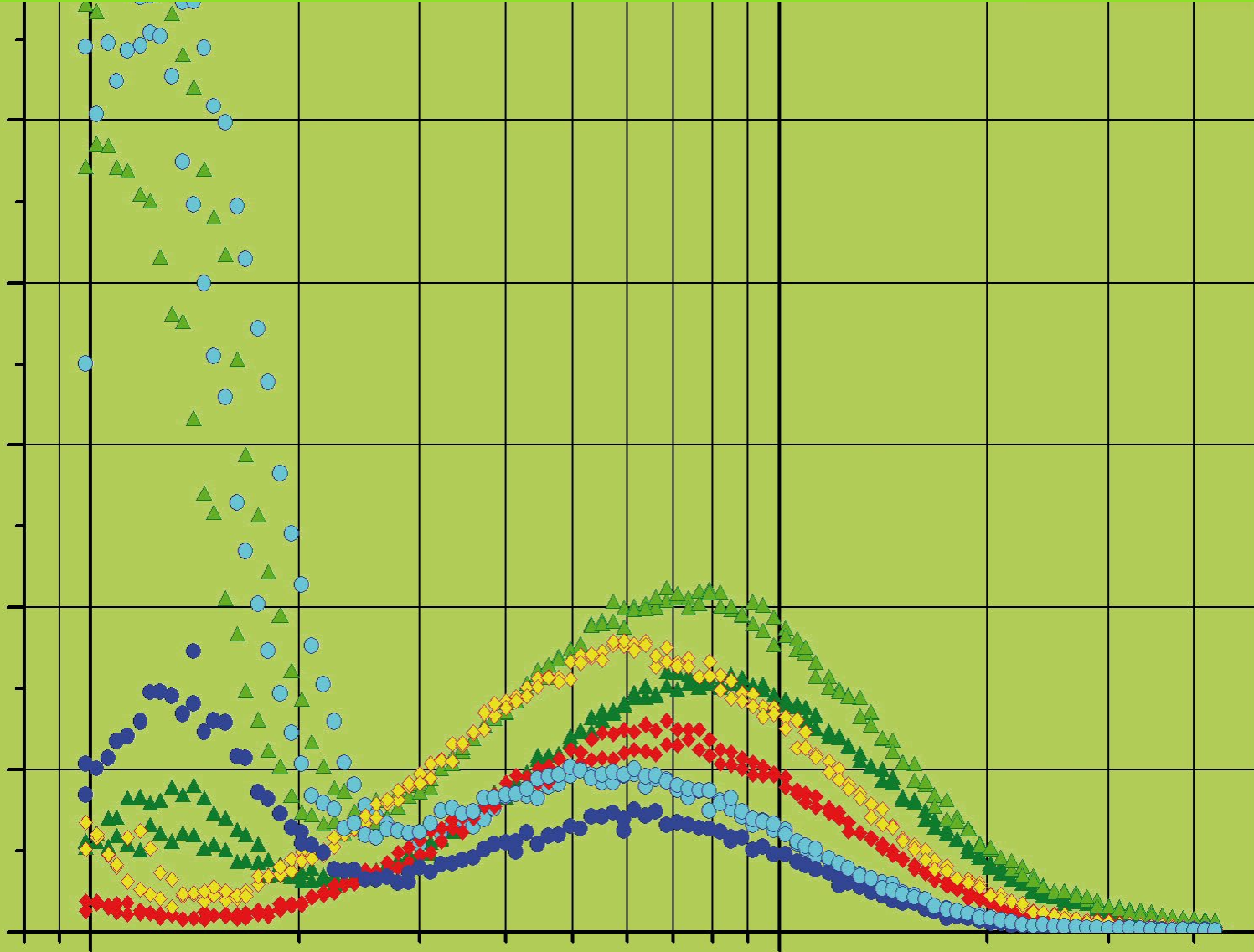


# 27<sup>th</sup> ETH-Nanoparticles Conference

**June 10 -14, 2024**

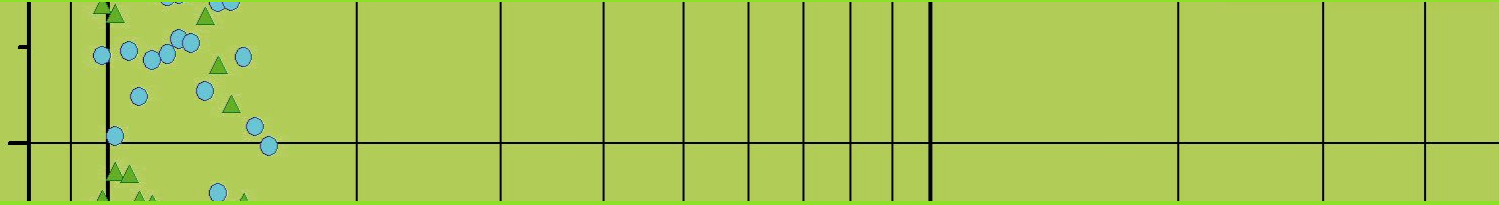


**Norbert Heeb,  
Empa**

**On behalf of the  
Organizing  
Committee**

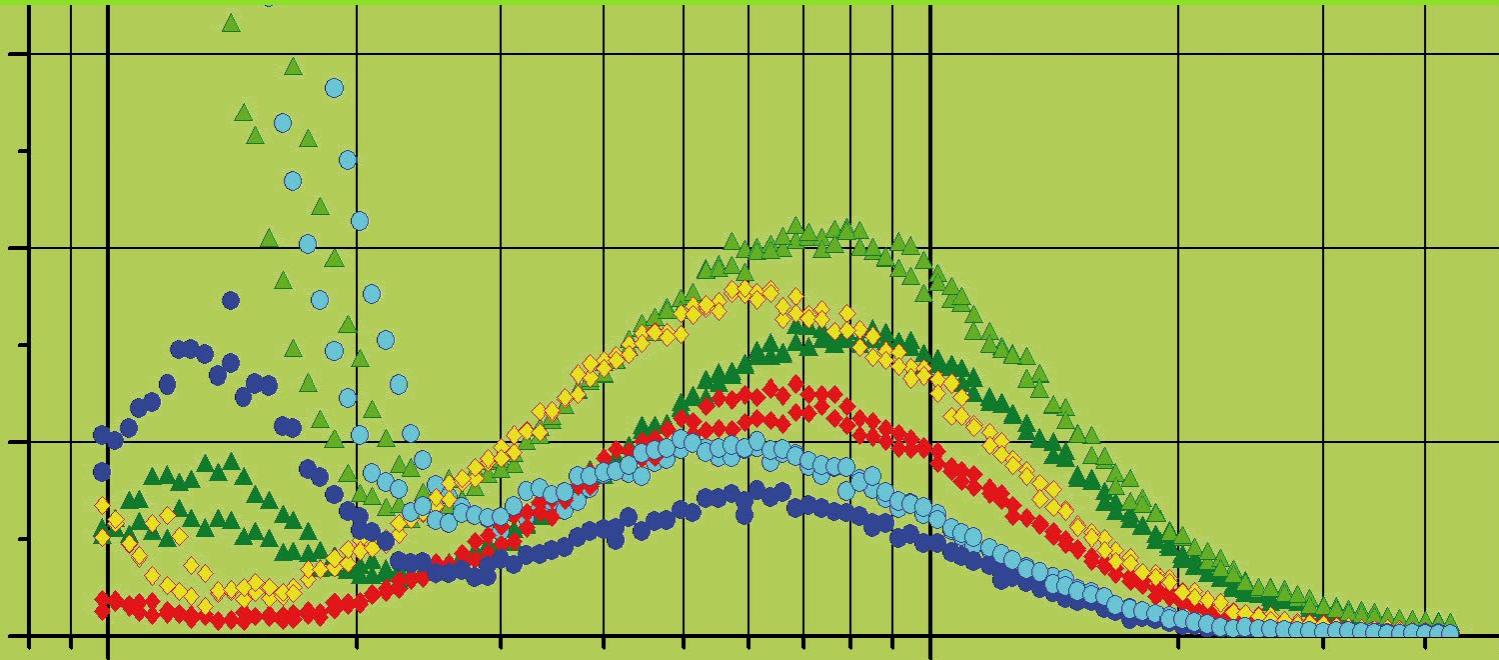
27<sup>th</sup> ETH-Nanoparticles Conference

June 10 -14, 2024



**Aerosols-24**

**Workplace and Indoor Aerosols**



**Norbert Heeb,  
Empa**

**On behalf of the  
Organizing  
Committee**

# 27<sup>th</sup> ETH-Nanoparticles Conference

**June 10 -14, 2024**

## Scope

The conference serves as an interdisciplinary platform for expert discussions on all aspects of nanoparticles, freshly emitted from various sources, aged in ambient air, technical mitigation aspects, impact of particles on health, environment and climate, and particle legislation.

The international conference brings together representatives from research, industry and legislation.

**Workplace and Indoor Aerosols**

**All aspects of nanoparticles, from their birth to their death**

**Focus**



**Spectacular evening sky mirroring in the river Limmat at the outflow of Lake Zürich with Grossmünster and Helmhaus**



Photo courtesy Meret Heeb

**Spectacular evening sky mirroring in the river Limmat at the outflow of Lake Zürich with Grossmünster and Helmhaus**

# 27<sup>th</sup> ETH-Nanoparticles Conference

## Workplace and Indoor Aerosols



**For those who participated at the 1<sup>st</sup> ETH-Conference on nanoparticles in 1997, which was a one-day workshop, it was on workplace aerosols, nanoparticle measurement and abatement**

# 27<sup>th</sup> ETH-Nanoparticles Conference

## Workplace and Indoor Aerosols

Content: 1<sup>st</sup> ETH-NPC in 1997



H.C. Siegmann: Introduction

A. Mayer: VERT: Diesel Nano-Particulate Emissions  
P. Filliger: VERT and PM10 in Switzerland

### Contributions

D.B. Kittelson:  
Engines and Nanoparticles

H.C. Siegmann:  
Formation of Carbon in Combustion: The Influence of Fuel Additives

J. Czerwinski:  
Combustion particles number concentrations with different engines and fuels

D.J. Rickeard:  
Fuel and Vehicle Effects on Particulate Emissions

P. Filliger:  
