointing, electric propulsion aiming, reaction wheels, solar arrays driving mechanisms, hold-down and release systems and all other critical mechanisms used in payload systems, including the art of friction, lubrication and wear in a harsh space environment.

The committee aims at maintaining the high standards of the conference with even more papers than previously. It will be an opportunity to share experiences, best practices and lessons learned.

The social event, hosted at the Olympic Museum, should be an ideal setting for space business competitors to lay down arms, befriend and perhaps find synergies if not business opportunities.

I look forward to a successful symposium 2025, organized by EPFL (the Swiss Federal Institute of Technology in Lausanne), CSEM (Swiss technology and innovation center) and Almatech (a private company).

Lionel Gaillard

European Space Agency
Head of the Mechanisms Section

THE CITY

LAUSANNE THE IDEAL DESTINATION

Lausanne, the second largest city on Lake Geneva, is a vibrant hub for business and research, within the frame of a holiday resort.

Lausanne's compact size, perfect accessibility and well-developed infrastructure make it a top choice for international conferences. Additionally, its reputation is bolstered by a cosmopolitan, multilingual population and workforce.

Only 45 minutes away from Geneva International Airport by road or rail, Lausanne is easily accessible from all international destinations. The city is located at a major rail and road crossing, and within easy reach from all European cities.

Lausanne, also called the Olympic Capital because of its partnership with the Olympic Committee, offers a strong international community due to of the presence of numerous international head-quarters and universities such as EPFL (Ecole Polytechnique Fédérale de Lausanne), UNIL (Université de Lausanne), IMD (Management Institute), EHL (Ecole Hotelière de Lausanne) that are among the best worldwide in their domain.

The combination of lake and Alps provides a breathtaking natural setting. If you extend your stay through the week-end, Lausanne and Vaud tourism will provide numerous possibilities: cultural treasures, local cuisine and wine, walks in a landscape classified by UNESCO, and hikes in the mountains.

Lausanne has it all! So make sure to take you swimsuit AND your hiking boots!

The ORGANISERS

EPFL Space Center - Space Innovation

EPFL is one of the most vibrant and cosmopolitan science and technology institutions in Europe. It welcomes students, professors and collaborators of more than 120 nationalities. EPFL has both a Swiss and international vocation and focuses on three missions: teaching, research and innovation.

Switzerland, with its long tradition in microtechnology, is one of the key European players in the development of space mechanisms. EPFL introduced the first curricula related to space in Switzerland: a minor in space technologies with a yearly attendance of over 90 students since 2007. Situated at the heart of one of the most dynamic space related areas in Switzerland, EPFL is the trigger of many innovations, through its close relation to the industry and a rich start-up environment. EPFL also has a leading role in promoting space activities, with students participating in many space-related associations: space robotics, satellite development, rockets…

The EPFL Space Center, serves as catalyst for space activities and reaches out to a network of over 40 industrial, academic, and research and technology organisations from all over Switzerland.

FACING THE CHALLENGES OF OUR TIME

About CSEM – Scientific instruments transforming precision applications

CSEM is a non-profit-oriented public-private Swiss technology innovation center renowned for developing advanced technologies with profound societal impact. Our mission is to transfer these innovations to industries, strengthening the economy.

We are a pioneering force in high precision compliant mechanisms and lidars for space and terrestrial applications. With over three decades of expertise, CSEM's solutions are instrumental in prestigious space programs led by ESA, NASA, and international observatories. Our cutting-edge control algorithms combined with micro-vibration damping solutions enable submicron resolution motion and measurements in extreme environments, including cryogenic and vacuum conditions.

Our systems range from silicon-based technologies to centimeter scale mechanisms based on additive manufacturing. With CSEM you can unlock new possibilities in precision applications.

ALMATECH

Creative. Flexible. Reliable.

Almatech is a creative and flexible medium-sized company ideally located at the EPFL Innovation Park, the vibrant, deep tech hub of the region.

