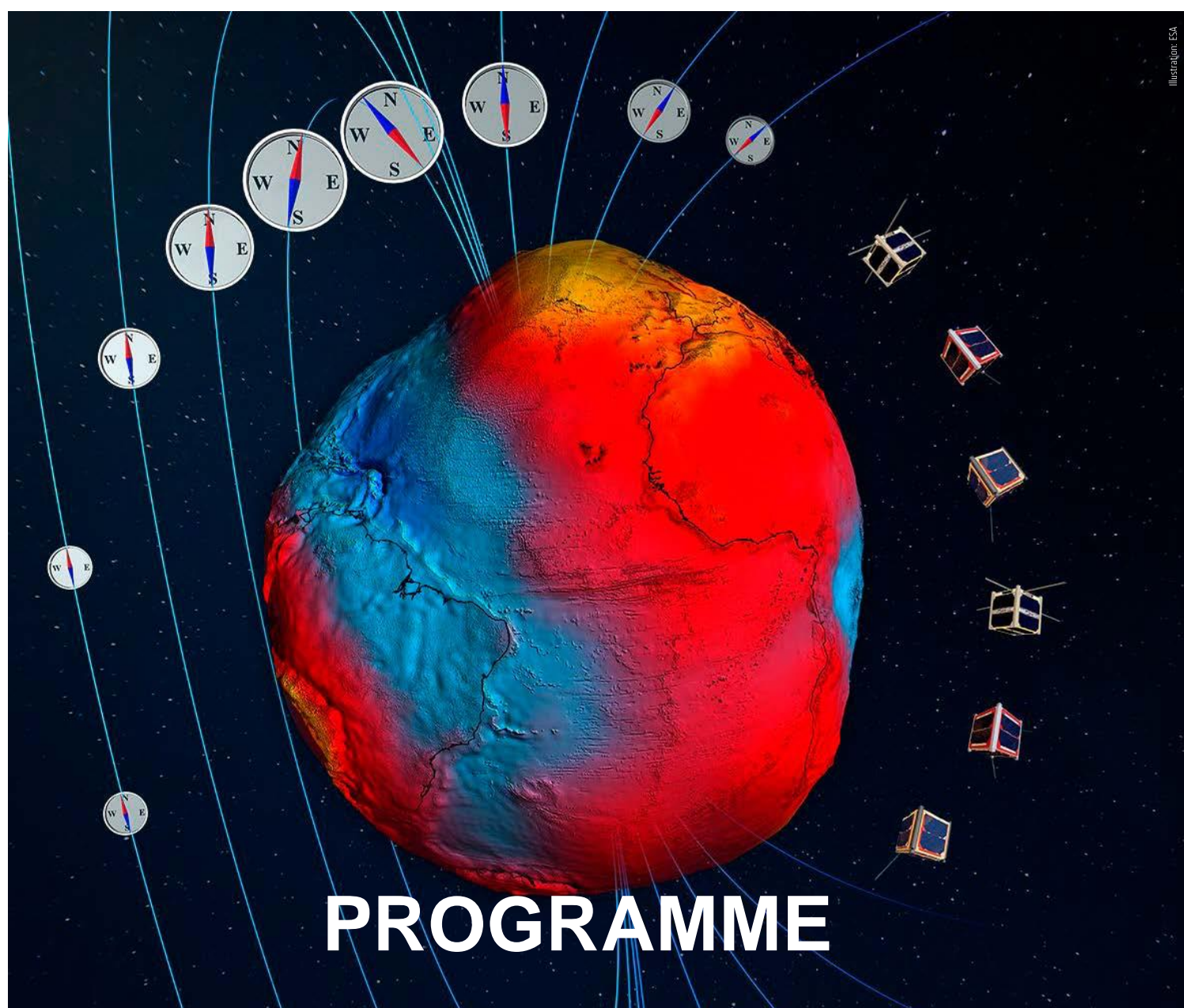


# → SUMMER SCHOOL ALPBACH 2019

**Geophysics from Space using Micro- or Nano-Satellite Constellations**

**16–25 July 2019 | Alpbach/Tyrol – Austria**

Details and further information: [www.summerschoolalpbach.at](http://www.summerschoolalpbach.at)



