

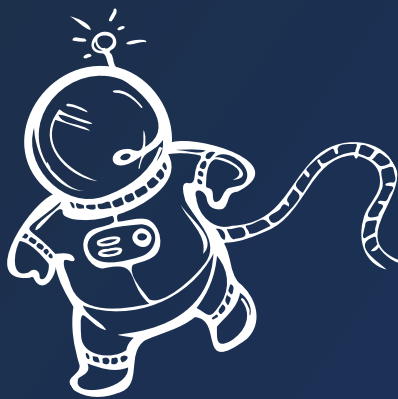


**MUNICH
AEROSPACE**

SUMMER SCHOOL 2023

10-11 JULY

Space Exploration &
Updates on Space
Safety



GUT SONNENHAUSEN
SONNENHAUSEN 2
85625 GLONN
BAVARIA | GERMANY

 **Bauhaus Luftfahrt**
The Aviation Think Tank

 **Deutsches Zentrum
DLR für Luft- und Raumfahrt**

Technische
Universität
München

TUM

der Bundeswehr
Universität München

 **AEROSPACE
REGION MUNICH**

 **RLS-SCIENCES**

Bavarian Ministry of Economic Affairs,
Regional Development and Energy



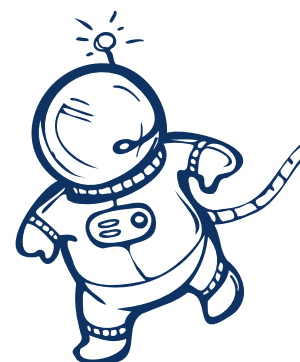


PROGRAMME



DAY 1

- 13:00** **REGISTRATION**
- 13:15** **WELCOME DAY 1**
Andreas Lermann, Thomas Reiter
- 13:30** **STATUS OF EUROPEAN SPACE SAFETY PROGRAMME**
Holger Krag (ESA)
- 14:15** **REVOLUTIONIZING SPACE SAFETY: AN INTRODUCTION TO
ARTIFICIAL INTELLIGENCE IN SPACE AND ITS POTENTIAL FOR
SPACECRAFT COLLISION AVOIDANCE**
Maren Hülsmann (University of the Bundeswehr Munich)
- 15:00** *Coffee break*
- 15:30** **SPACE SITUATIONAL AWARENESS (SSA) DATA - THE MISSING
PIECE FOR AUTOMATED SATELLITE OPERATIONS**
Luisa Buinhas (Vyoma)
- 16:15** **SPACE WEATHER HAZARD AND SERVICES TO END USERS**
Juha-Pekka Luntama (ESA)
- 17:00** *Short break*





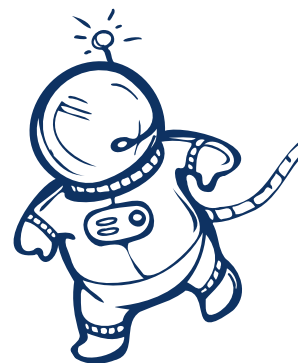
PROGRAMME

DAY 1

- 17:15** **LEGAL ASPECTS**
Stephan Hobe (University of Cologne) - *online lecture*
- 18:00** *Dinner at the restaurant*
- 19:00** **BEERTALK**
Time for networking

DAY 2

- 08:45** **WELCOME DAY 2**
Thomas Reiter
- 09:00** **TERRAE NOVAE 2030+ STRATEGY ROADMAP**
Bernhard Hufenbach (ESA)
- 09:45** **STATUS RESEARCH MOON**
Ulrich Köhler (German Aerospace Center (DLR))
- 10:30** *Coffee break*
- 11:00** **STATUS RESEARCH MARS**
Daniela Tirsch (German Aerospace Center (DLR))
- 11:45** **EARTH-MOON TRANSPORTATION ARCHITECTURES**
Markus Landgraf (ESA)