Ambient air quality measurements of TSP, PM10, PM2.5 and EC

E. Weingartner:  
Aerosol Emission in a Road Tunnel

M. Mohr:  
Formation of Carbon in Combustion: The Influence of Fuel Additives

For those who participated at the first ETH-Conference on nanoparticles in 1997, which was a one-day workshop, it was on workplace aerosols, nanoparticle measurement and abatement



**NEAT, the first large-scale application of diesel particle filters for combustion-generated nanoparticles (15-80 nm)**





**The beauty of the alveolar system of a human lung at the micrometer scale (200-500  $\mu\text{m}$ )**



**We will take you to an inspiring 4-day journey to the fascinating world of nanoparticles**



**You need your imagination to see the invisible.**

**You need your creativity to foresee the unforeseeable.**

# 27<sup>th</sup> ETH-Nanoparticles Conference

June 10 -14, 2024



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Bundesamt für Umwelt BAFU  
Office fédéral de l'environnement OFEV  
Ufficio federale dell'ambiente UFAM  
Uffizi federal d'ambient UFAM

**ETH** zürich



**SCS**  
Swiss Chemical  
Society

**Non-profit society  
to organize this conference**

Organized by the NPC-association  
Under the auspices of the FOEN, SCS and ETH

# 27<sup>th</sup> ETH-Nanoparticles Conference

**June 10 -14, 2024**

## Scientific and Organizing Committee

Claudia Auinger, Empa  
Dr. Oliver Bischof, TSI  
Peter Bonsack, FOEN  
Prof. em. Dr. Heinz Burtscher, FHNW/ISE  
Prof. em. Dr. Jan Czerwinski, BFH/AFHB, Biel  
Dr. Imad El Haddad, PSI  
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Dr. Martin Gysel, PSI  
Dr. Norbert Heeb, Empa  
Dr. Christoph Hüglin, Empa  
Ron Kappeler, Swiss TPH  
Dr. h.c. Andreas Mayer, TTM  
Prof. Dr. Claudia Mohr, ETH, PSI  
PD. Dr. Loretta Müller,  
DBMR University of Bern, Inselspital Bern  
Prof. Dr. Barbara Rothen-Rutishauser,  
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Dr. Laretta Rubino, VERT  
Dr. Claus-Detlef Schegk, VerAn  
David Spichiger, Swiss Chemical Society  
Dr. Martin Stöckli, inspire AG  
Dr. Konstantina Vasilatou, METAS  
Céline Wittwer, Swiss Chemical Society  
Yan Zimmerli, BFH/AFHB, Biel

