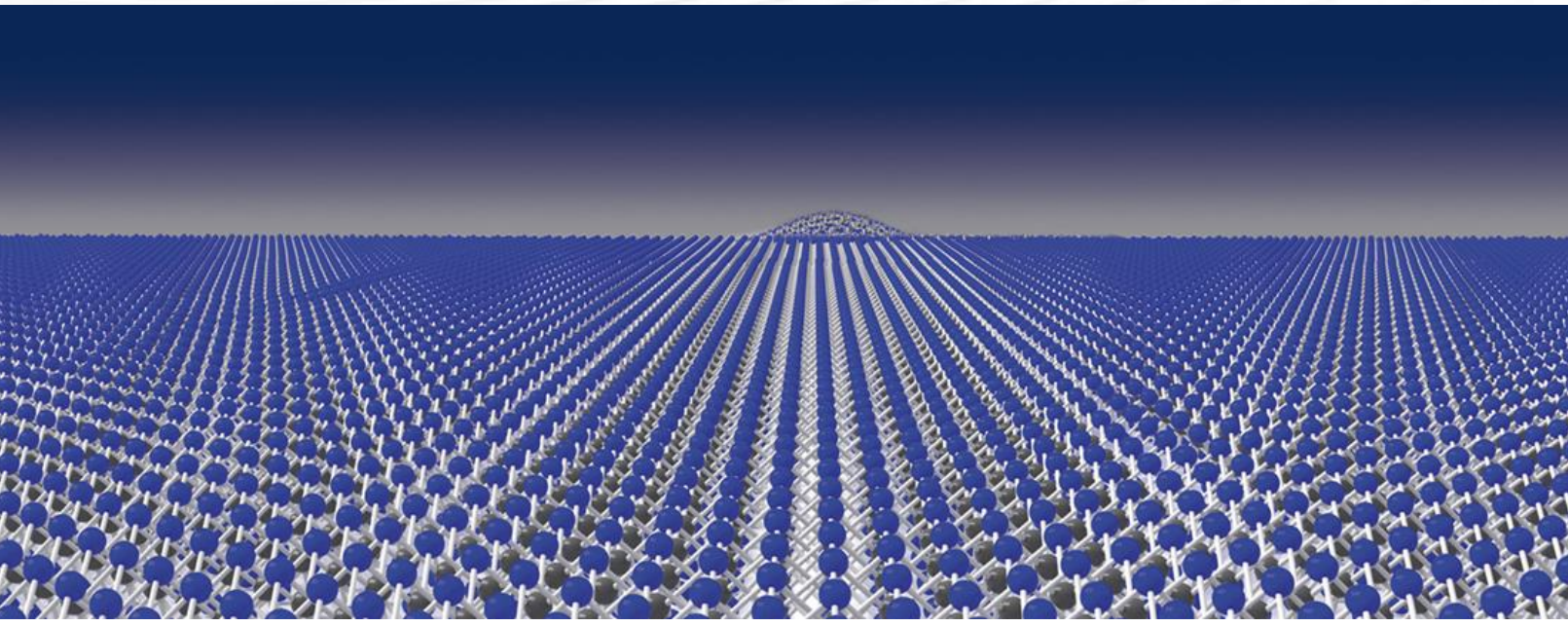
attocube
WITTENSTEIN group

# 2D Materials Conference

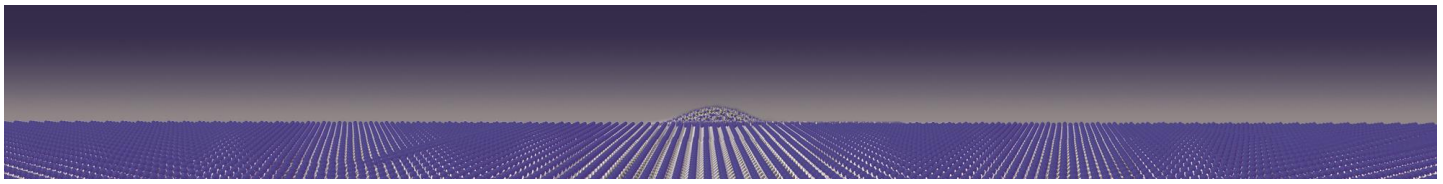
Munich, June 3 – 8, 2024



## Conference Program

meet the leading experts

Conference venue:
Kleines Theater Haar
Casinostr. 75
85540 Haar by Munich
Germany