Founded in 2009 and privately owned, our success is based on our people and innovation is in our DNA. With its team's collaborative mind-set, Almatech brings unprecedented complex engineering challenges all the way to the delivery of value-added solutions to its clients in the fields of mechatronics, lightweight structures, and thermal systems.

Almatech has a unique expertise in compliant mechanisms designs and innovation that requires cutting-edge expertise in system engineering, FEM analyses, material science and high-tech manufacturing techniques.

Inventor of the Large Angle Flexible Pivot, Almatech offers disruptive solutions such as contactless rotary joint actuators, hemispherical stabilised pointing systems, camera stabilisation systems, multi-mode scanners, resonant scanners... for infinite life!

LAUSANNE MONTREUX CONGRESS

Lausanne Montreux Congress ensures every event is an unforgettable experience for participants, run with clockwork efficiency

LMC (Lausanne Montreux Congress) is the official Convention Bureau office of the region of Lausanne and Montreux.

Lausanne Montreux Congress (LMC) distils the expertise of a whole economic region to offer a comprehensive support and management service for conferences and in general events.

We offer a wide range of services from A to Z. From a project set-up and evaluation to its management on site.

PROGRAM

	TUESDAY 23RD SEPT	WEDNESDAY 24TH SEPT	THURSDAY 25TH SEPT	FRIDAY 26TH SEPT
07:00		Presenters' breakfast	Presenters' breakfast	Presenters' breakfast
08:00		Registration	Morning sessions	Morning sessions
		Welcome		
		Morning sessions		
12:00		Lunch		
		Afternoon sessions	Afternoon sessions	Visits
16:00				
17:00	Registration			
17:40		Invited talk		
19:00		Welcome reception	Gala dinner at the Olympic Museum	
23:00				

APCO TECHNOLOGIES

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- Structures for Launchers
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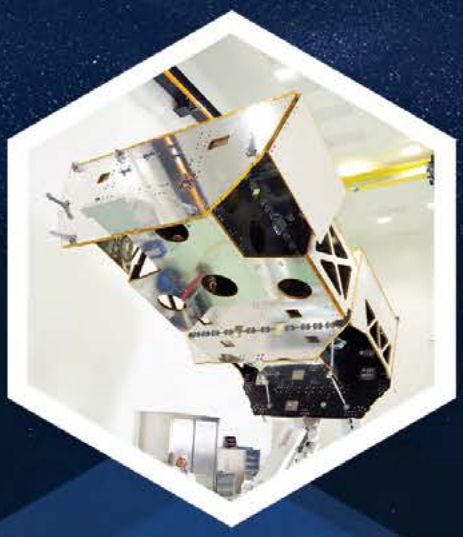


PROGRAM DAY 1

24.09.2025

08:00	**On-site Registration**
08:00	**Presenters' breakfast 08:00 to 08:45**
09:00	**Welcome and introduction** Gilles Feusier, Head of Science and Technology, Space Innovation EPFL Lionel Gaillard, Head of the Mechanisms Section, European Space Agency
	Head of Swiss Space Office Renato Krpoun, State Secretariat for Education, Research and Innovation
	Directeur du Service de la promotion de l'économie et de l'innovation Raphael Conz, Canton de Vaud
	Welcome by host organisations Edouard Bugnion, Vice President for Innovation and Impact, EPFL Steve Lecomte, Vice-President Instrumentation, CSEM Fabrice Rottmeier, CTO, Almatech
10:20	Coffee break (30 min)
	Session 1: Components Bernd Strube, OHB
10:45	**Design and Manufacturing considerations for spur gears. Some lessons Learned from 3 different gears train development.** Alain Blanc, ESA ESTEC
11:05	**Design of a High Power 1064 nm Fiber Coupled Optical Switch for Space Applications** Yves Ruffieux, CSEM
11:25	**Development of a industrialized mid-size Rotary Actuator for Extended Lifetime in New Space** Markus Jansson, Harmonic Drive
11:45	**Design of a Flexure-based Constant-Velocity Joint Optimized for High Axial Loads** Florent Cosandier, EPFL
12:05	**Electro-Active Polymer (EAP) Actuator and Compliant Mechanism Design for Space Applications** Guzmán Borque Gallego, CSEM
12:30	Lunch break (60 min)
13:30	***New development session 1*** Pierre-Emmanuel Martinez, CNES