## A few words on our society:

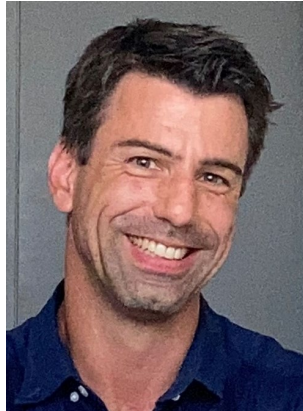
- Universities of  
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- UAS of Bern/Biel, NWS,
- ETH, Inspire
- Swiss Federal Institutes  
Empa, PSI, METAS
- Swiss TPH
- Industry: VERT, TTM  
TSI, TSE, VerAn,
- Swiss Chemical Society

# Support (We wear pink dotted name tags)

***Céline Wittwer, SCS***



***David Spichiger, SCS***



***Loretta Müller, Uni Bern***



***Martin Stöckli, Inspire***



***Karin Schuchter, Inspire***



***Martin Neskovic, Inspire***



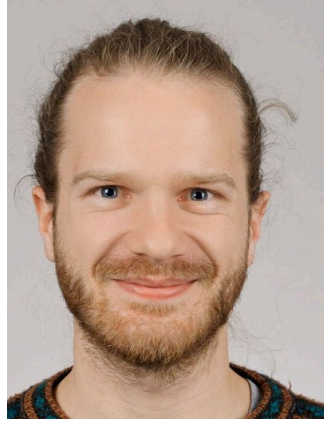
***Claudia Auinger, Empa***



***Oscar Mendo Diaz, Empa***



***Michael Bauer, PSI***



***Danyang Tao, PSI***



***Christoph Schürch, ETH***



***Yan Zimmerli, BFH Biel***



***Norbert Heeb, Empa***

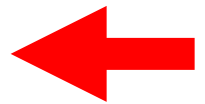
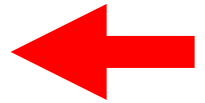
**Please contact us if problems appear**

# Program Overview

Central European  
Summer Time, CEST

CEST: UTC+02:00

CEST	Mon, June 10, 2024	Tue, June 11	Wed, June 12	Thu, June 13	Fri, June 14	CEST
09.00h		Opening Ceremony Keynote lecture Session 1: Aircraft, marine and other non-road sources 1	Session 5: Biomass-, biofuel- and synfuel combustion	Session 9: Instrumentation (Nanoparticle metrology and chemical characterization)	Session 13: Workplace and Indoor Aerosols	09.00h
10.30h		Coffee break	Coffee break	Coffee break	Coffee break	10.30h
11.00h		Session 2: Aircraft, marine and other non-road sources 2	Session 6: Toxicology	Session 10: Ambient air & soot particles, secondary pollutants	Session 14: Nanoparticle formation and transformation Trojan Horse Award and Poster Award Ceremony	11.00h
12.30h		Lunch break	Lunch break	Lunch break	Lunch break	12.30h
13.30h		Session 3: Emission Control 1	Session 7 Poster Session 1	Session 11 Poster Session 2	Session 15: Occupational Exposure and prevention	13.30h
15.00h		Coffee break	Coffee break	Coffee break	Coffee break	15.00h
15.30h		Session 4: Emission Control 2 and periodical technical inspection	Session 8: Brake and tyre wear, non-combustion emissions	Session 12: Health Effects	Session 16: Chemical composition, transport, and exposure	15.30h
17.00h		Apèro <b>Apèro</b>			Closing remarks End of the conference	17.00h
18.00h						18.00h
19.00h	Welcome Party ETH DZSH/ETH ZH		Conference Dinner ETH R...			



# Program Overview

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12.30h		L	L	L	L	12.30h
13.30h		S	S	S	S	13.30h
15.00h		C	C	C	C	15.00h
15.30h		S	S	S	S	15.30h
17.00h		Apèro			Closing remarks End of the conference	17.00h
18.00h						18.00h
19.00h	Welcome Party ETH Zürich	<b>Welcome</b>	Conference Dinner ETH Zürich	<b>Dinner</b>	(sign up at the reception)	

Scan me for the day program





# Program Overview

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17.00h		Apéro <b>Apéro</b>			Closing remarks End of the conference	17.00h
18.00h						18.00h
19.00h	<b>Welcome</b>		Conference Dinner ETH Zürich	<b>Dinner</b> (sign up at the reception)		19.00h

4 days from 9:00 to 17:00

14 Sessions (topic wise)  
(90 min, 4-5 talks)

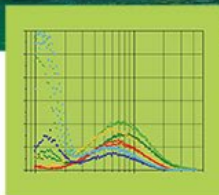
2 Poster sessions  
(90 min, 22-25 posters)

Best Poster Awards,  
Trojan Horse Award,

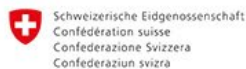
Best Talk Awards

# 27<sup>th</sup> ETH-Nanoparticles Conference

June 10 -14, 2024



June 10 – 14, 2024, ETH Zurich, Switzerland  
The **ETH-Nanoparticles Conference (NPC-24)** and  
the **Aerosols-24 Conference** are kindly supported by:



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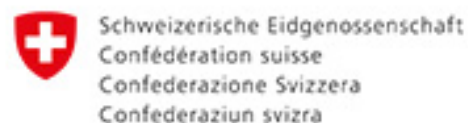
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# 27<sup>th</sup> ETH-Nanoparticles Conference

June 10 -14, 2024

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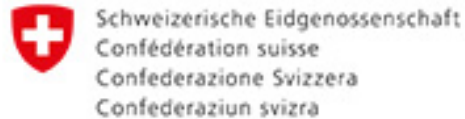
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ETH zürich

# 27<sup>th</sup> ETH-Nanoparticles Conference

June 10 -14, 2024

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# 27<sup>th</sup> ETH-Nanoparticles Conference

**June 10 -14, 2024**

## **Thanks to our: Award Sponsors**



# 27<sup>th</sup> ETH-Nanoparticles Conference

June 10 -14, 2024

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**Klick on their icon and  
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**Meet them in person  
at their booth!**