## Monday | June 3, 2024

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| 13:30 – 16:30 | **Registration** |
| | Tutorials Session<br>Chair: Prof. Khaled Karraï – attocube systems, Germany |
| 14:00 – 14:45 | **Dr. Rainer Hillenbrand** – nanoGUNE, Spain<br>*Introduction to s-SNOM. Basic concept, instrumentation, mechanisms and applications in 2D materials research* |
| 14:50 – 15:35 | **Prof. Jie Shan** – Cornell University, USA<br>*Optical measurements of 2D materials* |
| 15:40 – 16:25 | **Prof. Marin Alexe** – University of Warwick, UK<br>*Probing functional properties with AFM* |
| 16:30 – 18:00 | **Welcome Reception** |

## Tuesday | June 4, 2024

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| 08:00 – 09:00 | **Registration and Coffee Break** |
| 09:00 – 09:10 | **Peter Kraemer** – attocube systems, Germany<br>*Conference opening* |
| Session 1 | Twistronics and moiré superlattices – Part I<br>Chair: Prof. Xiaodong Xu – University of Washington, USA |
| 09:10 – 09:40 | **Prof. Kin Fai Mak** – Cornell University, USA<br>Plenary Talk: *Electron fractionalization under zero magnetic field* |
| 09:40 – 10:00 | **Prof. Shahal Ilani** – Weizmann Institute of Science, Israel<br>*News from the Quantum Twisting Microscope* |
| 10:00 – 10:20 | **Prof. Harald Giessen** – University of Stuttgart, Germany<br>*Plasmonic twistronics: Discovery of Plasmonic Skyrmion Bags* |
| 10:20 – 10:40 | **Prof. Dmitri Efetov –** Ludwig Maximilian University of Munich, Germany<br>*Thermodynamic measurements of correlated states in MATBG* |
| 10:40 – 11:00 | **Prof. Marin Alexe** – University of Warwick, UK<br>*Incommensurate spin crystal phases in ultra-thin ferromagnetic and ferroelectric oxide layers* |

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| 11:00 – 11:30 | **Coffee Break** |

## Session 2 — Topological 2D materials

Chair: Prof. Arindam Ghosh – Indian Institute of Science, India

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| 11:30 – 11:50 | **Prof. Xiaodong Xu** – University of Washington, USA<br>*Interaction, magnetism, and topology in a fractional Chern insulator* |
| 11:50 – 12:10 | **Prof. Mazhar Ali** – TU Delft, Netherlands<br>*2D Quantum material Josephson junctions* |
| 12:10 – 12:30 | **Prof. Minoru Kawamura** – RIKEN, Japan<br>*Half-integer quantized Hall conductivity in magnetic topological insulator heterostructure* |
| 12:30 – 12:50 | **Prof. Amir Yacoby** – Harvard University, USA<br>*Strong interactions and isospin symmetry breaking in a supermoiré lattice* |
| 12:50 – 14:10 | **Lunch Break** |

