

# 7<sup>th</sup> ICATT, Welcome



G. Ortega

November 7<sup>th</sup>, 2018

DLR Oberpfaffenhofen, Germany





# Welcome to the 7th edition

To the Moon and Beyond  
New Ways of Astrodynamics

- ICATT aims at providing agencies, companies, organisations, universities and research institutes with a forum of excellence in the area of astrodynamics and space flight mechanics
- The 7th edition of ICATT is dedicated to the exploration of the Moon and beyond







# ICATT editions



2001

2004

2006

2010

2016

2012

2018





# Hosting by DLR





# 7<sup>th</sup> ICATT overall schedule



**TUE**

**WED**

**THU**

**FRI**

**09:00**

**09:00**

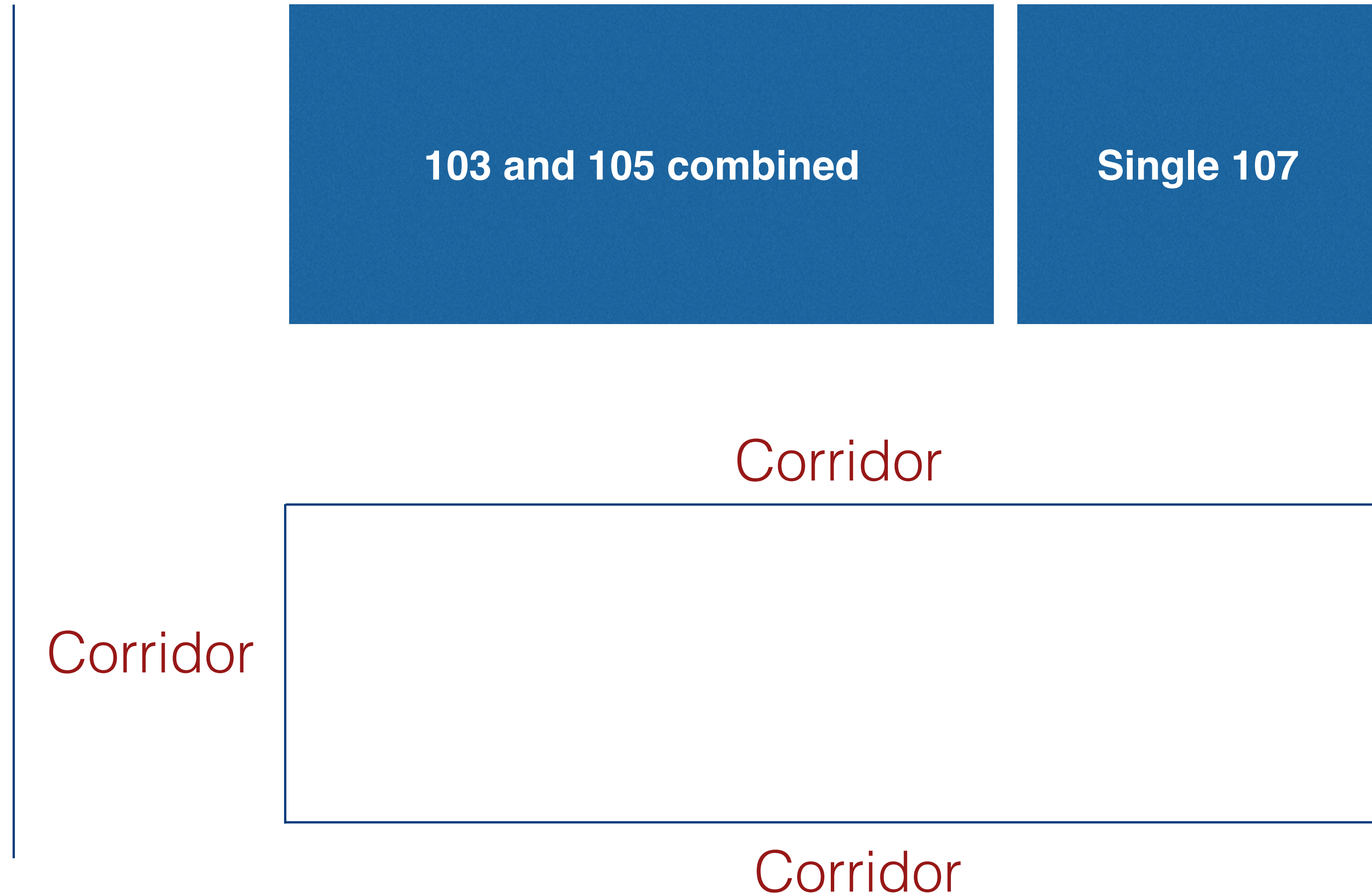
**09:30**

09:30

Tutorials	Plenary block	Parallel blocks	Parallel blocks
		Coffee	Coffee
		Parallel blocks	Parallel blocks
Lunch break			
Tutorial	Parallel blocks	Parallel blocks	Parallel blocks
	Coffee	Coffee	
		Parallel blocks	



# 7<sup>th</sup> ICATT rooms @DLR





# TUE November 6<sup>th</sup>, 2018 AM and PM



- Developing flight dynamics software at ESOC By Ruaraidh Mackenzie (ESOC)
- PTScientists: Mission to the Moon and the return to Apollo 17 By Helge Eichhorn (PTScientists)
- Trajectory and multi-disciplinary design optimisation by Andreas Wiegand (Astos Solutions GmbH)

11:00	<b>Developing flight dynamics software at ESOC</b> <i>Dr Ruaraidh Mackenzie</i>  11:00 - 12:00
12:00	<b>PTScientists: Mission to the Moon and the return to Apollo 17</b> <i>Helge Eichhorn</i>  12:00 - 13:00
13:00	<b>Break for lunch</b>  <i>DLR Oberpfaffenhofen, Germany</i> 13:00 - 14:00
14:00	<b>Trajectory and multi-disciplinary design optimisation</b> <i>Andreas Wiegand</i>  14:00 - 16:00
15:00	
16:00	



WED November 7<sup>th</sup>, 2018 AM

- Opening ICATT
- Keynote speech about HERACLES
- Ascent #1 block

	103 and 105 combined	Single 107
08:00		
09:00	<div>Opening the 7th ICATT</div> <div>Dr Johann Bals</div> <div>DLR</div> <div>09:00 - 10:00</div>	