# Meet the exhibitors at their booth in floors D and E

Visit the exhibitions throughout the conference

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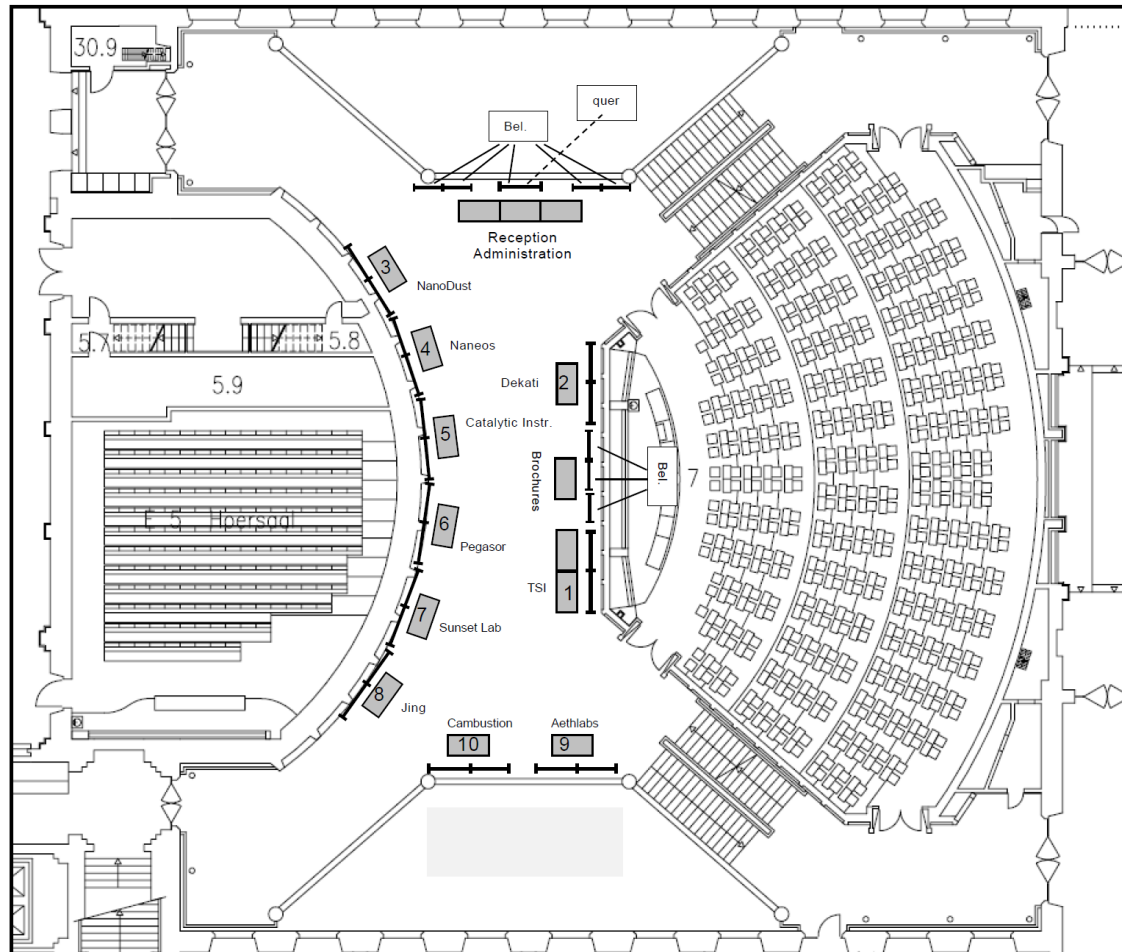


Location	Exhibitors Floor D, Particle Filter Technologies
Floor D, Booth 1	Mann + Hummel
Floor D, Booth 2	VERT
Floor D, Booth 3	BARTEC AUTO ID
Location	Exhibitors Floor E, Instrumentation
Floor E, Booth 1	TSI
Floor E, Booth 2	Dekati
Floor E, Booth 3	NanoDust
Floor E, Booth 4	naneos
Floor E, Booth 5	Catalytic Instruments
Floor E, Booth 6	pegasor
Floor E, Booth 7	Sunset Laboratory
Floor E, Booth 8	jing
Floor E, Booth 9	AETHLABS
Floor E, Booth 10	Cambustion

# Meet the exhibitors at their booth in floors D and E

Visit the exhibitions throughout the conference

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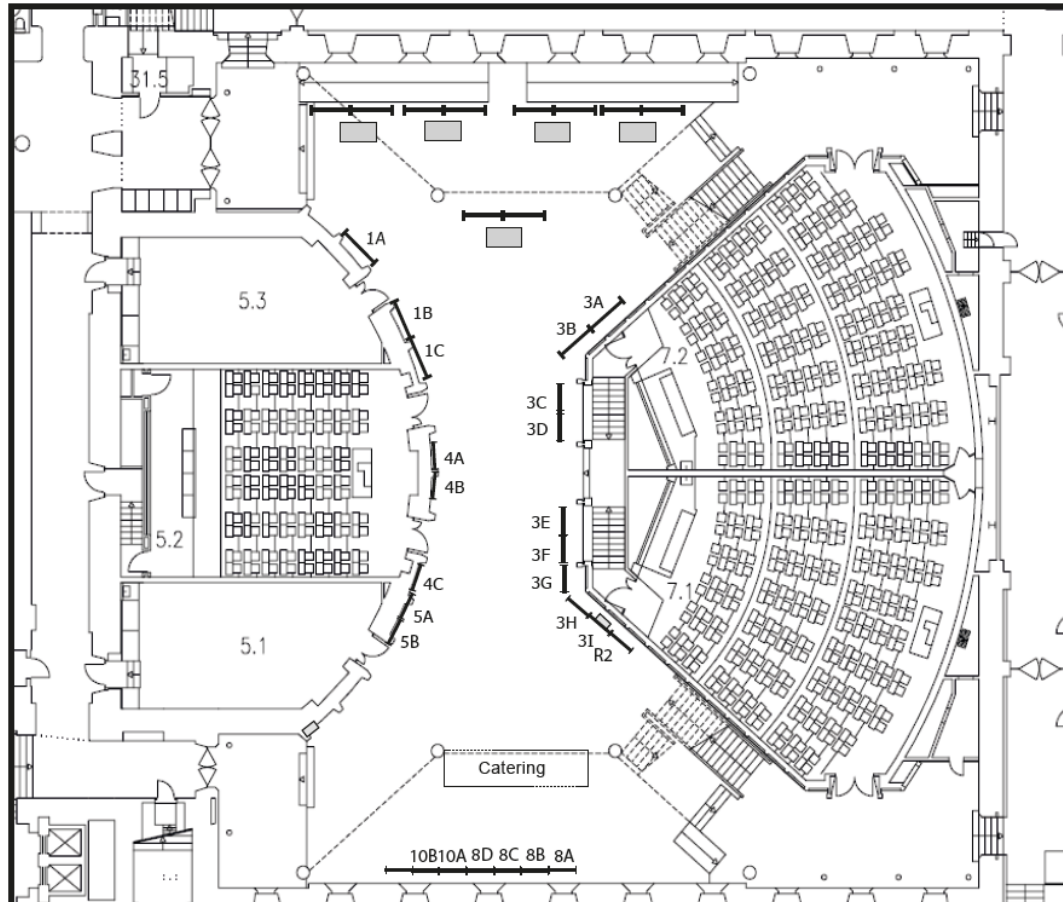
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Floor E, Booth 10	Cambustion