## Session 3 — 2D Magnets – Part I

Chair: Dr. Angela Hight Walker – NIST Gaithersburg, USA

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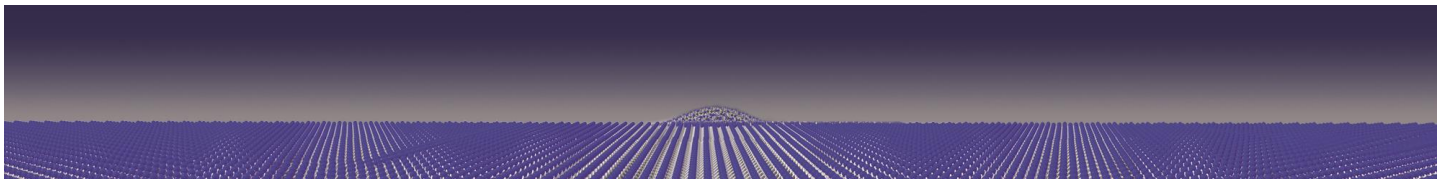
| 14:10 – 14:40 | **Prof. Stuart Parkin** – Max Planck Institute of Microstructure Physics, Germany<br>Plenary Talk: *Chiral spin textures on the racetrack* |
| 14:40 – 15:00 | **Dr. Samuel Mañas-Valero** – TU Delft, Netherlands & University of Valencia, Spain<br>*Beyond moiré in twisted 2D magnets: tailoring the magnetization switching in 2D CrSBr by an orthogonal twist* |
| 15:00 – 15:20 | **Prof. Efrat Lifshitz** – Technion, Israel<br>*Magnetic-electronic coupling in the vdW metal-phosphor tri-chalcogenides* |
| 15:20 – 15:40 | **Prof. Patrick Maletinsky** – University of Basel, Switzerland<br>*Quantum sensing of 2D magnets using single-spin microscopy* |
| 15:40 – 16:00 | **Dr. Vincent Jacques** – University of Montpellier & CNRS, France<br>*Quantum sensing with spin defects in hexagonal boron nitride* |
| 16:00 – 16:30 | **Coffee Break** |



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| Session 4 | Optical spectroscopy of 2D materials – Part I<br>Chair: Prof. Jana Vejpravova – Charles University, Czechia |
| 16:30 – 16:50 | **Prof. Bernhard Urbaszek** – TU Darmstadt, Germany<br>*Optics with 2D quantum materials* |
| 16:50 – 17:10 | **Prof. Jonathan Finley** – TU Munich, Germany<br>*Manipulating interactions in 2D-heterostructures using high-Q nanobeam cavities* |
| 17:10 – 17:30 | **Prof. Ibrahim Sarpkaya** – Bilkent University, Turkey<br>*Quantum beats of interlayer excitons in TMDC heterobilayers* |
| 17:30 – 17:50 | **Prof. Yohannes Abate** – University of Georgia, USA<br>*Sulfur vacancy related optical transitions in graded alloys of $Mo_xW_{1-x}S_2$ monolayers* |
| 17:50 – 18:10 | **Dr. Markus Huber** – University of Regensburg, Germany<br>*Ultrafast electron dynamics in semiconducting thin films using subcycle terahertz nanoscopy* |

## Wednesday | June 5, 2024

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| 08:30 – 09:00 | **Registration and Coffee Break** |
| Session 5 | Polaritons in 2D materials – Part I<br>Chair: Dr. William Wilson – Harvard University, USA |
| 09:00 – 09:30 | **Prof. Dmitri Basov** – Columbia University, USA<br>Plenary Talk: *Van der Waals interfaces* |
| 09:30 – 09:50 | **Prof. Cheng-Wei Qiu** – National University of Singapore, Singapore<br>*Optical interfaces from metasurface optics to low-symmetry phonon polaritons* |
| 09:50 – 10:10 | **Dr. Jessica Boland** – University of Manchester, UK<br>*Cryogenic near-field spectroscopy from visible to mid-IR frequencies: exploring topological insulator nanostructures and 2D materials at the nanoscale* |
| 10:10 – 10:30 | **Prof. Pablo Alonso-Gonzalez** – University of Oviedo, Spain<br>*Nanooptics in flatlands* |
| 10:30 – 10:50 | **Prof. Markus Raschke** – University of Colorado Boulder, USA<br>*Ultrafast nano-imaging: Probing quantum dynamics in space and time* |
| 10:50 – 11:10 | **Prof. Miriam Vitiello** – Consiglio Nazionale delle Ricerche, Italy<br>*Hyperspectral detectorless near-field nanoscopy at terahertz frequencies* |