# Contents

<b>GEOPHYSICS FROM SPACE USING NANO- OR MICROSATELLITE CONSTELLATIONS.....</b>	<b>3</b>
<b>PROGRAMME.....</b>	<b>4</b>
<b>THE VILLAGE OF ALPBACH .....</b>	<b>11</b>
<b>LOGISTICS .....</b>	<b>13</b>
<b>HOTEL BÖGLERHOF .....</b>	<b>13</b>
<b>THE SCHOOL HOUSE .....</b>	<b>14</b>
<b>COFFEE BREAKS.....</b>	<b>17</b>
<b>LUNCHES.....</b>	<b>17</b>
<b>PICTURES .....</b>	<b>17</b>
<b>THE PROGRAMME COMMITTEE.....</b>	<b>18</b>
<b>SUMMER SCHOOL TUTORS.....</b>	<b>19</b>
<b>SUMMER SCHOOL LECTURERS .....</b>	<b>19</b>
<b>SUMMER SCHOOL JURY .....</b>	<b>20</b>

# GEOPHYSICS FROM SPACE USING NANO- OR MICROSATELLITE CONSTELLATIONS

The Summer School students will attend lectures on past achievements and current issues, and will be invited to propose ideas for new satellite missions to observe the magnetic and gravitational field of the Earth from space with high resolution in space and time using a mission configuration that goes beyond all missions that have been realized so far.

Students are asked to define the scientific objectives of a space mission and a preliminary end-to-end mission including the spacecraft, scientific instruments, mission and science operations that will meet the stated objective under the supervision of noted scientific and engineering experts.

Students are expected to select and research the problem to be addressed by their specific space mission and to cooperatively work with their team members to meet difficult deadlines to develop their own working style.

As the highlight of the workshops, each team presents a short mission study to an expert review panel and all other teams, tutors and lecturers on the last day of the school.

The Summer School is organised by FFG and co-sponsored by ESA and the national space authorities of ESA member, associate and cooperating states. A traditional partner is the International Space Science Institute. It is also supported by Austrospace, the association of Austrian space industries and research institutions.

EuroPlanet offers support for student grants.



# PROGRAMME

## MONDAY, JULY 15

### INDIVIDUAL ARRIVAL OF PARTICIPANTS

16:00-18:30 REGISTRATION AT THE SCHOOL HOUSE

19:00 RECEPTION AT THE BÖGLERHOF

## TUESDAY, JULY 16

08:00 REGISTRATION

09:00 **Opening**

Welcome: Michaela Gitsch, Summer School Director

Moderator: Wolfgang Baumjohann, Chairman of Programme Committee

- Andreas Geisler, FFG, Head of Aeronautics and Space Agency
- Peter Jankowitsch, FFG, Chairman of Advisory Board on Space
- Walther Pelzer, DLR, Head of German Space Administration
- Tilmann Spohn, ISSI, Executive Director

10:00 COFFEE BREAK

10:30 **TELL ME ABOUT YOUR MAGNETIC FIELD, I TELL YOU WHO YOU ARE:  
What we can learn from Earth Magnetic Field Measurements**

