

The **Institute for Meteorology and Climate Research (IMK)** is part of the Karlsruhe Institute of Technology (KIT), a member of the Helmholtz Association of German Research Centres (HGF). It is highly experienced in the investigation and modelling of aerosol dynamics, aerosol optical properties, aerosol chemistry, and aerosol-cloud interactions in simulation chamber experiments. The institute runs the 84.5m³ aerosol and cloud chamber AIDA (Aerosol Interactions and Dynamics in the Atmosphere), which can be operated at variable pressures and temperatures between 50°C and -90°C, and is able to provide high relative humidities including supersaturations. KIT has experience in coordination of large measurement campaigns with multiple partners at the AIDA facility. The excellent infrastructure (Technicians, engineers, IT specialists, senior scientists, advanced process models) with a growing database allows for comprehensive experiments and fast data analysis/exchange.

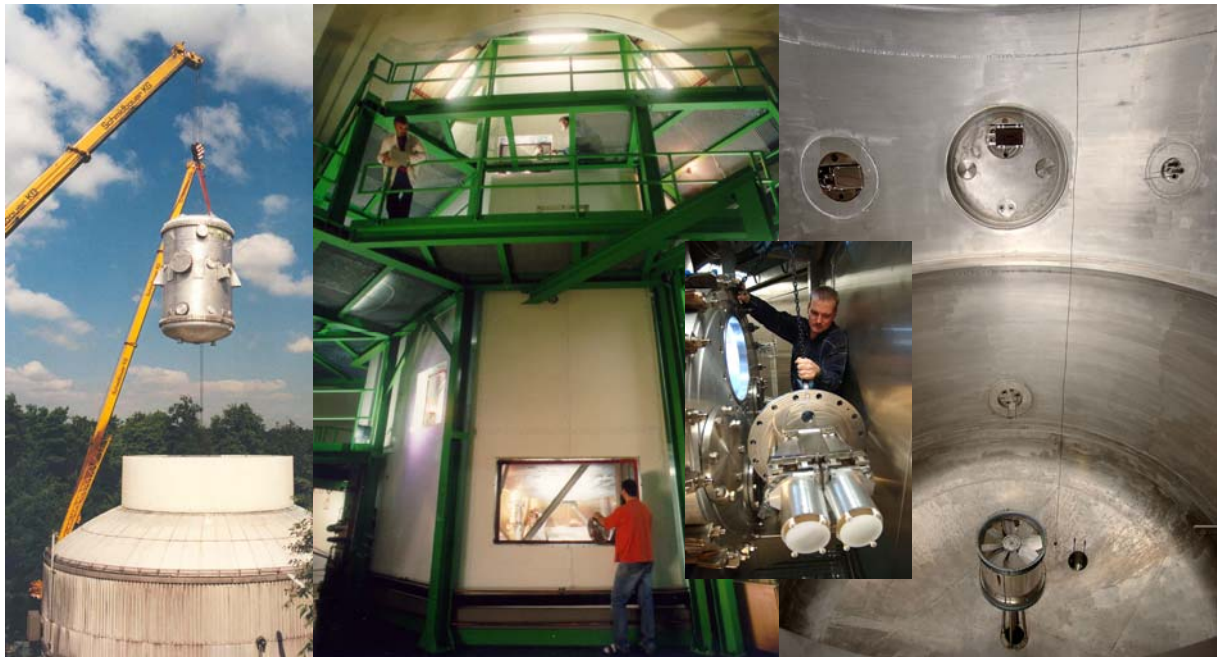
The main tasks of KIT within EUROCHAMP2 are leading the networking activity 3 on infrastructure related workshops, development of improved experimental techniques for trace gas detection in simulation chambers (JRA1), and the development of improved aerosol process models (JRA2). The following staff members will do this work:

Dr. Harald Saathoff is senior research scientist and since about 13 years he is active in the field of atmospheric and aerosol chemistry which includes development of instruments and organisation of international measurement campaigns. **PD Dr. Karl-Heinz Naumann** is senior research scientist and since about 19 years he is active in the field of modelling of aerosol dynamics and heterogeneous atmospheric chemistry. **Dr. Ottmar Möhler** is an expert in aerosol and cloud physics and responsible for the AIDA infrastructure.

KIT has the overall responsibility for the networking activity N3 (WP4) and is participating in work packages 1, 2, 3, 4, 5.3 and 6.2 and the TNA.

The AIDA Aerosol and Cloud Chamber

Aerosols, Interactions and Dynamics in the Atmosphere

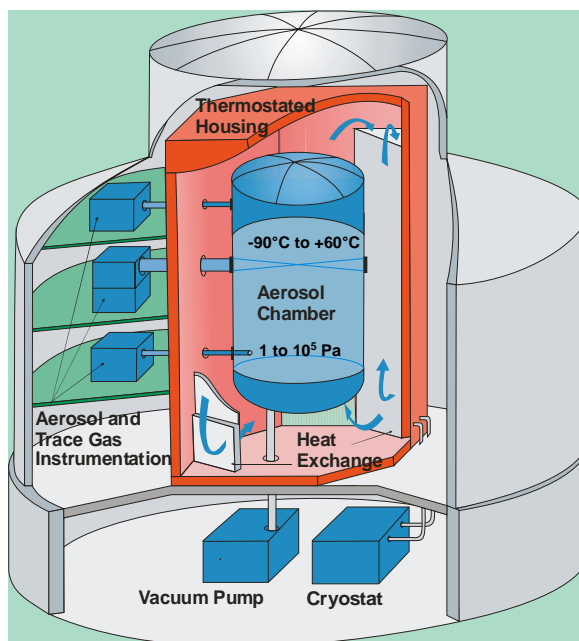


Description of the infrastructure: The AIDA facility comprises the large 84 m³ volume aluminium aerosol and cloud simulation chamber AIDA and the 3.9 m³ volume stainless steel aerosol preparation and characterisation chamber NAUA, both in the same building and connected to each other. The AIDA chamber can be operated at variable pressure (0.01 to 1000 hPa), temperature (+50°C to -90°C),