10:00	<div>Human Enabled Robotic Architecture Capability for Lunar Exploration and Science</div> <div>Prof. Markus Landgraf</div> <div>10:00 - 11:00</div>	
11:00	<div>Multidisciplinary Modeling and Simulation Framework for Reusabl...</div> <div>Lale Evrim Briese</div>	
12:00	<div>Stochastic Constellation Replenishment Planner</div> <div>Federico Letterio</div> <div>ASTOS 9.3 - Multibody Feature for Simulations of Flexible Launcher Dy...</div> <div>Sven Weikert</div>	
13:00	<div>Lunch break</div> <div>DLR Oberpfaffenhofen, Germany</div> <div>13:00 - 14:00</div>	



- Loitering, Orbiting #1 and #2
- Open Source Tools and Smart Computing #1 and #2
- Visit to DLR facilities

	103 + 105	107
14:00	<b>POINCARÉ: A MULTI-BODY, MULTI-SYSTEM TRAJECTORY DESIGN T...</b> <i>Dr Mar Vaquero</i>	<b>Free CNES Flight Dynamics Tools</b> <i>Mr Jean François GOESTER</i>
	<b>Correlation techniques to build-up and maintai...</b> <i>Alejandro Pastor-Rodríguez</i>	<b>OPEN SOURCE ORBIT DETERMINATION WITH SEMI-AN...</b> <i>Luc Maisonobe</i>
15:00	<b>Are we really covering up the whole sky?</b> <i>Dr CHRISPHIN KARTHICK</i>	<b>Astrodynamics.jl: A Julia-based Open Source Framework for Orbit...</b> <i>Helge Eichhorn</i>
16:00	<b>Break</b>  <i>DLR Oberpfaffenhofen, Germany</i>	
	<b>Basilisk: A Flexible, Scalable and Modular Astrodynamics Simulati...</b> <i>Patrick Kenneally</i>	<b>TUDAT: the open-source astrodynamics toolbox of Delft University of Technolo...</b> <i>Kevin Cowan</i>
17:00	<b>Semi-analytical Framework for Precise Relative Motion in Low Eart...</b> <i>gabriella gaias</i>	<b>Visual Orbit design using the open-source VOD tool</b> <i>Robin Biesbroek</i>
	<b>DESEO - Design Engineering Suite for Earth Observation</b> <i>Gonzalo Vicario de Miguel</i>	<b>JSatOrb: ISAE-Supaero's open-source software tool for teaching cl...</b> <i>Thibault Gateau</i>
18:00	<b>Visit to DLR facilities: Visit to DLR facilities</b>  <i>DLR Oberpfaffenhofen, Germany</i>	
19:00		