# Your guide to the NPC24 – the conference booklet

Permanent access throughout the conference for registered participants

<https://npc24.scg.ch/program>

## Program Overview


All indicated times are in CEST (GMT +2). [Convert CEST into any time zone.](#)


CEST	Mon, June 10, 2024	Tue, June 11, 2024	Wed, June 12, 2024	Thu, June 13, 2024	Fri, June 14, 2024	CEST
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17.00h		Apéro			Closing remarks End of the conference	17.00h
18.00h						18.00h
19.00h	Welcome Party ETH Dozentenfoyer		Conference Dinner ETH Restaurant			19.00h





 Conference Booklet

 Program Day 1, June 11, 2024

 Program Day 2, June 12, 2024

 Program Day 3, June 13, 2024

 Program Day 4, June 14, 2024

 Poster Session 1

 Poster Session 2

**Just download  
the Conference  
Booklet (pdf)  
with all  
information  
needed**

# Search for abstracts, both for talks and posters

Permanent access throughout the conference for registered participants

<https://npc24.scg.ch/program/tue-june-11-2024>

09.40 **Session 1: Aircraft, marine and other non-road sources Part A**  
*Chair: Norbert Heeb, Empa*


**Theo Rindlisbacher**, Swiss Civil Aviation Authority, FOCA  
«Aircraft particle emissions in cruise»


**Benjamin Brem**, Paul Scherrer Institute, PSI  
«The ubiquitous nature of lubrication oil in aero gas turbine exhausts»


10.30 Coffee Break


 **Just click on the title**


 Program Day 1, June 11, 2024

 Program Day 2, June 12, 2024

 Program Day 3, June 13, 2024

 Program Day 4, June 14, 2024

 Poster Session 1

 Poster Session 2

# Search for abstracts, both for talks and posters

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27<sup>th</sup> ETH Nanoparticles Conference  
Conference Topic: Aircraft, marine and other non-road sources

June 10-14, 2024, ETH Zurich

09.40 **Session 1: Aircraft**  
*Chair: Norbert...*

## Aircraft gas turbine particle emissions in cruise

*Theo Rindlisbacher*  
«Aircraft particulates»

Theo Rindlisbacher

Swiss Civil Aviation Authority FOCA  
theo.rindlisbacher@bazl.admin.ch

*Benjamin Brem*  
«The ubiquitous»

10.30 Coffee Break

The existing global regulation of aircraft gas turbine particle emissions (limits for non-volatile particle mass and number) has been mainly developed related to local air quality concerns. In recent years, the environmental role of aircraft particle emissions at cruise above 8 km of altitude has gained more interest. Particle emission measurements performed at cruise (with chase aircraft) revealed an influence of non-volatile particle number emissions on the number of ice nucleation particles and on the radiative properties of contrails and contrail-cirrus. Recent measurements indicate that volatile particles may play a role, too. Since especially persistent contrails at night can produce a significant climate warming effect, whereas during daytime they can produce a climate cooling effect, reduction of cruise particle emissions and avoiding persistent contrails at night, while not increasing fossil CO<sub>2</sub> emissions are considered important mitigation measures to reduce unwanted short term climate effects from aviation. The presentation summarises the state of knowledge concerning the role of particle emissions in cruise, the gaps in terms of engine dependent particle emission characteristics, the role of Sustainable Aviation Fuels in this context and the activities by aviation regulators to close the gaps.

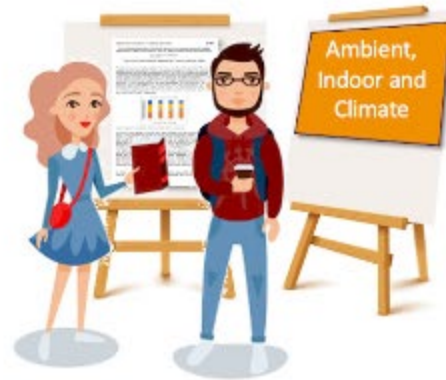
**click on the title**

# Enjoy posters in Floors D and Eo

Permanent access throughout the conference for registered participants

Poster session 1: Wednesday June 12, 13.30-15.00, Floor D

Poster session 2: Thursday June 13, 13.30-15.00, Floor Eo



# Enjoy posters in Floors D and Eo

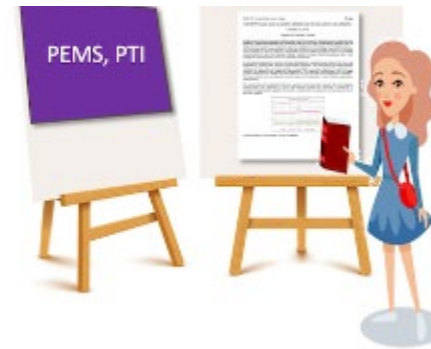
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Poster session 1: Wednesday June 12, 13.30-15.00, Floor D