and humidity conditions, including supersaturations with respect to ice and liquid water. Its capabilities to simulate upper tropospheric/lower stratospheric conditions and to generate supersaturations in a large volume are unique in Europe. The AIDA facility is equipped with an extensive suite of state of the art instruments, both commercial and custom built (<http://imk-aida.fzk.de/facility/>). It provides an excellent infrastructure in terms of optical, physical and other instrumentation to carry out, with many external partners, comprehensive studies of aerosol processes, and to evaluate their impact on air quality and climate on various scales. Research areas normally supported at the AIDA facility include investigation and modelling of aerosol dynamics, aerosol optical properties, aerosol chemistry, and aerosol-cloud interactions. This includes studies of tropospheric, stratospheric, and mesospheric clouds under both static and dynamic expansion conditions. Analysis of the AIDA experiments is supported with the AIDA database and the aerosol models (NACHE, MAID, and COSIMA) which are continuously improved and extended.

Projects:

Aerosol optical properties
 Heterogeneous chemistry
 Heterogeneous ice nucleation and ice crystal growth
 Homogeneous freezing of super-cooled cloud droplets
 Effects of particle ageing and coating
 Inter-comparison of characterisation methods for aerosol particles, ice, clouds, and trace gases



Techniques:

Aerosol generation and coating (soot, dust, organics, salts, biogenic, nanoparticles)
 Physical and chemical aerosol characterisation (number, size distribution, mass, composition, ice nuclei, CCN)
 In-situ, ex-situ trace gas measurement including (FTIR, TDL, CI-MS)
 In-situ, ex-situ measurement of optical aerosol properties (extinction, absorption, scattering & depolarisation, fluorescence, imaging)

Services currently offered by the infrastructure:

- Planning and coordination of international measurement campaigns at the AIDA facility including dedicated workshops.
- Operation of the simulation chambers and the local instrumentation.
- Technical support for the integration of new/external instruments with technicians, engineers and local workshops.
- Data handling and analysis is supported with the AIDA database and the state of the art aerosol models NACHE, MAID, and COSIMA.

Several successful international measurement campaigns have increased the visibility of the AIDA facility in the scientific community during the recent years and lead to an increasing number of external users. From 2004 to 2007 on average 21 external partner groups visited the AIDA facility per year for joint measurement campaigns (<http://imk-aida.fzk.de/campaigns/>). About 2/3 of these groups are international users. The widespread interest to use the AIDA facility is also expressed in an increasing number of research topics addressed ranging from dedicated instrument intercomparisons to special questions of cloud microphysics.

The following references are examples of research papers resulting from our international collaborations.

- Abbatt, J. P. D., S. Benz, D. J. Cziczo, Z. Kanji, U. Lohmann, and O. Möhler (2006), Solid ammonium sulfate aerosols as ice nuclei: A pathway for cirrus cloud formation, *Science*, **313**, 1770-1773.
- Jonsson, A. M., Hallquist, M., and Saathoff, H. (2007): Volatility of secondary organic aerosols from the ozone initiated oxidation of α -pinene and limonene. *J. Aerosol Sci.* **38**:843-852.

Kärcher, B., O. Möhler, P. J. DeMott, S. Pechtl, and F. Yu (2007), Insights into the role of soot aerosols in cirrus cloud formation, *Atmos. Chem. Phys.*, **7**, 4203-4227.

Möhler, O., Field, P. R., Connolly, P., Benz, S., Saathoff, H., Schnaiter, M., Wagner, R., Cotton, R., Kramer, M., Mangold, A., Heymsfield, A. J. (2006): Efficiency of the deposition mode ice nucleation on mineral dust particles. *Atmos. Chem. Phys.* **6**, 3007-3021.

Modality of access:

Usually users access the AIDA facility with their instruments for a joint measurement campaign of 2-4 weeks duration. The results will be discussed at workshops, presented at conferences, and published in peer reviewed journals. Co-authorship should be offered to all AIDA team members and external partners contributing significant amount of data and scientific work to the respective paper. The planning and scheduling of the measurement campaigns is done about a year in advance of the activity by discussing scientific goals and technical details with the participants. For this purpose planning workshops will be organised. New users of the facility may also suggest major research topics and organise respective planning workshops. Final decisions about the research topics addressed and the scheduling of campaigns are made by the AIDA team.

Support offered:

Normally we provide the following support to external users of the AIDA facility:

- Planning and coordination of international measurement campaigns.
- Operation of the simulation chambers and the local instrumentation.
- Technical support for the adaptation and integration of partner instruments.
- Providing AIDA housekeeping and instrument data sets needed for the analysis and interpretation of measurements by partners.
- Database-oriented support of acquisition and analysis of data from partner instruments.
- Support of AIDA and partner data analysis and interpretation with the help of state of the art aerosol models NACHE, MAID, and COSIMA.
- Explanation of specific AIDA facility and experiment characteristics to partners, in particular new users.