- Interplanetary Flight and Non-Earth Orbits #1, #2
- On-orbit servicing and proximity #1, #2

	103 and 105 combined	Single 107
08:00		
09:00	Interplanetary trajectory design and mission analy... <i>Dr Ahmed Magdy Abdelaziz</i>	RICADOS - Rendezvous, Inspection, CApturing and D... <i>Dr Heike Benninghoff</i>
	Efficient design of low lunar orbits based on Kaula recursions <i>Dr Martin Lara</i>	Safe natural far Rendezvous approaches f... <i>Mr Emmanuel Blazquez</i>
10:00	A technique for designing Earth-Mars low-thrust transfers culminat... <i>Gonalo Aguiar</i>	ROSSONERO: a tool for preliminary rendezvous missio... <i>Giovanni Franzini</i>
	Break	
11:00	DLR Oberpfaffenhofen, Germany	
	Optimized transfers between Earth-Moon invariant manifolds <i>Mr Laurent Beauregard</i>	Analysis of a Rendezvous Mission in Non-Keplerian ... <i>Rub�n Vega Astorga et al.</i>
12:00	On the Design of Transfers to Solar-Sail Displaced Orbits in t... <i>Dr Jeannette Heiligers</i>	Commercial Collision Avoidance Service based... <i>Dr Diego Escobar Anton</i>
	Astrodynamics techniques for missions towards Earth trailing or le... <i>Mr Eric JOFFRE</i>	
13:00	Break for lunch	
	DLR Oberpfaffenhofen, Germany	
	13:00 - 14:00	



13:00	Break for lunch	
	DLR Oberpfaffenhofen, Germany	
		13:00 - 14:00
14:00	Semianalytical Design of Libration Point Formations <i>Dr Sergey Trofimov</i>	Tiangon-1 re-entry follow-up by CNES <i>Aurélie Bellucci</i>
		14:00 - 14:30
	Trajectory Design in High-Fidelity Models <i>Prof. Francesco Topputo</i>	Cataloguing performance assessment method of SST ... <i>Diego Escobar Anton</i>
15:00	Near Rectilinear Orbits around the Moon as Operational Orbit ... <i>Mr Carlos Sanchez</i>	ReDSHIFT software tool for the design and computation of miss... <i>Federico Letterio</i>
	Break	
16:00	DLR Oberpfaffenhofen, Germany	
		15:30 - 16:30
	DRAMA 3.0.0: A one stop shop for the verification of space debris mitigation... <i>Stijn Lemmens</i>	Mission Design for a Retropropulsive Mars Pinpoint La... <i>Tiago Hormigo</i>
17:00	Rate and collision probability of tethers and sails against ... <i>Ricardo García-Pelayo</i>	

- Interplanetary Flight and Non-Earth Orbits #3
- Clean Space and Environment Modelling #1, #2
- Re-Entry and Aero-Assisted Manoeuvres #1