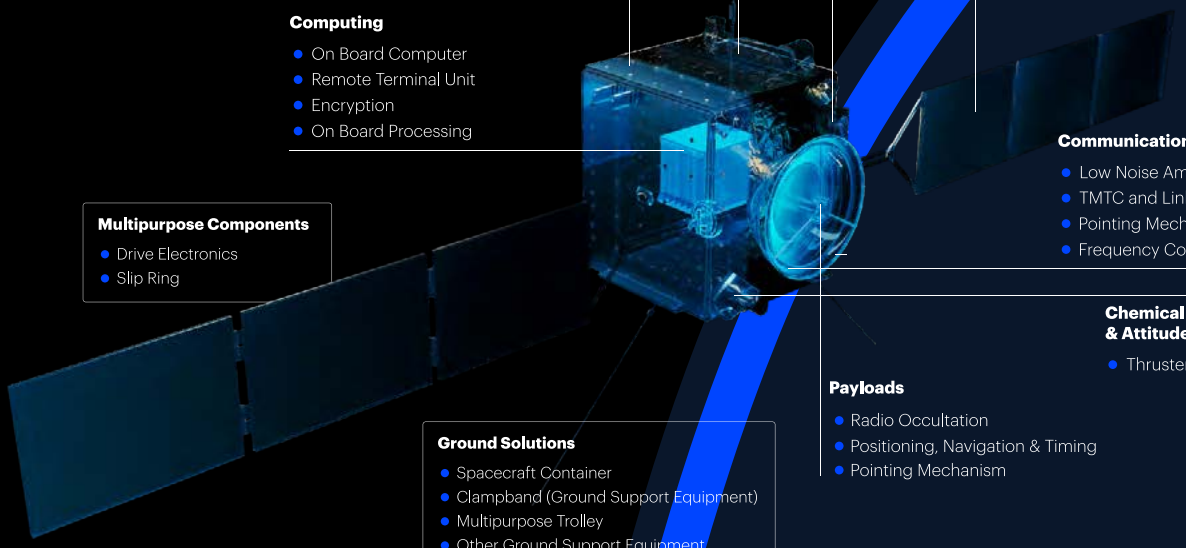
PROGRAM DAY 1

24.09.2025

	Session 2 : Tribology 1 Alvaro Pascual, ESA
14:10	**Great new grease, but can I use it ? Guidelines for Qualification of New Fluid Lubricants** Simon Lewis, ESTL
14:30	**Development of Next Generation Solid Lubricants** Michael Buttery, ESTL
14:50	**Lubrication by self-assembled multilayer _ New avenue for low cost lubrication alternative to MoS2** Guillaume Colas, FEMTO-ST
15:10	**Hydrodynamic Bearings for Space Mechanisms** Noemy Scheidegger, nanoSPACE
15:30	Coffee break (30 min)
	Session 3 : Testing Lisa Salamin, CSEM
16:00	**Free-Floating Validation of LARIS Robotic Gripper for Satellite Capture** Łukasz Kozłowski, PIAP Space
16:20	**The Sentinel-5 UVNS TVAC Rotation System: Lessons learned from a challenging out of scope use** César Toussaint, APCO
16:40	**Detailed Mechanical Design of a Robotic Gravity Offloading System for Spacecraft Appendage Deployment Testing** Charles Lambelet, Beyond Gravity
17:00	**Poster session** Michael Buttery, ESTL
17:40	**INVITED TALK** **Jean-François Clervoy - ESA and CNES Astronaut & Claude Nicollier - ESA Astronaut**
19:00	Cocktail Reception – In the Conference & Exhibition Area offered by OMEGA
21:00	Closing

beyond gravity

Enabling Missions That Shape Our World



Power
- Solar Panels & Arrays
- Solar Array Mechanism
- Power Control & Distribution Unit