11:10 – 11:40 **Coffee Break**

## Session 6 — Twistronics and moiré superlattices – Part II

Chair: Prof. Abhay Pasupathy – Brookhaven National Laboratory, USA

11:40 – 12:00 **Prof. Thomas Weitz** – Georg August University of Göttingen, Germany
*Quantum phases in flat-band van-der-Waals systems: making, controlling and measuring by quantum transport*

12:00 – 12:20 **Prof. Yuerui Lu** – Australian National University, Australia
*Enhanced interactions of interlayer excitons in free-standing hetero-bilayers*

12:20 – 12:40 **Prof. Arindam Ghosh** – Indian Institute of Science, India
*Low-frequency noise in the heterostructures of near-MATBG and TMD layers*

12:40 – 13:00 **Prof. Yong Chen** – Purdue University, USA & University of Aarhus, Denmark
*In-operando spectroscopy and microscopy on twisted 2D materials: from graphene to magnets*

13:00 – 14:40 **Lunch Break**

## Session 7 — Optical spectroscopy of 2D materials – Part II

Chair: Prof. Miriam Vitiello – Consiglio Nazionale delle Ricerche, Italy

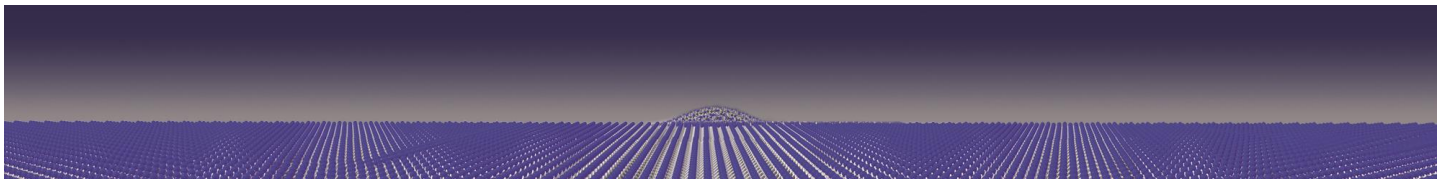
14:40 – 15:00 **Prof. Atac Imamoglu** – ETH Zurich, Switzerland
*Quantum optical spectroscopy of 2D materials*

15:00 – 15:20 **Prof. Sven Höfling** – Julius Maximilian University of Würzburg, Germany
*Gate-tunable $NbSe_2/MoSe_2$ heterostructures*

15:20 – 15:40 **Prof. Alexander Holleitner** – TU Munich, Germany
*Extended spatial coherence of interlayer excitons in $MoSe_2/WSe_2$ heterobilayers*

15:40 – 16:00 **Prof. Artem Mishchenko** – University of Manchester, UK
*Exploring polaritons and dielectric behaviour of nanoconfined water in gypsum*

16:00 – 16:30 **Coffee Break**



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| Session 8 | Plasmonics<br>Chair: Prof. Thomas Taubner – RWTH Aachen University, Germany |
| 16:30 – 16:50 | **Dr. Alexey Kuzmenko** – University of Geneva, Switzerland<br>*Tunable phonon polaritons in oxide interfaces and nanomembranes* |
| 16:50 – 17:10 | **Prof. Hai Hu** – Chinese Academy of Science, China<br>*Control of polaritons in low-dimensional nanomaterials* |
| 17:10 – 17:30 | **Prof. Vladimir Zenin** – University of Southern Denmark, Denmark<br>*Merging 2D materials and atomically smooth gold crystals: challenges and opportunities* |
| 17:30 – 17:50 | **Dr. Stephanie Gilbert Corder** – Lawrence Berkeley National Lab, USA<br>*Revealing the secrets of 2D materials: nanospectroscopy and nano-imaging illuminate structure-property relationships in complex materials* |
| 19:30 – 22:30 | Conference Dinner<br>*in traditional Bavarian restaurant* Ratskeller München<br>*Address: Landschaftstraße 1, Munich city centre (urban-train stop* Marienplatz*)* |