Karl Heinz Glassmeier, Technical University Braunschweig

11:30 **GRAVITY FIELD AND GEOPHYSICS**

Reiner Rummel, Technical University of Munich

12:30 LUNCH BREAK

15:00 **GEOMAGNETISM - MAGNETIC FIELD DATA ANALYSIS**

Enkelejda Qamili, ESA

16:00 **GRAVITY FIELD DATA ANALYSIS**

Torsten Mayer-Gürr, Graz University of Technology

17:00 COFFEE BREAK

17:30 **WORKSHOP PREPARATION:**

**Project Phases, Team Building and Team Structuring**

Peter Falkner, ESA

19:00 JOINT DINNER AT THE BÖGLERHOF

**FOLLOWED BY EVENING LECTURE**

**Jean-Yves LeGall, President of CNES**

## WEDNESDAY, JULY 17

**09:00 MISSION AND SYSTEM DESIGN**

Peter Falkner, ESA

**10:00 SMALL SPACECRAFT**

Tyler Jones, Norwegian Space Agency

**11:00 COFFEE BREAK**

**11:30 DESIGN OF SPACE ARCHITECTURES**

Eberhard Gill, TU Delft Space Institute

**12:30 LUNCH BREAK**

**14:30 MISSION PAYLOAD INSTRUMENTS FOR SMALL SPACECRAFT: GRAVITY FIELD SENSORS**

Luca Massotti, ESA

**15:30 COFFEE BREAK**

**16:00 MISSION PAYLOAD INSTRUMENTS: Spacecraft Magnetometers**

Werner Magnes, Space Research Institute, Graz

**17:00 WORKING TEAM MEETINGS**

**19:00 JOINT DINNER AT THE BÖGLERHOF**

**21:00 MISSION PREPARATION AT THE SCHOOL HOUSE**

## THURSDAY, JULY 18

**09:00 MISSION ANALYSIS**

Marcus Hallmann, DLR

**10:00 IDEAS FOR FUTURE MAGNETIC FIELD MISSIONS**

André Laurens, CNES

**11:00 COFFEE BREAK**

**11:30 IDEAS FOR FUTURE GRAVITY MISSIONS**

Roger Haagmans, ESA

**12:30 LUNCH BREAK**

**14:30 WORKSHOP**

**16:00 COFFEE BREAK**

**17:00 WORKSHOP**

**19:00 JOINT DINNER AT THE BÖGLERHOF**

**21:00 MISSION PREPARATION AT THE SCHOOL HOUSE**

## FRIDAY, JULY 19

09:00 **NETWORKED, DISTRIBUTED SMALL SATELLITE SYSTEM DESIGN**

Klaus Schilling, University of Würzburg

10:00 **APPLICATION SCENARIOS FOR COOPERATING SMALL SATELLITES**

Klaus Schilling, University of Würzburg

11:00 **COFFEE BREAK**

11:30 **SYSTEM ENGINEERING & TECHNOLOGY**

Michele Lavagna, Politecnico di Torino

12:30 **LUNCH BREAK**

14:30 **WORKSHOP**

16:00 **COFFEE BREAK**

16:30 **MISSION OBJECTIVES AND REQUIREMENTS REVIEW**

19:00 **JOINT DINNER AT THE BÖGLERHOF**

21:00 **MISSION PREPARATION AT THE SCHOOL HOUSE**



## SATURDAY JULY 20

09:00 – 16:00 GUIDED MOUNTAIN WALK



17:00 MISSION PREPARATION AT THE SCHOOL HOUSE

19:00 JOINT DINNER AT THE BÖGLERHOF

21:00 MISSION PREPARATION AT THE SCHOOL HOUSE

## SUNDAY, JULY 21

### MISSION PREPARATION AT THE SCHOOL HOUSE

19:00 JOINT DINNER AT THE BÖGLERHOF

21:00 MISSION PREPARATION AT THE SCHOOL HOUSE

## MONDAY, JULY 22

09:00 **MAGNETIC FIELDS AS A WINDOW ON THE DYNAMICS OF EARTH'S CORE**  
Andrew Jackson, ETH Zürich

10:00 **PLANETARY MAGNETIC FIELDS SAILING: THE MAGNETIC ROUTE**  
Karl Heinz Glassmeier, Technical University Braunschweig