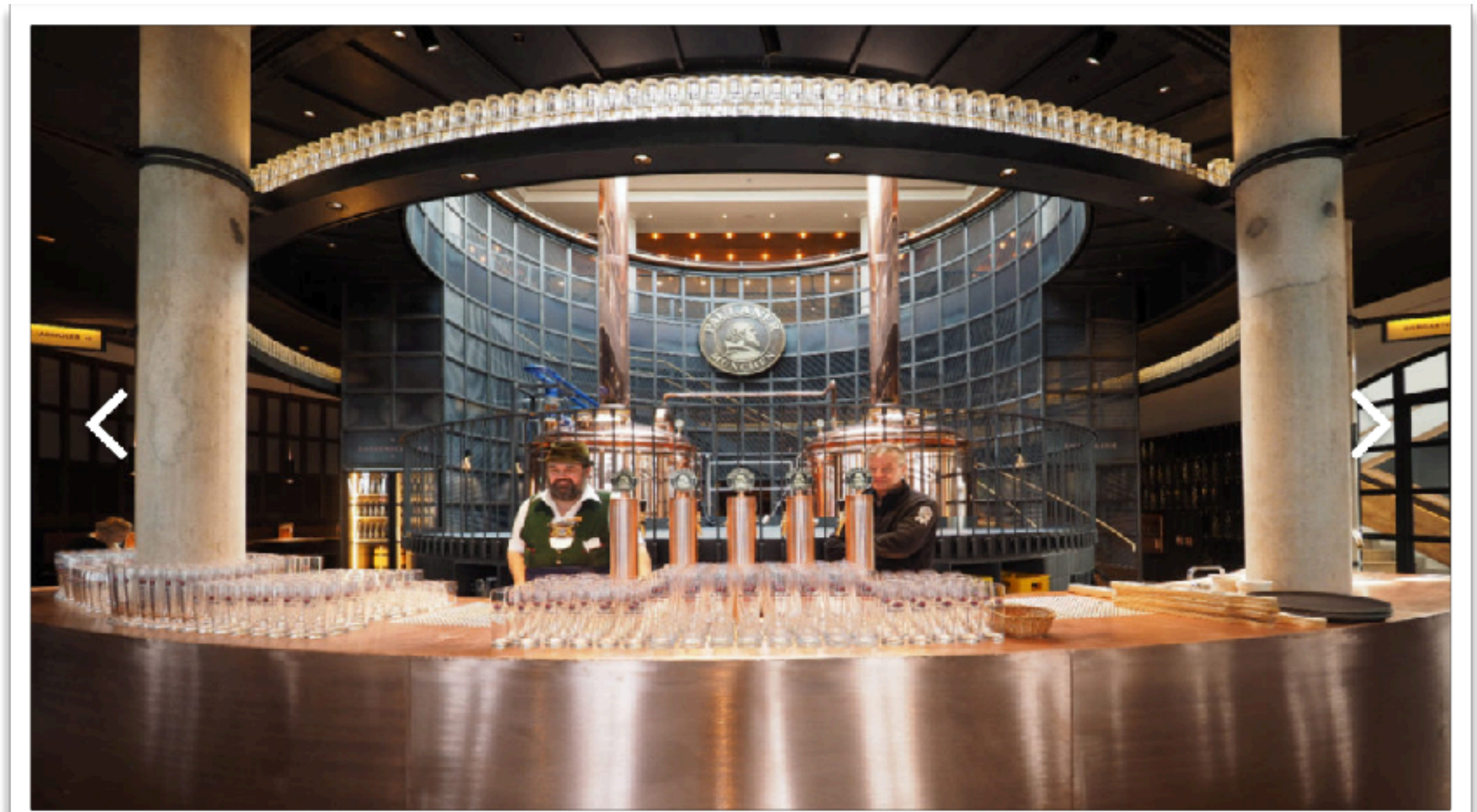




To the Moon and Beyond  
New Ways of Astrodynamics

# Gala Dinner

- The Gala Dinner will take place on THU 8h November 2018 at the traditional Paulaner am Nockherberg famous restaurant in Munich
- Paulaner am Nockherberg Hochstr. 77, 81541 München
- The buss will depart from DLR to Paulaner and come back to DLR