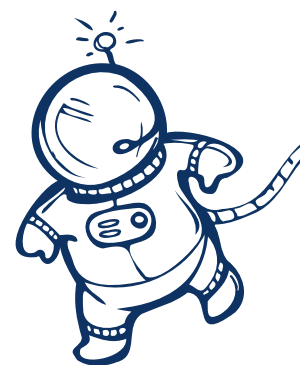




PROGRAMME

DAY 2

- 12:30** *Lunch*
- 13:45** **ESA APPROACH FOR STIMULATING THE GROWTH OF AN IN-SPACE ECONOMY**
Bernhard Hufenbach (ESA)
- 14:30** **ISRU – ENABLING SUSTAINABLE SPACE EXPLORATION**
Christian Gscheidle (Technical University of Munich (TUM))
- 15:15** **MEDICAL CHALLENGES OF LONG-TERM SPACEFLIGHT: NEW VENUES FOR COUNTERMEASURES!?**
Alexander Choukér (Ludwig-Maximilians-University (LMU))
- 16:00** **Event closing**
- 16:15** *Shuttle to Grafing Bahnhof (Trainstation)*



SPEAKERS



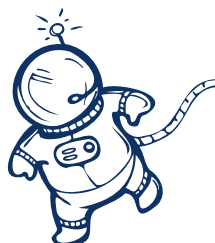
Luisa Buinhas holds a PhD in Aerospace Engineering (from the University of the German Federal Armed Forces) and a Master's degree (TU Delft), also in Aerospace Engineering. She was involved in mission studies for satellite constellations for six years for DLR, in Germany, and spent six months at MIT as a research intern. She holds an Amelia Earhart Fellowship from 2016 and is part of the Space Traffic Management technical committee of the International Astronautical Federation. Currently, she oversees the space program at **Vyoma** and is responsible for system engineering developments.



Alexander Choukér attended medical school at the **Ludwig-Maximilians-University (LMU)** in Munich, Germany. He completed his scientific training in the United States at the National Institutes of Allergy and Infectious Diseases (NIAID, Anthony Fauci) at the NIH in Bethesda, Maryland. Currently he is based in the department of Anaesthesiology at the LMU and is Professor and clinical specialist in Anaesthesiology at the LMU's Medical Faculty. He heads the "Stress and Immunity" research and has lead several experimental, clinical and field related studies (e.g. also on the ISS, in Antarctica and in other analogue environments) in the field of stress-associated immune consequences.



Christian Gscheidle is a research associate and PhD candidate at the **Technical University of Munich** under Prof. Walter and Prof. Reiss. He graduated from TUM in 2019 and, having background in mechanical and aerospace engineering, he worked as thermal engineer for ESA's Athena Telescope project at the Max-Planck Institute for Extraterrestrial Physics before again joining TUM. His research focuses on concepts to detect and characterize water, ice, and other volatiles on the Moon and other bodies for sustainable space exploration. He is involved in the development of scientific instruments, for example the Lunar Volatiles Scout or ESA's PROSPECT instrument package.



SPEAKERS



Professor Dr. Dr. h.c. Dr. h.c. **Stephan Hobe** is the director of the **Institute of Air Law, Space law and Cyber Law** as well as co-Director of the **International Investment law Centre Cologne**. He is member of various scientific associations, inter alia the Vice President of the German Society of International Law. His scientific Oeuvre encompasses 3 books on Public International Law (11th ed. 2020), European Law (10th ed. 2020) and Space Law (1st ed. 2019) as well as editorships (e.g. of the Cologne Commentary on Space Law) and 350 articles on German public law, public International law, international investment law, air law space law and cyber law. He teaches as a guest professor at various universities in Europe, Africa and Asia.



Bernhard Hufenbach leads the commercialisation and innovation team of the **ESA Directorate for human and robotic exploration**. In this function he is responsible for developing and implementing a comprehensive innovation plan for space exploration, which includes the delivery of new initiatives aimed at paving the way for a future Low Earth Orbit and lunar economy. He works since 31 years at ESA in areas such as strategic planning, innovation management, project management, policy development, programme appraisal and evaluation, strategic partnership development, future studies and programme definition, outreach and technology development with a particular focus on space exploration. He holds two Master degrees from the Technical University of Berlin and Delft in Space Systems and Technologies and Space System Engineering, respectively.