11:00 COFFEE BREAK

11:30 **COLD ATOM INTERFEROMETERS FOR FUTURE INERTIAL SENSORS AND GRADIOMETERS**  
Olivier Carraz, ESA

12:30 LUNCH BREAK –  
GROUP PICTURE WILL BE TAKEN DURING LUNCH BREAK

14:30 **WORKSHOP**

15:00 COFFEE BREAK

16:30 MISSION PRELIMINARY DESIGN REVIEW

19:00 JOINT DINNER AT THE BÖGLERHOF

21:00 MISSION PREPARATION AT THE SCHOOL HOUSE



## **TUESDAY JULY 23**

**09:00 MISSION PREPARATION AT THE SCHOOL HOUSE**

**16:30 MISSION FINAL DESIGN REVIEW**

**19:00 JOINT DINNER AT THE BÖGLERHOF**

**21:00 MISSION PREPARATION AT THE SCHOOL HOUSE**

## **WEDNESDAY, JULY 24**

**09:00 MISSION PREPARATION AT THE SCHOOL HOUSE**

**16:00 INDIVIDUAL TEAM REHEARSALS**

**19:00 JOINT DINNER AT THE BÖGLERHOF**

**21:00 MISSION PREPARATION AT THE SCHOOL HOUSE**

## THURSDAY, JULY 25

00:00	<b>LATEST DELIVERY OF PRESENTATION MATERIAL</b> "Bed time"
09:00	<b>PRESENTATION TEAM A *</b>
10:00	Question and Answer Period
10:30	COFFEE BREAK
11:00	<b>PRESENTATION TEAM B *</b>
12:00	Question and Answer Period
12:30	BUFFET LUNCH SERVED AT THE SCHOOL HOUSE
13:30	<b>PRESENTATION TEAM C *</b>
14:30	Question and Answer Period
15:00	COFFEE BREAK
15:30	<b>PRESENTATION TEAM D *</b>
16:30	Question and Answer Period
17:00	<b>CLOSING REMARKS BY PETER FALKNER, HEAD TUTOR</b>
17:15	<b>MEETING OF THE JURY</b>
19:30	FAREWELL DINNER AT THE CONGRESS CENTER  ANNOUNCEMENT OF JURY EVALUATION AWARD CEREMONY

\* NOTE: team presentation sequence defined by lucky draw

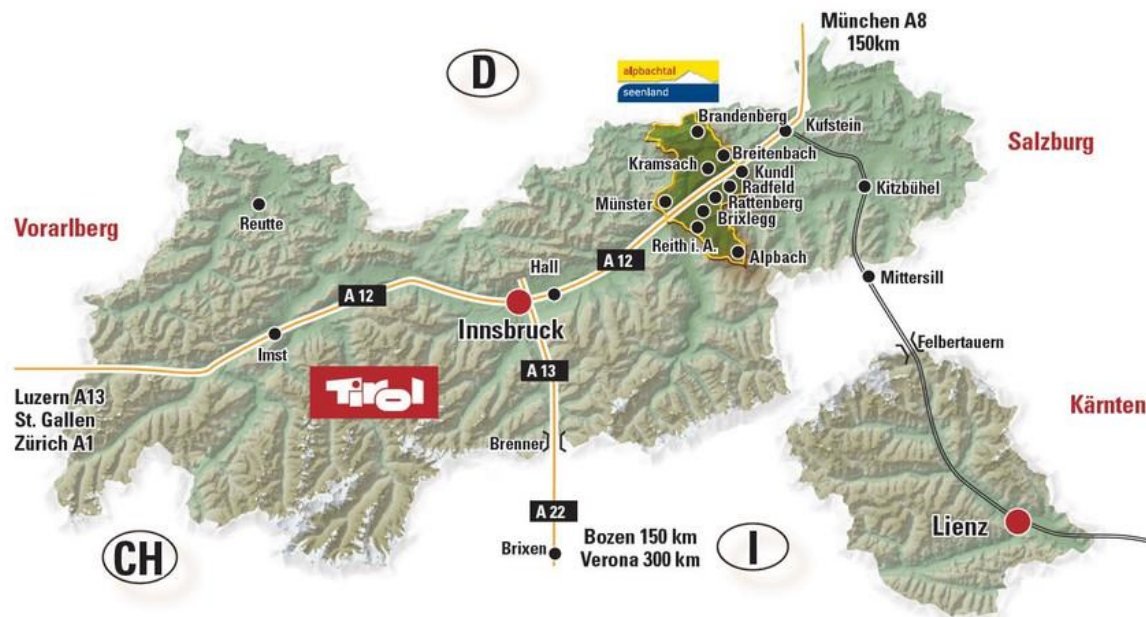
## THE VILLAGE OF ALPBACH



Alpbach occupies a beautiful location on a sunny plateau at approx. 1.000m above sea level.