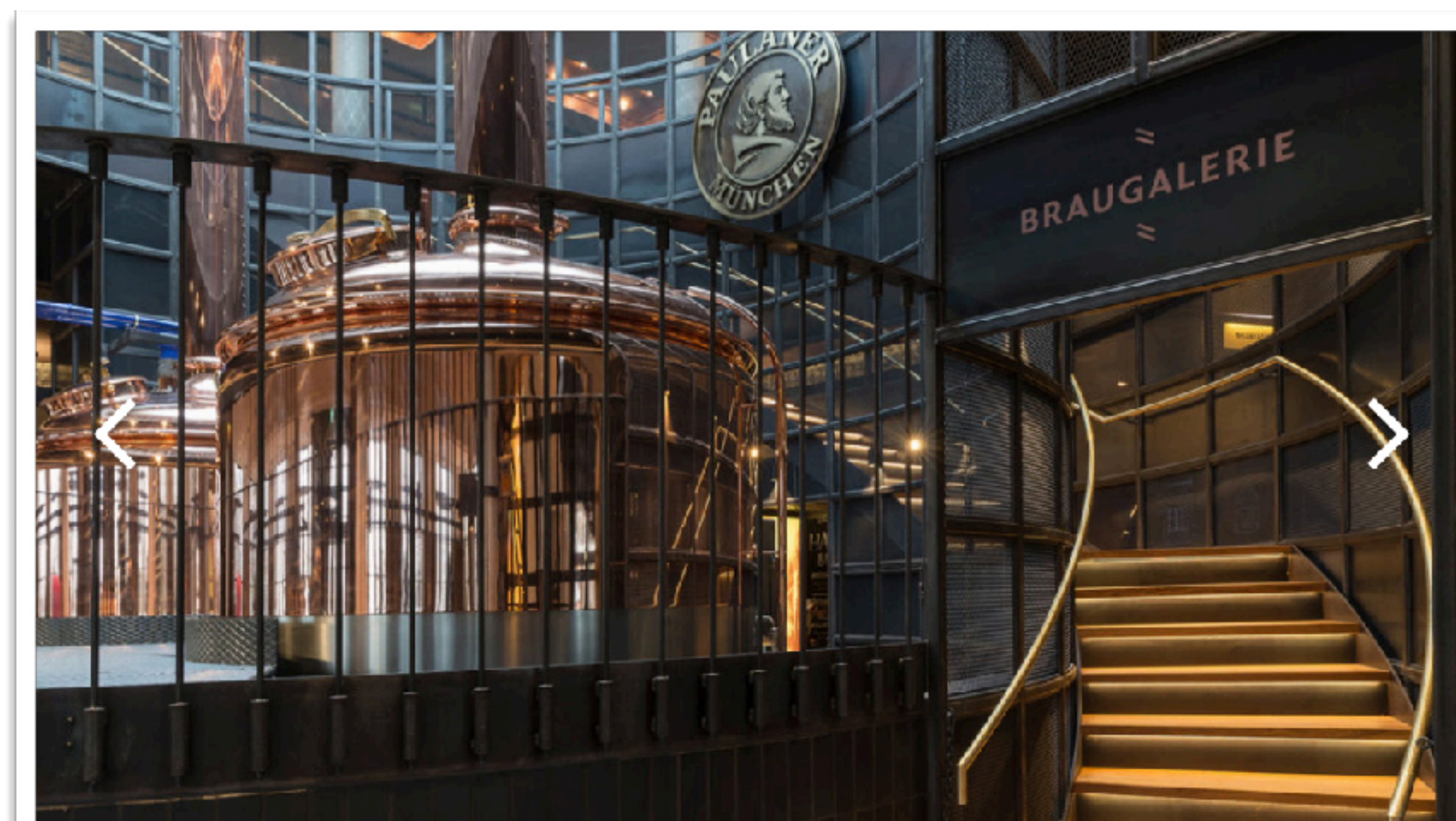


To the Moon and Beyond  
New Ways of Astrodynamics

## Price to best paper



- Price to the best paper is a tablet
- Sponsored by GMV





# FRI November 9<sup>th</sup>, 2018 AM



	103 and 105 combined	Single 107
08:00		
09:00		
	<b>SOLAR-SAIL TRANSFERS FROM INVARIANT OBJECTS T...</b> <i>Alvaro Fernandez Mora</i>	<b>Comparison of different optimization methods to constr...</b> <i>Dr Cécile RENAUDIE</i>
10:00	<b>Trajectory Optimization of a Low-Thrust Geostationary O...</b> <i>Mr Alexander Starchenko</i>	<b>Adaptive Pareto Front Sampling Based on Parametric Sensitivity Ana...</b> <i>Arne Berger</i> <a href="#">🔗</a>
	<b>Break</b>	
11:00	<i>DLR Oberpfaffenhofen, Germany</i> 10:30 - 11:30	
	<b>LOTNAV: A low-thrust Interplanetary Navigation Tool</b> <i>Simone Centuori</i>	<b>AO-Car: Transfer of Space Technology to Autonomous D...</b> <i>Mrs Laura Sommer</i> <a href="#">🔗</a>
12:00	<b>ELECTRO: a SW tool for the ELECtric propulsion TRajecto...</b> <i>Mr Juan C. Bastante</i> <a href="#">🔗</a>	<b>Revisiting Design Aspects of a QP Solver for WORHP</b> <i>Marcel Jacobse</i> <a href="#">🔗</a>
	<b>OPTELEC - Constrained Low-Thrust Transfer Optimisation Tool applied in O...</b> <i>Slim Locoche</i>	<b>MODHOC - Multi Objective Direct Hybrid Optimal Control</b> <i>Lorenzo Angelo Ricciardi</i>
13:00	<b>Break for lunch</b>	
	<i>DLR Oberpfaffenhofen, Germany</i> 13:00 - 14:00	

Starting at 09:30 !

- Low Thrust #1, #2
- Optimization and Dynamics #1, #2



- Low Thrust #3
- Orbit Determination and Prediction Techniques #1
- Closing speech and farewell

13:00	Break for lunch			
	DLR Oberpfaffenhofen, Germany			13:00 - 14:00
14:00	Efficient design of low lunar orbits based on Kaula recursions	Dr Martin Lara	A fast an efficient algorithm for the computation of distant retrograde ...	Dr Martin Lara
	MOLTO-OR: A Multi-Objective Low-Thrust Optimization Tool for Orbit ...	DAVID MORANTE	First tests of the C/C++ version of the Draper Semi-analytical ...	Dr Juan Félix San-Juan