Maren Hülsmann, a research associate and PhD candidate at the **University of the Bundeswehr in Munich**, specializes in applying Artificial Intelligence and Machine Learning to spacecraft operations. Here she also serves as coordinator for the Munich Aerospace research group on autonomous collision avoidance in multi-spacecraft systems. Her PhD research centers on improving trust in AI-based space systems by enhancing their explainability. Her contributions to the field were recognized with the ZONTA International Amelia Earhart Fellowship in 2022. Beyond her academic pursuits, Maren an active member at the Space Generation Advisory Council, currently representing Germany as the National Point of Contact.



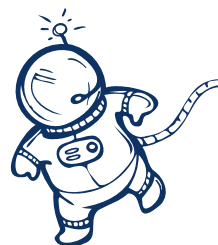
SPEAKERS



Ulrich Köhler studied geosciences in Munich and São Paulo. After a first employment at the **German Aerospace Center (DLR)** he spent two years at Brown University in Providence (RI), USA. Since 2002 he is with DLR's Institute of Planetary Research in Berlin. Analyzing remote-sensing camera images, he is involved in various deep-space missions to the Solar System's planets, moons, asteroids, and planets. Born 1963, he's a true "child" of the Apollo era and ever since dedicated to lunar spaceflight. His major scientific interest is the geology of the Moon and lunar volcanism in particular.



Holger Krag acquired his master in Aerospace Engineering at the University of Braunschweig, followed by a 4 year research period at the Institute of Aerospace System where he focussed on space debris modelling and surveillance, which also became the topic of his PhD (2003). He is today the Head of the Space Safety Programme in the Directorate of Operations, **ESA-ESOC**, in Darmstadt, Germany. He joined ESA as an Analyst in the Space Debris Office. He worked on establishing risk models and an operational collision avoidance system and contributed to first space surveillance studies. In 2014, he took the position of the Head of the Space Debris Office, which, provided fundamental support to ESA's Space Situational Awareness Programme. In 2019, he took over the position as the head of the programme and prepared the evolution into the new Space Safety Programme which was established at the Space19+ Ministerial. His current duties comprise the implementation of the Programme, resource managing, including staff, budgets, industrial contracts and legal agreements in the areas of Space Weather, Space Debris, Planetary Defence, Cleanspace and Frequency Management, and ESA representation on debris matters at relevant international bodies (IADC, UNCOPUOS,...).





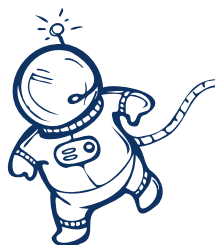
SPEAKERS



Prof. **Markus Landgraf** is leading the implementation of future European Moon missions in the frame of the European Exploration Envelope Programme. He has joined the team of the Human and Robotic Exploration Programme in **ESA/ESTEC** in 2014 after spending 15 years at ESA/ESOC in roles with increasing responsibility, culminating in the mission analysis responsibility for the Gaia and LISA Pathfinder missions launched in 2013 and 2015, respectively. Receiving a Douglas Marsh Fellowship in 2005, Dr. Landgraf performed one year of payload development on large area dust analyser at the Laboratory for Atmospheric and Space Physics in Boulder, Colorado, US. Before joining ESA in 2000, Dr. Landgraf contributed to the discovery of the solar dust ring and the magnetic solar cavity in the interstellar dust cloud based on data from the Ulysses, Galileo, Pioneer 10 and 11 probes in the frame of his National Research Council fellowship.