## HOW TO GET THERE



- ➔ 50 km from Innsbruck
- ➔ 150 km from Munich
- ➔ 140 km from Salzburg
- ➔ 160 km from Bozen
- ➔ 440 km from Vienna
- ➔ reach Alpbach by car on the Inntal motorway A1, exit Kramsach - 12 km to Alpbach via Brixlegg and Reith
- ➔ nearest mainline railway stations: Wörgl (25 km) and Jenbach (20 km)
- ➔ fly into Innsbruck, Salzburg or Munich

Express trains (ICE, IC, EC) stop at the express train stations Jenbach or Wörgl. Regional trains stop at the Brixlegg or Rattenberg stations.

Guests arriving by train to Wörgl or Jenbach or Brixlegg can use the buses to Alpbach free of charge by producing a valid booking confirmation or accommodation voucher.

For train connections see <http://fahrplan.oebb.at/bin/query.exe/en>

# LOGISTICS

## HOTEL BÖGLERHOF

Familie Duftner  
Nr. 166, 6236 Alpbach  
Telefon +43 5336 5227  
[www.boeglerhof.at](http://www.boeglerhof.at)  
[info@boeglerhof.at](mailto:info@boeglerhof.at)





The Hotel Böglerhof is the Summer School Hotel. It is located in the centre of Alpbach, next to the church and within 10 minutes walking distance from the School House.

Joint dinners for all Summer School participants help in forming a strong community spirit. All participants (students, tutors, lecturers and accompanying persons) will have dinners throughout the period of the Summer School at the Hotel Böglerhof.

Vouchers for the dinners including one free drink per evening will be distributed to all Summer School students upon registration.

Lecturers and tutors staying at the Böglerhof have dinners included in the room arrangement.

The price for the evening meal at the Hotel Böglerhof for lecturers/tutors/guests who are not staying at the Böglerhof is € 26 per evening and can be paid at the end of the stay at the Böglerhof reception.

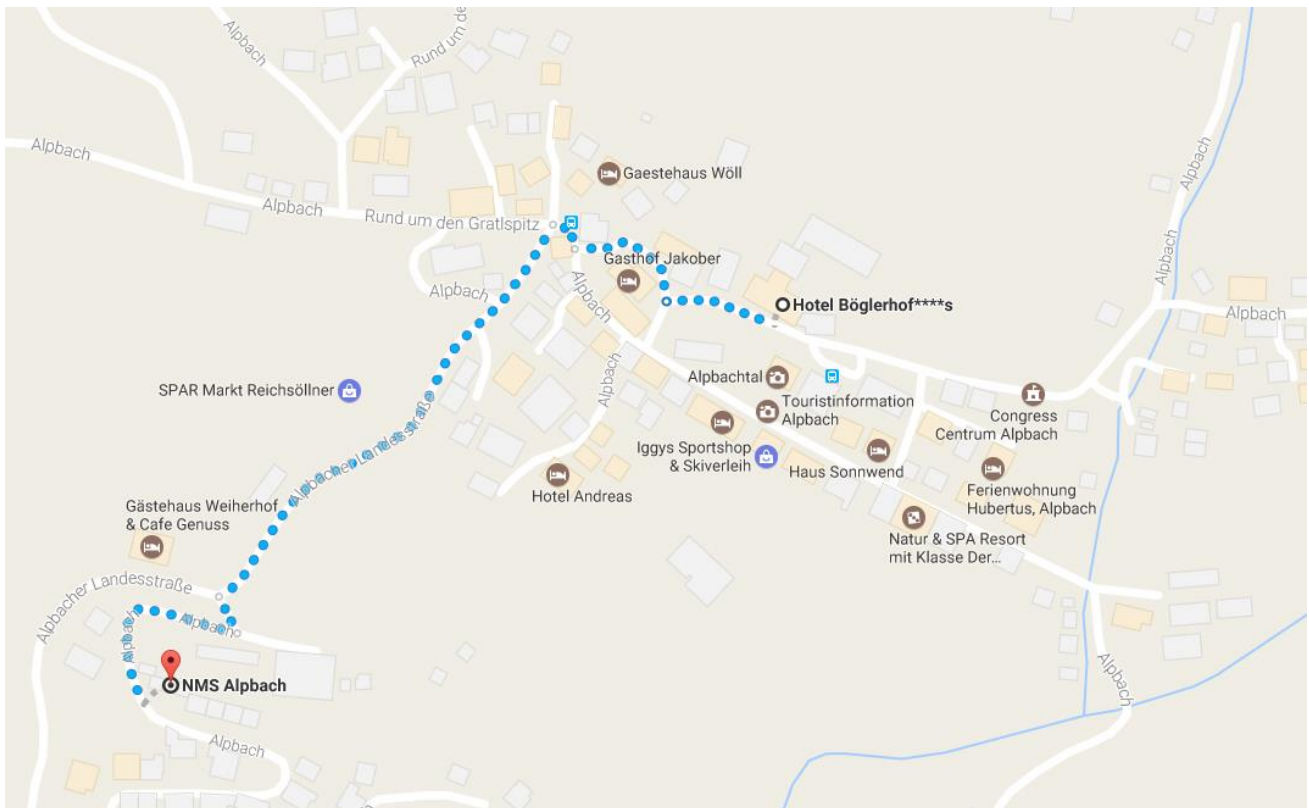
Accompanying persons are welcome to join for dinner.