## Thursday | June 6, 2024

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|---|---|
| 08:30 – 09:00 | **Registration and Coffee Break** |
| Session 9 | Spintronics and multiferroics<br>Chair: Prof. Yu Ye – Peking University, China |
| 09:00 – 09:30 | **Prof. Ramamoorthy Ramesh** – Rice University, USA<br>Plenary Talk: *Antiferromagnetic spintronics with multiferroics* |
| 09:30 – 09:50 | **Prof. Jian Shen** – Fudan University, China<br>*Oxide materials for spintronics* |
| 09:50 – 10:10 | **Prof. Jan Seidel** – University of New South Wales, Australia<br>*Functional topological defects: materials at the edge of order* |
| 10:10 – 10:30 | **Prof. Kenji Yasuda** – Cornell University, USA<br>*Sliding ferroelectricity* |
| 10:30 – 10:50 | **Prof. Christian Degen** – ETH Zurich, Switzerland<br>*Quantum microscopy of antiferromagnetic and ferroelectric materials* |
| 10:50 – 11:20 | **Coffee Break** |

## Session 10 — Twistronics and moiré superlattices – Part III

Chair: Prof. Tomasz Smolenski – ETH Zurich, Switzerland

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| 11:20 – 11:40 | **Prof. Abhay Pasupathy** – Brookhaven National Laboratory, USA<br>*Visualizing supersonic electron flow in an electronic de Laval nozzle* |
| 11:40 – 12:00 | **Prof. Jie Shan** – Cornell University, USA<br>*Excitonic insulator in atomic double layers* |
| 12:00 – 12:20 | **Prof. Alexander Högele** – Ludwig Maximilian University of Munich, Germany<br>*Exciton, charge and spin lattices in moiré heterostructures* |
| 12:20 – 12:40 | **Prof. Chunhui Du** – Georgia Institute of Technology, USA<br>*Revealing intrinsic domains and fluctuations of moiré magnetism by a quantum microscope* |
| 12:40 – 14:20 | **Lunch Break** |

## Session 11 — Optical spectroscopy of 2D materials – Part III

Chair: Prof. Efrat Lifshitz – Technion, Israel

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|---|---|
| 14:20 – 14:40 | **Prof. Andrea Ferrari** – University of Cambridge, UK<br>*Layered materials for (quantum) photonics* |
| 14:40 – 15:00 | **Prof. Brian Gerardot** – Heriot-Watt University, UK<br>*Exciton-polaron spectroscopy of moiré heterostructures* |
| 15:00 – 15:20 | **Prof. Thomas Taubner** – RWTH Aachen University, Germany<br>*Interband transitions in few-layer graphene and their coupling to phonon polaritons* |
| 15:20 – 15:40 | **Prof. Ziliang Ye** – University of British Columbia, Canada<br>*Slip avalanche and non-volatile optical switch in rhombohedral stacked $MoS_2$* |
| 15:40 – 16:00 | **Prof. Ajit Srivastava** – Emory University, USA & University of Geneva, Switzerland<br>*Exciting moiré materials for quantum matter* |
| 16:00 – 16:20 | **Drs. Jake Horder** – University of Technology Sydney, Australia<br>*Near-coherent quantum emitters in hBN with discrete polarization axes* |
| 16:20 – 16:50 | **Coffee Break** |

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| 17:00 – 19:30 | Poster Session @ attocube Nanofactory<br>Co-chairs: Dr. Mirko Bacani & Dr. Adrian Cernescu – attocube systems, Germany |
| 18:00 – 19:30 | Grill Party @ attocube Nanofactory |