Positioning Sensors
- Spaceborne GNSS Receiver and Antenna

Satellite Bus
- Structure
- Struts

Thermal Control
- Multi-Layer Insulation

Computing
- On Board Computer
- Remote Terminal Unit
- Encryption
- On Board Processing

Communications
- Low Noise Amplifier
- TMTC and Link Antenna
- Pointing Mechanism
- Frequency Converter

Multipurpose Components
- Drive Electronics
- Slip Ring

Chemical / Electric Propulsion & Attitude Control
- Thruster Pointing

Payloads
- Radio Occultation
- Positioning, Navigation & Timing
- Pointing Mechanism

Ground Solutions
- Spacecraft Container
- Clampband (Ground Support Equipment)
- Multipurpose Trolley
- Other Ground Support Equipment

PROGRAM DAY 2

25.09.2025

Presenters' breakfast 07:15 to 8:00

Session 4: Mechanisms 1
Simon Henein, EPFL

08:20 **3-axis Stabilization System for Stereo Cameras of Future Exploration Rovers**
Stefano Nebuloni, Almatech

08:40 **Spin it up! – Some less common torque effects in reaction wheels**
Sebastian Brunner, ESA ESTEC

09:00 **Experimental validation of a semi-active hexapod platform for high-performance micro-vibration isolation**
Christopher Willet, ESA ESTEC

09:20 **Design, development and testing of CHIME M4 Refocusing Mechanism**
Itziar Losa, Sener

09:40 **Design, development and testing of a precision pointing mechanism for laser communication and imaging applications**
Matija Brumat, General Atomics Synopta

10:00 **Nanoboom: Development of a modular and compact self-deployable mast for space applications**
Eric Poulain, COMAT

10:20 Coffee break (30 min)

Session 5 : Mechanisms 2
Yoël Puyol, Almatech

10:50 **Compliant Mechanisms made by Additive Manufacturing: the Good, the Bad and the Lessons Learned**
Lionel Kiener, CSEM

11:10 **Intersatellite Separation Mechanism for Probe B2 as part of the ESA COMET Interceptor mission. Qualification functional testing of the separation mechanism**
Janusz Grzybowski, Sener

11:30 **The doors of the Extreme-UV Imager onboard Solar Orbiter: from design to flight**
Jean-Yves Plesseria, Centre Spatial de Liège

11:50 **Development, Stratospheric Balloon Flight Testing, and Post-Flight Failure Analysis of a Motorised Sail Membrane Deployment and Spin-Tensioning System**
Gil Barbosa Ribeiro, Lift Me Off

12:10 **A modular 2-axis antenna mechanism for LEO, MEO and deep-space interplanetary communication: design, analysis, manufacturing, assembly, integration and testing**
Boris Halter, Beyond Gravity

12:30 Lunch break (60 min)

PROGRAM DAY 2

25.09.2025

13:30	***New development session 2*** Adrien Moraine, Airbus
	Session 6: Tribology 2 Jonathan Wood, Lockheed Martin
14:10	**Lubrication for deployment without heating – results from testing towards bearings and gears for large deployable antennas (LDA) "A3LUB2"** Andreas Merstallinger, AAC
14:30	**Post Test Inspection of Lubricants – Guidelines and Lessons Learnt** Michael Buttery, ESTL
14:50	**Labyrinth seal design for enhanced sealing of evaporated lubricant molecules in space mechanisms** Josef Pouzar, Brno University of Technology
15:10	**Extreme fatigue life and wear reduction capabilities of Ni-based Bulk Metallic glass** Guillaume Colas, Université Marie et Louis Pasteur
15:30	**Novel and PFAS-free lubricants based on Ionic Liquids** Fabian Schüler, Materiales
15:50	Coffee break (30 min)
	Session 7: LISA mechanisms Adam Dąbrowski, Astronika
16:20	**Development of the LISA Optical Assembly Tracking Mechanism** Jorge Mugica, Sener
16:40	**LISA Optical Assembly Tracking Mechanism – Results of Technology Development** Tim Tattusch, OHB
17:00	**Development of an ultra-low vibration actuator for LISA APM** Mateusz Krakowczyk, Sener
17:20	***New development session 3*** Raphael Stellio, Thales Alenia Space
18:00	**Visit of the Olympic Museum**
19:15	Aperitif & Gala Dinner in the restaurant of the Olympic Museum
23:30	Closing