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*Dinner room at Hotel Böglerhof*

## THE SCHOOL HOUSE



All lectures and the workshops are held in the School House of Alpbach (NMS Alpbach) located at 10 minutes walking distance to the Hotel Böglerhof. There are no lectures during the weekend. The mission design work continues and the School House will be open for work.

Lectures, final student presentations and student rehearsals will take place in the lecture hall (audimax). 60 Alpbach students will be grouped into four teams (Blue, Red, Orange, Green). Each Summer School student team will be allocated a classroom.

The daily joint dinners are scheduled for 7 p.m. at the Hotel Böglerhof. The workshop activities continue after dinner at the School House.

## INFRASTRUCTURE AVAILABLE AT THE SCHOOL HOUSE

- Access to the internet: 1 fixed Notebook allocated to each team (with LAN) in the classrooms
- personal Notebooks (students)
- wireless access point (WiFi)
- 1 classroom per team (flip charts, chalkboard, beamer, WiFi, 1 Laptop)
- Computer Room (team laptops, printers, library)
- STK Edu tool
- Copying machine

## MATERIAL AVAILABLE FOR THE USE OF STUDENTS

- Books (small library) & reports
- Access to online journals
- Internet Address Lists
- Server for
  - uploading information material/tools of tutors and lecturers
  - for exchange between students (e.g. mini CDF, STK)



## COFFEE BREAKS

Coffee breaks take place at the School House. In addition each team will be provided with a coffee machine in the classroom.



## LUNCHES

There are no arrangements for lunch, a supermarket is within walking distance from the School House and small restaurants and a coffee shop can be found in the village of Alpbach.

## PICTURES

Photos will be taken during the Summer School Alpbach (including a group picture) to be used and published by FFG for the purpose of reporting on the Summer School Alpbach.