Poster session 2: Thursday June 13, 13.30-15.00, Floor Eo



Meet the presenting author during respective poster session



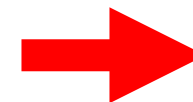
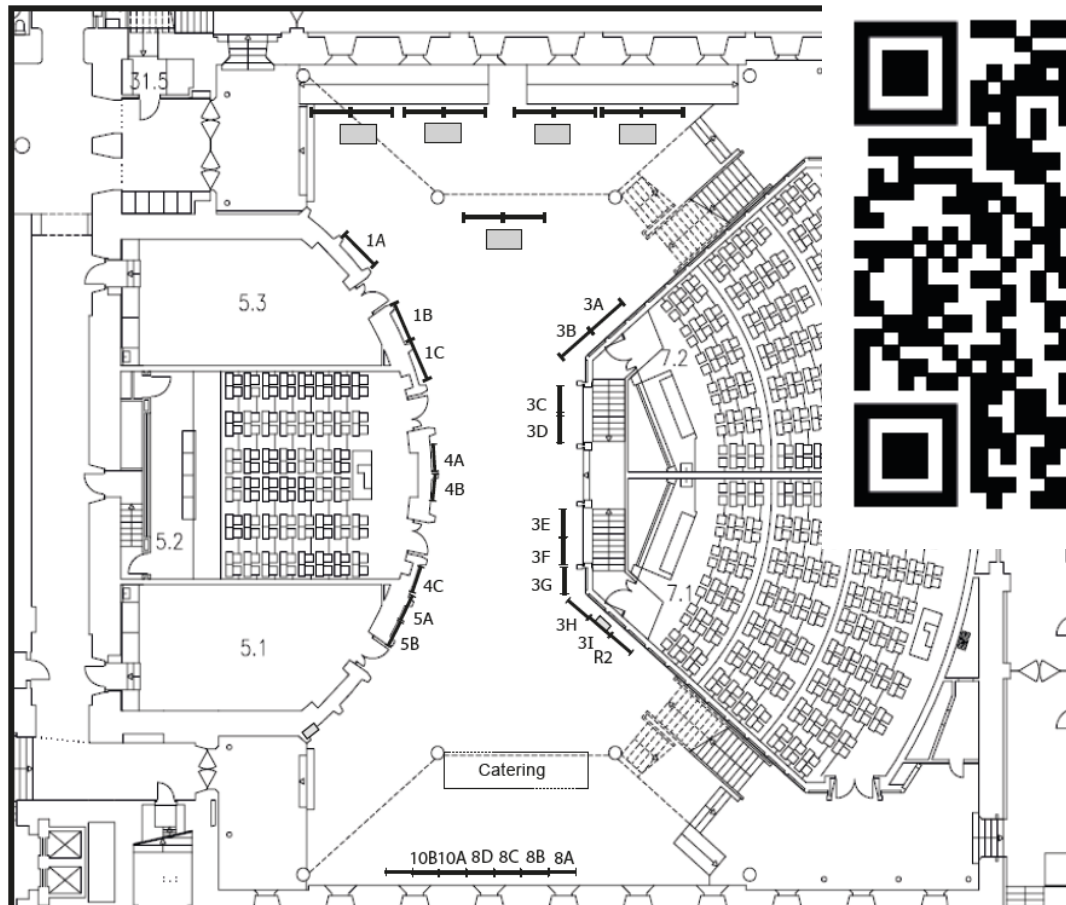
 Poster Session 1


 Poster Session 2


# Poster sessions 1 on D floor, June 12<sup>th</sup>, 13:30 – 15:00

Get a printable poster program as registered participant

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 Poster Session 1

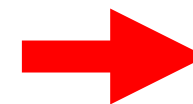
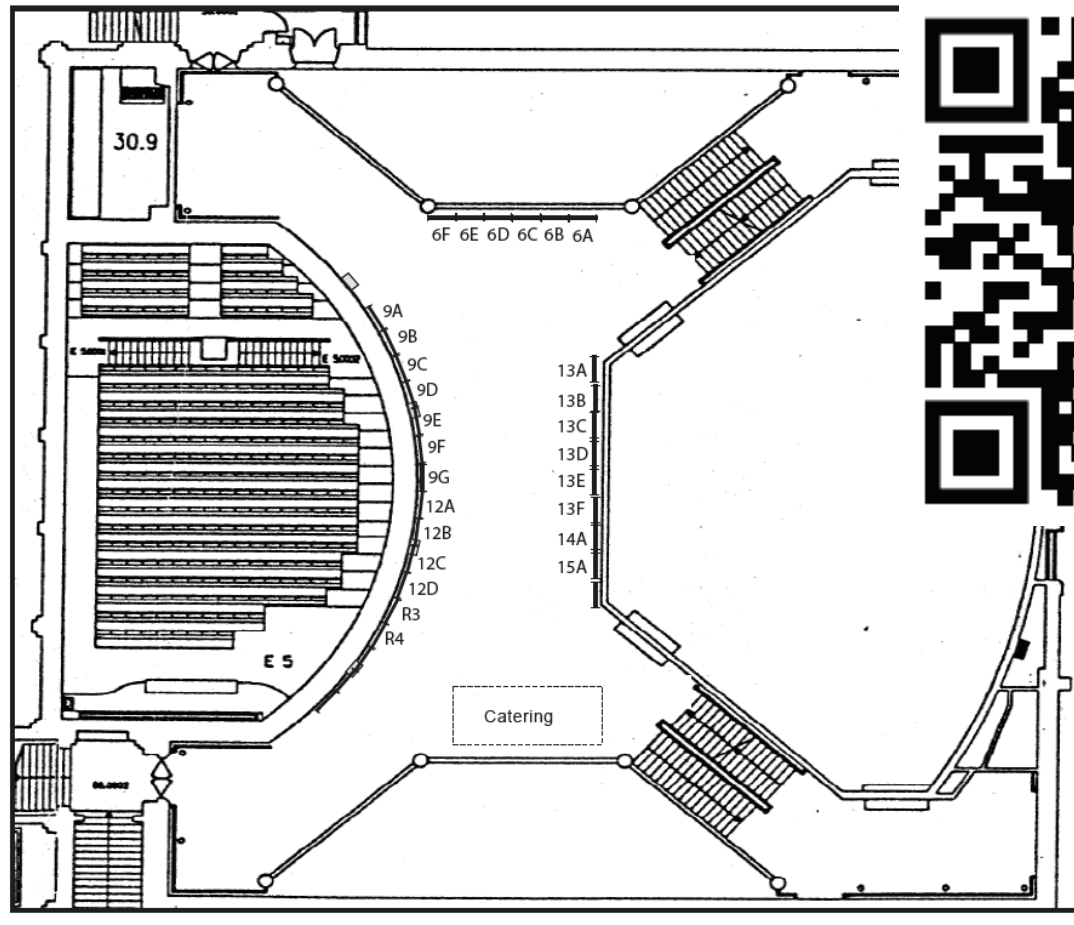
 Poster Session 2