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PROGRAM DAY 3

26.09.2025

Presenters' breakfast 07:30 to 08:15

Session 8 : Mechanisms 3
Philipp Oetershagen, Beyond Gravity

08:40 **Development of a Rotary Actuator with two stage anti-backlash gear train for PLATO Antenna Pointing Mechanism**
Paul Schilbach, Kongsberg

09:00 **Development and Testing of a Passive Wire-Driven Deployment Mechanism for Telescopic Optical Baffles in Space Applications**
Annalisa Tresoldi, The University of Auckland

09:20 **Modeling, Design and Testing of Reusable Launcher Landing Leg Prototype for ESA THEMIS Demonstrator T1H**
Théo Grosgurin, Almatech

09:40 **3D-Printed NiTi for Space Actuators**
Gabriel Paciotti, HES-SO

10:00 **Bearings for Extreme Environments NiTi-HF as a Premium Materal for Miniature Ball Bearings**
Christoph Bayer, Gebr. Reinfurt GmbH & Co.KG

10:20 **Detumbler: Making active debris removal a reality now**
Adrien Moraine, Airbus

10:40 Coffee break (30 min)

PROGRAM DAY 3

26.09.2025

Session 9: Moon and Planetary Exploration
Jorge Vazquez, Sener

11:10	**Development of a Shape Memory Alloy hinge to deploy the Solar Array for the IDEFIX Rover on the MMX mission to Phobos** Frans Ijpelaan CNES
11:30	**Revision of the ExoMars - Rosalind Franklin Mission from the perspective of a space mechanism** Adam Dąbrowski, Astronika
11:50	**Demonstration of a new dust resilient thermal shutter for Lunar Applications** Olly Poyntz-Wright, ESR Space
12:10	**Chandrayaan-3 Lunar Rover Hold Down Release Mechanism – Lessons Learnt during Assembly and Testing** Shamrao Garur, U R Rao Satellite Centre
12:30	**Closing Remarks** **Symposium summary** **AMS 2026 + ESMATS 2027 Announcements** **Best Paper Award Presentation**
12:45	Lunch
14:00	**Visit of EPFL, including Almatech and CSEM Exhibition**
16:00	End of event