## Friday | June 7, 2024

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|---|---|
| 08:30 – 09:00 | **Registration and Coffee Break** |
| Session 12 | Optical spectroscopy of 2D materials – Part IV<br>Chair: Prof. Yohannes Abate – University of Georgia, USA |
| 09:00 – 09:20 | **Prof. Norman Yao** – Harvard University, USA<br>*Quantum sensing at megabar pressures* |
| 09:20 – 09:40 | **Prof. Goki Eda** – National University of Singapore, Singapore<br>*Bound exciton complexes as single photon sources* |
| 09:40 – 10:00 | **Dr. Angela Hight Walker** – NIST Gaithersburg, USA<br>*Novel instrumentation for 2D characterization: combined magneto-optical magneto-transport* |
| 10:00 – 10:20 | **Prof. Jana Vejpravova** – Charles University, Czechia<br>*Cryomagnetic Raman and PL micro-spectroscopy of 2D materials using chiral light* |
| 10:20 – 10:40 | **Drs. Lukas Lackner** – Carl von Ossietzky University of Oldenburg, Germany<br>*Controlling excitons in van der Waals materials in open optical cavities* |
| 10:40 – 11:10 | **Coffee Break** |
| Session 13 | Polaritons in 2D materials – Part II<br>Chair: Prof. Yuerui Lu – Australian National University, Australia |
| 11:10 – 11:30 | **Dr. William Wilson** – Harvard University, USA<br>*Scan-probe imaging optical quasiparticles in 2D materials* |
| 11:30 – 11:50 | **Prof. Mengkun Liu** – Stony Brook University, USA<br>*Landau phonon polaritons in Dirac heterostructures* |
| 11:50 – 12:10 | **Dr. Rainer Hillenbrand** – nanoGUNE, Spain<br>*IR and THz nanoscopy of ultra-confined phonon and plasmon polaritons* |
| 12:10 – 12:30 | **Prof. Qingdong Ou** – Macau University of Science and Technology, China<br>*Structurally engineered α-$MoO_3$ materials for anisotropic phonon polaritonics* |
| 12:30 – 12:50 | **Prof. Siyuan Dai** – Auburn University, USA<br>*Engineer polaritons in van der Waals materials* |
| 12:50 – 14:00 | **Lunch Break** |

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| Session 14 | 2D Magnets – Part II<br>Chair: Prof. Kenji Yasuda – Cornell University, USA |
| 14:00 – 14:20 | **Prof. Martino Poggio** – University of Basel, Switzerland<br>*Scanning SQUID-on-tip microscopy of 2D and chiral magnetism* |
| 14:20 – 14:40 | **Dr. Canxun Zhang** – University of California at Santa Barbara, USA<br>*Magnetic imaging of integer and fractional Chern insulating states in $tMoTe_2$* |
| 14:40 – 15:00 | **Prof. Tomasz Smolenski** – ETH Zurich, Switzerland<br>*Correlated kinetic magnetism of electrons in semiconductor moiré materials* |
| 15:00 – 15:20 | **Prof. Yu Ye** – Peking University, China<br>*Intrinsic exchange bias effect in $MnBi_2Te_4$ family* |
| 15:20 – 15:40 | **Prof. Zdenek Sofer** – University of Chemistry and Technology Prague, Czechia<br>*Novel 2D magnets and dielectrics* |
| 15:40 – 16:00 | **Prof. Cristian Bonato** – Heriot-Watt University, UK<br>*Adaptive Bayesian inference for quantum sensing* |
| 16:00 – 16:10 | **Dr. Florian Otto** – attocube systems, Germany<br>*Closing remarks* |
| 16:10 – 16:40 | **Coffee Break** |
| 17:00 – 18:30 | Equipment demonstrations Session (with NanoFactory Lab Tour)<br>Co-chairs: Dr. Mirko Bacani & Dr. Adrian Cernescu – attocube systems, Germany |
| 18:30 – 20:00 | Informal discussions with beer & wine @ NanoFactory terrace |

We are looking forward to fruitful discussions!

# Travel information:

## Your way to the conference venue (Kleines Theater Haar)

Take the urban train S4 or S6 (in direction Ebersberg, Grafing or Zorneding) to the train stop Haar.


Please get off @ the train stop Haar
you will see the attocube HQ already from the platform.