15:00	MOLTO-IT: A Multi-Objective Low-Thrust Optimization Tool for Interp...	DAVID MORANTE	Operational Orbit Determination for the Eumets...	Mr Raúl Domínguez
	Closing speech and farewell	Dr Guillermo Ortega		
				15:30 - 16:00
16:00	Visit to DLR facilities #2 (TBC)			
	DLR Oberpfaffenhofen, Germany			16:00 - 17:00
17:00				



# Chairing ICATT




- Special thanks to all chairs of the 7<sup>th</sup> edition !
  - Ruaraidh Mackenzie (ESOC), Christina Jetzschmann (Airbus DS D), Emmanuele di Soto (GMV), Stijn Lemmens (ESOC), Helge Eichhorn (PTS), Luc Maisonobe (CS), Jeroen van den Eynde (ESTEC), Federico Letterio (Deimos), Johan Bals (DLR), Juan Carlos Bastante (OHB), Mar Vaquero (NASA), Eric Jofree (Airbus DS UK), Sarah Lammens (S&T), Jean-Francois Goester (CNES)



# Where to find the information





To the Moon and Beyond  
New Ways of Astrodynamics

7th International Conference on Astrodynamics Tools and Techniques (ICATT)  
6-9 November 2018  
DLR Oberpfaffenhofen, Germany  
Europe/Amsterdam timezone

Overview

Scientific Programme

Tutorials

Organising Committee

Calendar of Events

Venue

Book of Abstracts

Call for Abstracts

Registration

Timetable

My Conference

My Contributions

Awards

Exhibitions

Social

Accommodation

Sponsors

Contribution List

Author List

Speaker List

Call for Papers

Reviewing Area

Judging Area

Previous ICATT editions

Contact

The 7th International Conference on Astrodynamics Tools and Techniques (ICATT) is an event organized by the European Space Agency (ESA), the National Aeronautics and Space Administration (NASA), the Japan Aerospace Exploration Agency (JAXA), the Deutsches Zentrum für Luft und Raumfahrt (DLR), the Centre National d'Études Spatiales (CNES) of France, the Agenzia Spaziale Italiana (ASI), the Tsentralniy Aerogidrodinamicheskiy Institut (TsAGI) of Russia, the United Kingdom Space Agency (UKSA), and the Romanian Space Agency (ROSA).