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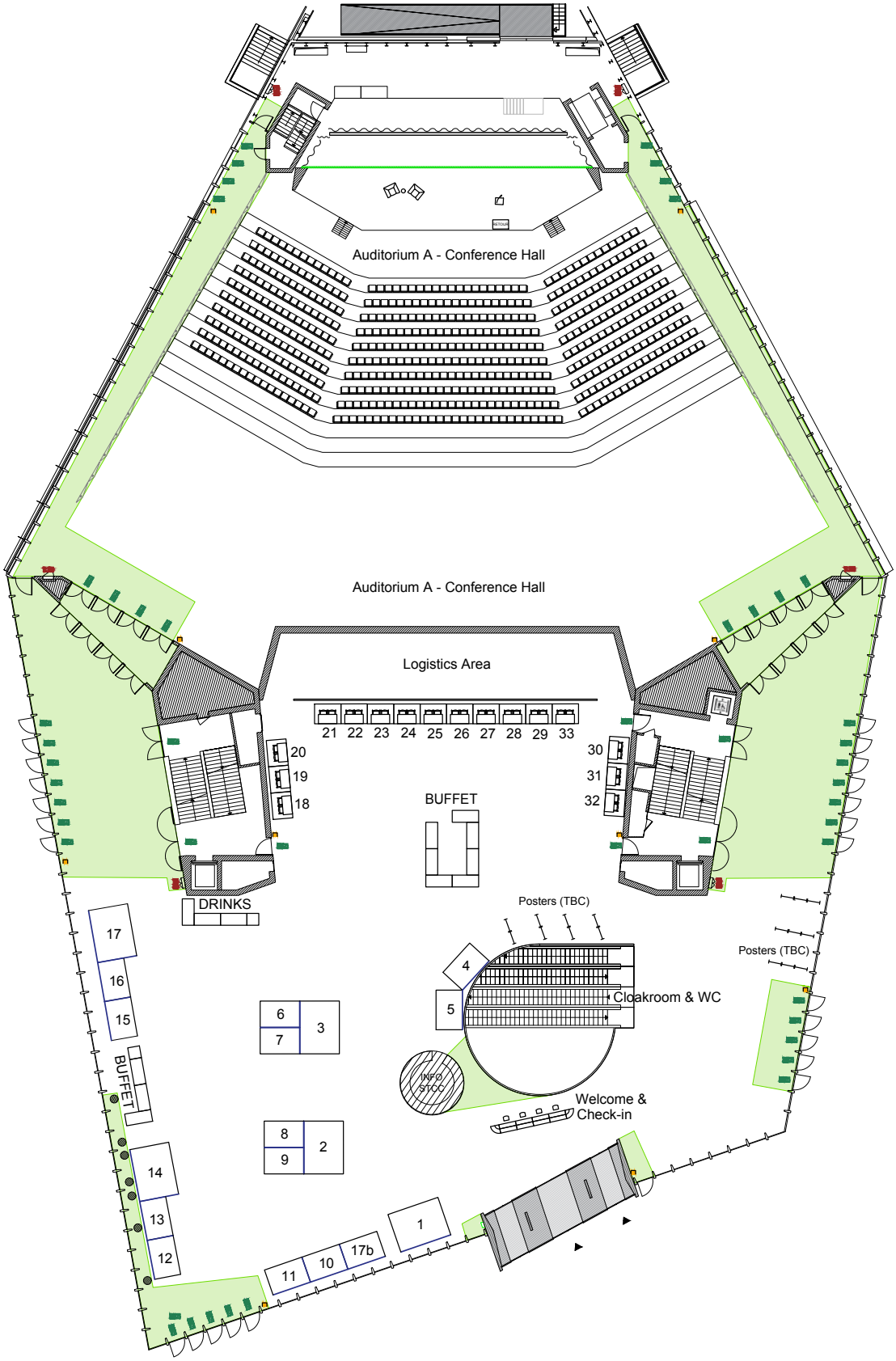
EXHIBITION MAP



COMPANIES LIST

Company	Exhibition map ID	Category
Harmonic Drive AG	01	Gold
Beyond Gravity	02	Gold
APCO Technologies SA	03	Gold
Ensign-Bickford Aerospace	04	Silver
Fuchs Lubricants	05	Silver
OHB System AG	06	Bronze
ISP system	07	Bronze
Glenair	08	Bronze
Centre Spatial de Liège	09	Bronze
Moog Inc.	10	Bronze
ClearSpace	11	Bronze
Kistler	12	Bronze
Almatech	13	Bronze
CSEM SA	14	Bronze (2x)
Sener Aerospace & Defence	15	Bronze
Added Value Solutions (AVS)	16	Bronze
Maxon	17	Bronze (2x)
Arquimea Space	17b	Bronze
ADR-Alcen	18	Exhibitor
Kawamura Research Lab, inc.	19	Exhibitor
Codechamp	20	Exhibitor
Cedrat Technologie	21	Exhibitor
Celeroton	22	Exhibitor
Cerobear	23	Exhibitor
Eaton Aerospace - Eaton ITD	24	Exhibitor
Faulhaber (France)	25	Exhibitor
Gurley Precision Instruments (GPI)	26	Exhibitor
Motiv Space Systems	27	Exhibitor
SMAC	28	Exhibitor
Visioneering Space Corporation	29	Exhibitor
Maccon	30	Exhibitor
Phytron GmbH	31	Exhibitor
Quantic BEI	32	Exhibitor
CDA InterCorp	33	Exhibitor

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