 Conference Booklet

# Poster sessions 2 on E<sub>0</sub> floor, June 13<sup>th</sup>, 13:30 – 15:00

Get a printable poster program as registered participant

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 Poster Session 1

 Poster Session 2

 Conference Booklet



# Award Ceremonies NPC-24

Trojan Horse Award: Friday June 14, 12.00-12.30

Best Poster Awards: Friday June 14, 12.00-12.30

Best Talk Awards: Friday June 14, 15.30-15.45

<https://npc24.scg.ch/sponsors>

## Thanks to our Awards sponsors

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# Organisational remarks



**Floor E:**

**Reception,  
Help desk**

**Open 08.00-17.30**

# Internet access

## Login (every day)

Choose WLAN net: **public or public-5**

Call external page: <https://nanoparticles.ch>

Landing page ETH: **share your mobile phone number**

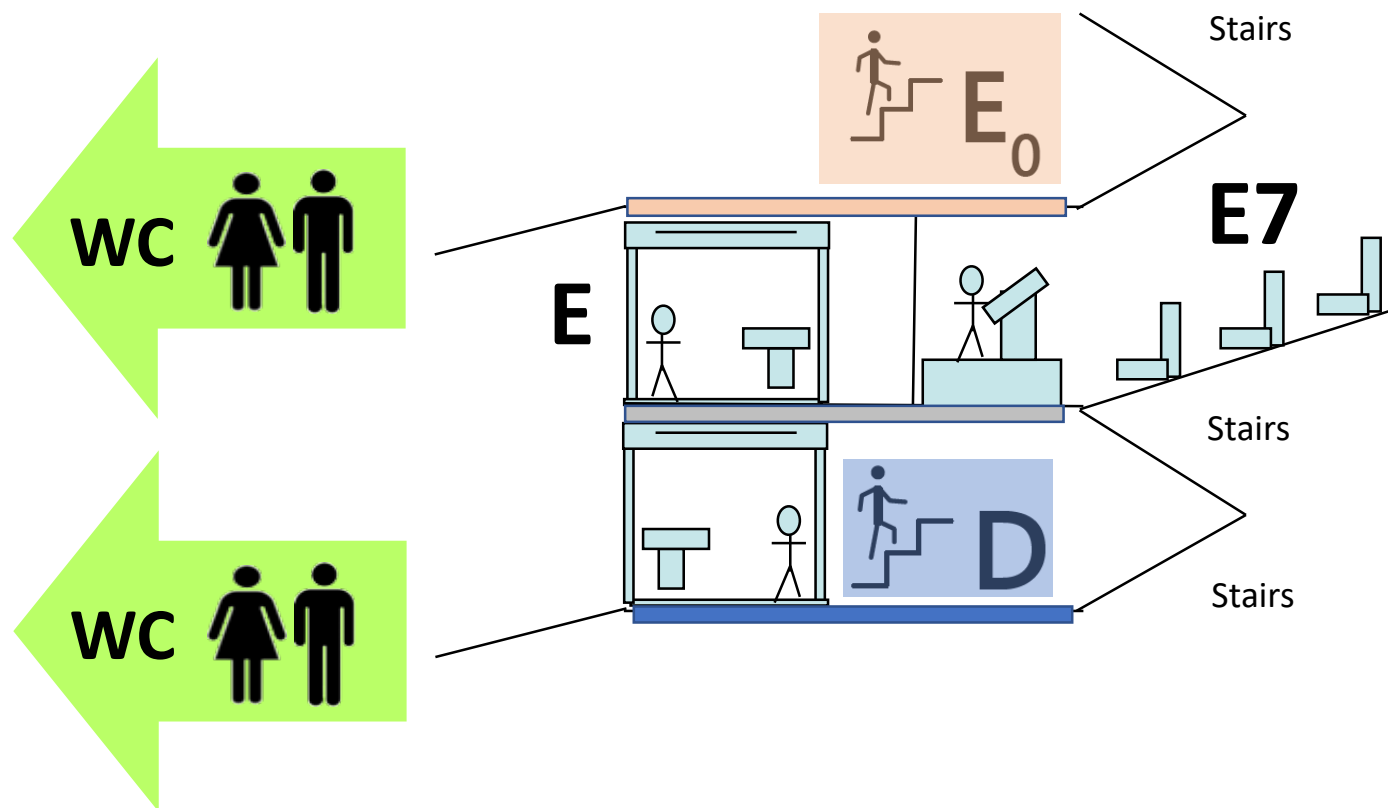
Get SMS with code: **apply your code**



**Floor E:**  
**Reception,**  
**Help desk**

**Open 08.00-17.30**

# Essential locations



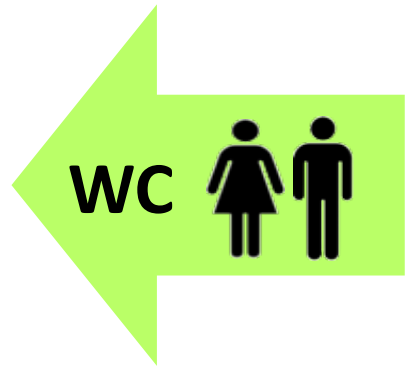
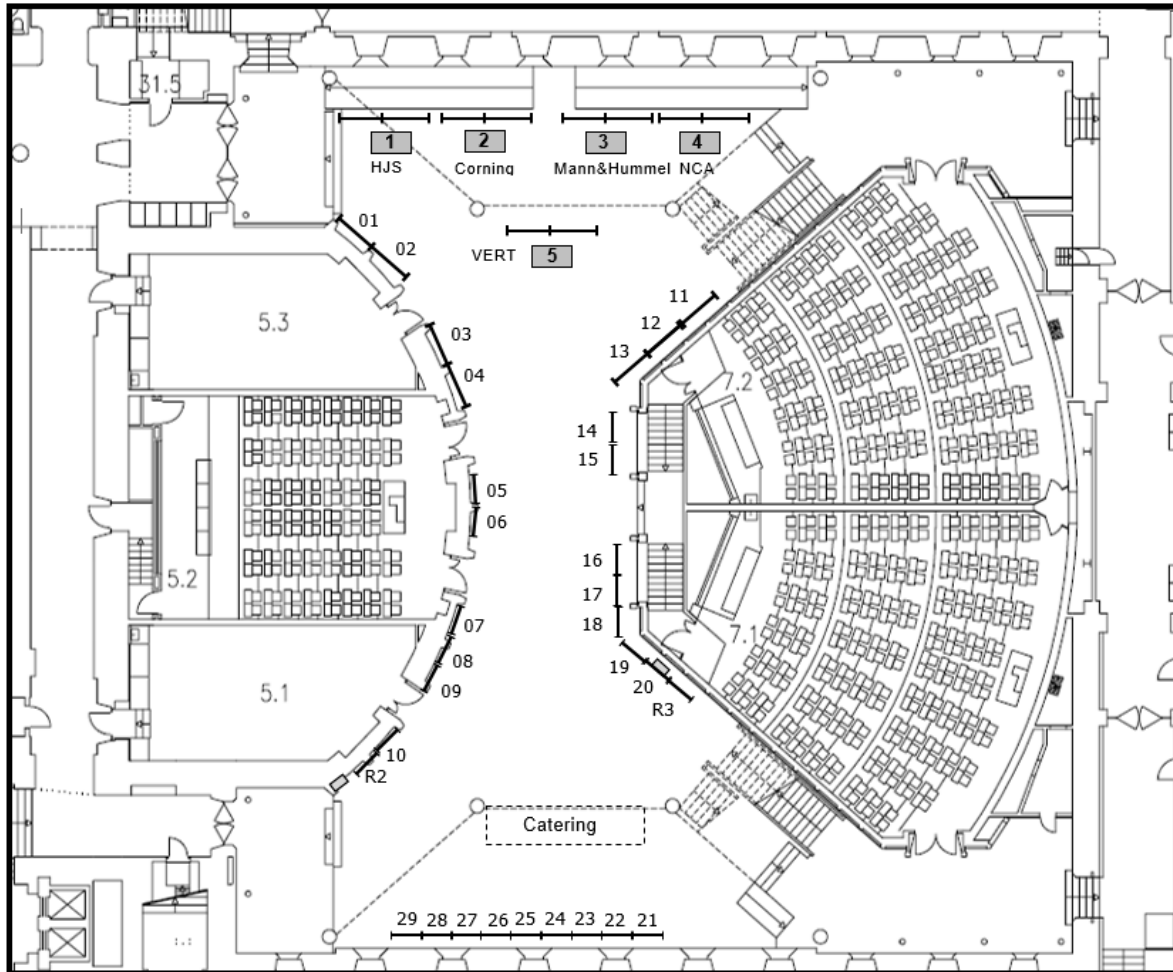
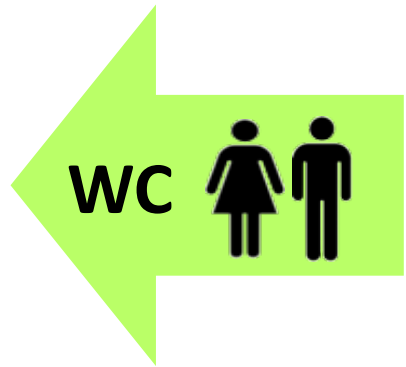
## Auditorium E7