ICATT aims at providing agencies, companies, organizations, universities and research institutes with a forum of excellence in the area of astrodynamics and space flight mechanics. Participants are invited to showcase their latest tools and techniques so as to promote the creation and exchange of ideas and the identification of new trends and required developments: challenges in the field of astrodynamics and orbital mechanics, current status of tools, their pros and cons, visions for the future, etc.

In addition to the latest theoretical advances in the field of astrodynamics, ICATT is especially devoted to astrodynamics software tools. Demonstrations and short tutorials are welcome. Furthermore, as in previous editions, ICATT offers a series of keynote lectures. These lectures are delivered by experts from specific astrodynamics fields.

The 7th edition of ICATT is dedicated to the exploration of the Moon and beyond.

Starts 6 Nov 2018, 08:30

Ends 9 Nov 2018, 17:00

Europe/Amsterdam

DLR Oberpfaffenhofen, Germany

Münchener Straße 23

82234 Weßling

Alvaro Martinez Barrio

Antonio Rinalucci

Dominika Perz

Guillermo Ortega

Jesus Gil

7th ICATT Registration Link

Organising Space Agencies

esa

nasa

jaxa

DLR

cn

cn

UK SPACE AGENCY

rosa

A blue lanyard with white text and logos. The text "7th ICATT 2018" and the ESA logo are repeated along its length. It features a black plastic buckle, a USB drive, and a metal carabiner at the bottom.

To the Moon and beyond: new ways of astrodynamics

18 European Space Agency



# Sponsoring



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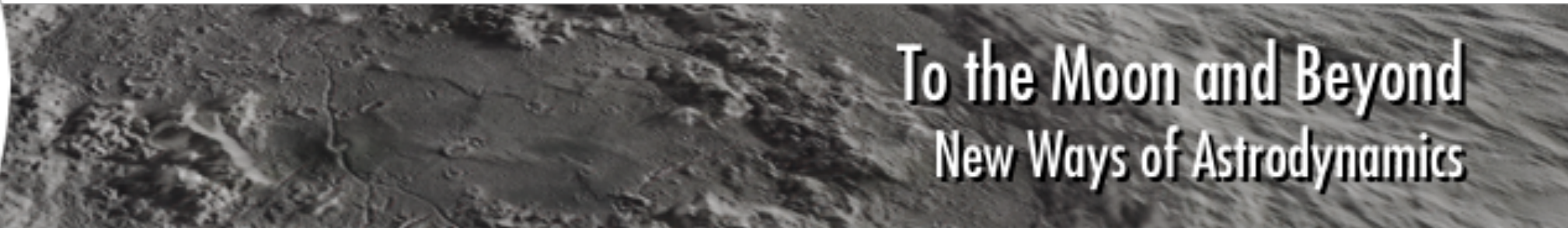


CS sponsors  
the drinks of  
the Gala  
Dinner





# Weather in Munich this week



## Munich, Germany 5 Day Weather

12:19 pm CET [Print](#)

DAY		DESCRIPTION	HIGH / LOW	PRECIP	WIND	HUMIDITY
TUE NOV 6		Partly Cloudy	19°/6°	0%	ESE 12 km/h	56%
WED NOV 7		Partly Cloudy	16°/8°	10%	SE 7 km/h	71%
THU NOV 8		AM Showers	11°/5°	40%	N 8 km/h	87%
FRI NOV 9		Partly Cloudy	12°/4°	10%	E 7 km/h	82%
SAT NOV 10		Partly Cloudy	14°/7°	20%	SE 9 km/h	75%



# Please airplane mode your smartphone





# Enjoy the conference