Andreas Lermann holds a Doctor's Degree in Satellite Navigation from the University Salzburg, an engineering degree in Geodesy from the University of the German Armed Forces in Munich and an MDA in General Management from Turku University. After his military career Andreas was working with Airbus Defence & Space and two medium sized Aerospace companies. He also spent 3 years in the United States as a General Manager. Since October 2022, Andreas Lermann is Managing Director of **Munich Aerospace**.





SPEAKERS



Juha-Pekka ("Jussi") Luntama is the Head of the Space Weather Office in ESA's Space Safety Programme. He graduated from Helsinki University of Technology in 1991 and continued working in the University as a lecturer and leader of the small satellite technology research group until 1997, when he was awarded a EUMETSAT Research Fellow position in the UK Meteorological Office. In 1998 Jussi Luntama was appointed as the Mission Scientist for the GRAS radio occultation instrument onboard the Metop meteorological satellite series in EUMETSAT HQ in Germany. In 2005 he moved from EUMETSAT to Finnish Meteorological Institute to lead the research on space weather impacts on GNSS applications. Jussi Luntama joined ESA in 2009 when he was selected as the manager of the Space Weather Segment in ESA's new Space Situational Awareness Programme, the predecessor of the Space Safety Programme that is in progress now.



Thomas Reiter holds a degree in aerospace engineering and an honorary doctorate from the University of the German Armed Forces in Munich. After completing his training as a jet pilot, he was stationed with the 43rd Fighter-Bomber Wing in Oldenburg. In 1992, Reiter was selected for ESA's European Astronaut Corps, stationed at the European Astronaut Centre (EAC) in Cologne. In March 1995, he was assigned as flight engineer for the "Euromir 95" mission. During his second mission, "Astrolab", from July to December 2006, he took on tasks as flight engineer for the International Space Station and conducted 19 experiments in space on behalf of several European institutions and research centres. Thomas Reiter held the European record of 350 days in space for about 12 years. After his active astronaut career, Thomas Reiter was appointed to the Executive Board of the German Aerospace Center (DLR) on 8 August 2007, responsible for space research and technology. On 1 April 2011, he was appointed Director of ESA's Directorate for Human Spaceflight and Operations, responsible for managing Europe's contribution to the ISS, the operation of ESA's satellite missions and the ground segment. Until 2020, he was ESA Interagency Coordinator at the European Space Agency and Advisor to the Director General.

SPEAKERS



Prof Dr **Thomas Schildknecht** is the director of the **Swiss Optical Ground Station** and **Geodynamics Observatory Zimmerwald**, and is leading the Optical Astronomy Group of the Astronomical Institute of the **University of Bern**, Switzerland. His research combines an interest in astrodynamics and optical survey observations, with a particular emphasis on space debris and space situational awareness. He has more than 25 years of experience in space debris research and established a research group which asserts a world-leading position in optical space debris surveillance and characterization. In this context he has been leading numerous European Space Agency (ESA) studies for the optical detection of space debris and Space Situational Awareness in general. Scientific highlights include the detection of decimeter-size debris in geostationary orbits and the discovery of an unexpected population of debris objects with extremely high area-to-mass ratios. He is a member of the ESA delegation in the Inter-Agency Space Debris Coordination Committee IADC, and a member of the Swiss delegation in UNCOPUOS and its working group on long-term sustainability of outer space activities. He is currently the Chair of the ESA Space Safety Advisory Group advising the ESA Director responsible for the space safety programme. Thomas Schildknecht is a full member of the international Academy of Astronautics IAA, President of the Swiss National Committee of the IAU, and served in the board of several international associations.



Daniela Tirsch is a planetary geologist at the **German Aerospace Center (DLR)** in Berlin. In addition to her research on the geology and climate history of Mars, she is responsible for image planning of the HRSC Mars camera onboard the Mars Express mission and is science coordinator for the international HRSC science team. She is also a member of the team responsible for the scientific operation of the ExoMars rover, which will set off in search of traces of life on Mars in the late 2020s. Daniela is a member of the International Astronomical Union, where she decides on the naming of surface forms on Mars in the Planetary Nomenclature Working Group.