**Floor E<sub>0</sub>:**  
**Coffee & Lunch**  
**Apéro today,**  
**Posters 2**

**Floor E:**  
**Registration, Help desk**  
**Exhibition 1**

**Floor D:**  
**Coffee & Lunch**  
**Exhibition 2**  
**Posters 1**

# Essential locations



**Floor D:**  
**Coffee & Lunch**  
**Exhibition 2,**  
**Posters 1**

**Easy access to WC**

# Social events

**Mon June 10,  
19:00**

**Welcome Apéro, ETH-Rooftop**

**Tue June 11  
17:00**

**Exhibitor Apéro, Floor Eo**

**Wed June 12,  
19:00**

**Conference Dinner (Mensa)**

**Fri June 13,  
12:00**

**Trojan Horse Award  
Best Poster Awards**

**14:00**

**Best Talk Award**



# Weather forecast

today

Wed

Thu

Fri



11/15°

10/16°

10/20°

12/22°

**Expect rain and thunderstorms, mostly in the Evening,**

**Thursday and Friday will be fine and warmer**

# Program, Tue June 11, 2024

09.00

Welcome, Introduction and Conference Opening

**Norbert Heeb**, Empa and Chair of NPC 2024

Welcome address by

**Jan-Helge Zimmermann**, ETH Zürich, Industry Relations

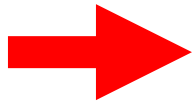
Keynote Lecture

**Martin Gysel-Beer**, Paul Scherrer Institut, PSI

«Anthropogenic aerosol emissions at the nexus between air quality, climate and geoengineering»



**5 min**

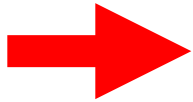




# Program, Tue June 11, 2024

- 09.00 Welcome, Introduction and Conference Opening  
*Norbert Heeb*, Empa and Chair of NPC 2024
- Welcome address by  
*Jan-Helge Zimmermann*, ETH Zürich, Industry Relations
- Keynote Lecture  
*Martin Gysel-Beer*, Paul Scherrer Institut, PSI  
«Anthropogenic aerosol emissions at the nexus between air quality, climate and geoengineering»

**20+5 min**



# Keynote: Anthropogenic aerosol emissions at the nexus between air quality, climate and geoengineering

A personal perspective



2023 wildfires affecting air quality in New York

**Martin Gysel-Beer**

**PSI,  
Laboratory for  
Atmospheric  
Chemistry**

# Keynote: Anthropogenic aerosol emissions at the nexus between air quality, climate and geoengineering

A personal perspective



2023 wildfires affecting air quality in New York

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# Program Tue, June 11, 2024

Central European  
Summer Time, CEST

CEST: UTC+02:00

- 09.40 **Session 1: Aircraft, marine and other non-road sources Part A**  
*Chair: Norbert Heeb, Empa*
- 10.30 Coffee Break
- 11.00 **Session 2: Aircraft, marine and other non-road sources Part B**  
*Chair: Theo Rindlisbacher, Swiss Civil Aviation Authority, FOCA*
- 12.30 Lunch Break
- 13.30 **Session 3: Emission Control Part A**  
*Chair: Danilo Engelmann, BFH, Biel*
- 15.00 Coffee Break
- 15.30 **Session 4: Emission Control Part B and periodical technical inspection (PTI)**  
*Chair: Jan Czerwinski, BFH, Biel*
- 17.00 Aperitif sponsored by exhibitors and End of Day 1

**4 Sessions (90 min, 4-5 talks)**

**Aircraft, marine and non-road  
sources (Part A and B)**

**Emission Control  
(Part A and B)**

**Exhibitors Apèro**

# Program Tue, June 11, 2024

09.40

**Session 1: Aircraft, marine and other non-road sources Part A**

*Chair: Norbert Heeb, Empa*

*Theo Rindlisbacher, Swiss Civil Aviation Authority, FOCA*

«Aircraft particle emissions in cruise»

**15+5 min**

*Benjamin Brem, Paul Scherrer Institute, PSI*

«The ubiquitous nature of lubrication oil in aero gas turbine exhausts»

10.30

Coffee Break

**15+5 min**

# Program Tue, June 11, 2024

09.40

**Session 1: Aircraft, marine and other non-road sources Part A**

*Chair: Norbert Heeb, Empa*

***Theo Rindlisbacher***, Swiss Civil Aviation Authority, FOCA

«Aircraft particle emissions in cruise»

**15+5 min**

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