Walk ‘Leibstraße’ 500 meters towards the conference venue:
**Kleines Theater Haar**


HQ address:
NanoFactory
Eglfinger Weg 2
85540 Haar

Phone: +49 89 420 797
Email: 2Dmaterials@attocube.com

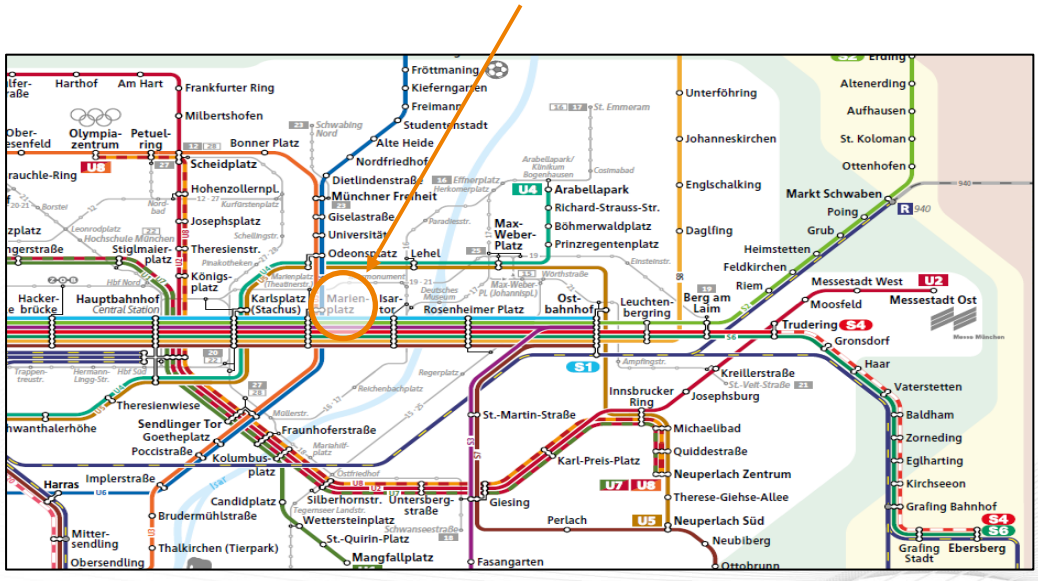
Conference venue:
Kleines Theater Haar
Casinostr. 75
85540 Haar
Germany

# Travel information:

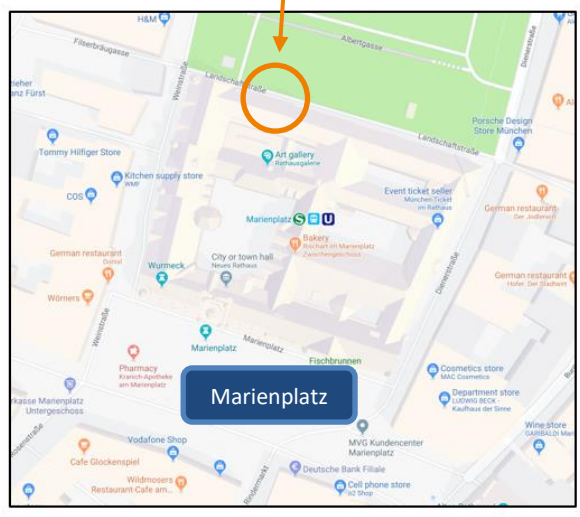
## Your way to Ratskeller München (dinner place on Wednesday evening, 19:30)

Address:
Landschaftstraße 1, Munich City centre

→ Take any suburban train S-Bahn towards Marienplatz




Restaurant entrance is located behind the city hall (Rathaus)
Reserved area for workshop participants: Alte Küferei



# Get together social event – Trip to Neuschwanstein Castle

Time for informal discussions and networking

## Saturday | June 8, 2024

08:00 Meeting point **attocube HQ** (Eglfinger Weg 2, 85540 Haar)

08:15 Departure by bus to **Neuschwanstein Castle** in the Bavarian Alps

12:30 **Guided Tour** inside Neuschwanstein Castle

13:45 **Lunch** at typical Bavarian restaurant
*cost covered individually*

14:45 **Bus trip** back

ca. 17:30 Arrival at **attocube HQ**