# THE PROGRAMME COMMITTEE

## **CHAIR:**

Wolfgang Baumjohann, Space Research Institute Graz

**SUMMER SCHOOL DIRECTOR:** Michaela Gitsch, FFG

**VICE SUMMER SCHOOL DIRECTOR:** Wolfgang Baumjohann, Space Research Institute

**HEAD TUTOR:** Peter Falkner, ESA

**SCIENTIFIC COORDINATOR:** Hans Sünkel, Graz University of Technology

**CHAIRMAN OF THE JURY:** Roger Bonnet, ISSI

## **PROGRAMME COMMITTEE MEMBERS:**

- Roger Bonnet, ISSI
- Paal Brekke, Norway
- Natacha Callens, ESA
- Peter Falkner, ESA
- Rune Flogerhagen, ESA
- Achim Friker, DLR
- Andreas Geisler, FFG
- Andrian Jäggi, University of Berne
- Pekka Janhunen, Finnish Meteorological Institute
- Serge Habraken, Centre Spatial de Liège
- Vassilios Karastathis, Geodynamics, Institute of the National Observatory of Athens
- Arpad Kis, Geodetic and Geophysical Institute of the Research Centre for Astronomy and Earth Sciences, Hungarian Academy of Sciences
- Otto Koudelka, Graz University of Technology
- Dan Alin Nedelcu, Astronomical Institute of the Romanian Academy
- Mioara Manda, CNES
- Mark McCaughrean, ESA
- Jens Dalsgaard Nielsen, University of Aalborg
- Johannes Ortner, Austria
- Andris Slavinskis, University of Tartu, Estonia
- Jose Carlos del Toro Iniesta, Spain
- Giancarlo Varacalli, ASI
- Tonie M van Dam, University of Luxembourg

## **SUMMER SCHOOL ADMINISTRATION:**

Silvia Wenger, ISSI

**TECHNICAL MANAGEMENT:** Thomas Margreiter, Alpbach

**PHOTOGRAPHER:** Michel A. Jakob, Austria



# SUMMER SCHOOL TUTORS

**HEAD TUTOR:** Peter Falkner, ESA

## ENGINEERING TUTORS:

Marcus Hallmann, DLR  
Günter Kargl, Space Research Institute, Graz  
Tyler Jones, Norwegian Space Agency  
Michele Lavagna, Politecnico di Milano  
Werner Magnes, Space Research Institute Graz  
Adriana Elizabeth Nuncio Quiroz, DLR  
Jaan Praks, Aalto University  
Klaus Schilling, University of Würzburg

## SCIENCE TUTORS:

Jerome Loicq, University of Liege  
Qiang Chen, Université du Luxembourg  
Andrew Jackson, ETH Zürich  
Roger Haagmanns, ESA  
Enkelejda Qamili, ESA  
Elise Knutsen, Norwegian University of Science and Technology  
Olivier Carraz, ESA

# SUMMER SCHOOL LECTURERS

Peter Falkner, ESA  
Olivier Carraz, ESA  
Eberhard Gill, TU Delft Space Institute  
Karl Heinz Glassmeier, Technical University Braunschweig  
Roger Haagmanns, ESA  
Marcus Hallmann, DLR  
Andrew Jackson, ETH Zürich  
Tyler Jones, Norwegian Space Agency  
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Jean-Yves LeGall, CNES  
Werner Magnes, Space Research Institute, Graz  
Torsten Mayer-Gürr, Graz University of Technology  
Luca Massotti, ESA  
Enkelejda Qamili, ESA  
Reiner Rummel, Technical University of Munich  
Klaus Schilling, University of Würzburg

# SUMMER SCHOOL JURY

**JURY CHAIRMAN:** Roger Bonnet, ISSI

## **JURY MEMBERS:**

- Roger Bonnet, ISSI
- Karl Heinz Glassmeier, TU Braunschweig
- Hugo Maree, ESA
- Hans Sünkel, Graz University of Technology
- Franco Ongaro, ESA
- Stephan Ulamec, DLR

Observing Members:

- Peter Falkner, ESA, Head Tutor
- Andreas Geisler, FFG

## **SUMMER SCHOOL OSCARS ARE AWARDED FOR THE BEST PROJECTS IN THE CATEGORIES**

- THE SCIENCE CASE FOR THE MISSION
- THE TECHNICAL CASE FOR THE MISSION
- THE COMPETITIVENESS OF THE MISSION
- THE QUALITY OF PRESENTATION

## **WELCOME TO THE SUMMER SCHOOL ALPBACH 2019**