





53rd International Congress & Exposition on Noise Control Engineering



PROGRAM BOOK













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Program book of the 53rd International Congress and Exposition on Noise Control Engineering, 25-29 August 2024, Nantes, France.

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WELCOME





Adrien Pelat **President**



It is with great pleasure that we extend our warmest welcome to you for the 53rd edition of the Inter-Noise Congress, held this year in the beautiful city of Nantes.

Since its inception, Inter-Noise has been a pivotal event, bringing together noise and vibration control experts from around the world to discuss the latest advancements in the field.

This year, thanks to the exceptional involvement of our scientific community, the technical program is particularly ambitious, with over 1150 papers structured into 117 sessions covering all aspects of noise and vibration control. In addition to the usual conference themes, approximately 40 papers reflect the general conference theme: "From Jules Verne's world to Multi-disciplinary Approaches for Acoustics & Noise Control Engineering". The industrial exhibition is also particularly rich this year, with 67 exhibitors, 30 of whom will be leading exhibitors' workshops.

For this 2024 edition, we would like to encourage as many as possible encounters and exchanges between participants. You will have the opportunity to initiate these interactions during the session discussion slots included in the program and the hybrid poster and online sessions, designed to maximize exchanges.



Judicaël Picaut co-President

We would like to express our gratitude to the Congress sponsors for their support and contributions to the success of this event. We would also like to thank the entire Organizing Committee and its partners, as well as volunteers, who have worked very hard to bring you the best possible conditions for your participation.

Finally, we encourage all participants, whether students, researchers, engineers or noise and vibration control professionals, to make this event more than just a scientific Congress. Beyond the sharing of knowledge and networking opportunities, let's together make Inter-Noise 2024 an unforgettable human and social experience, one that will shape the future of our discipline.





General secretary

Adrien Pelat Judicaël Picaut Julien Cesbron





Luigi Maffei
International Institute of
Noise Control Engineering
President

Dear Colleagues,

On behalf of the International Institute of Noise Control Engineering (I-INCE), I want to welcome you to INTER-NOISE 2024, the 53rd edition of this successful series of international congresses hold all over the world since 1972.

We are again in Europe and we are for the third time in France. After Avignon in year 1988 and Nice in year 2000, the beautiful city of Nantes has been chosen to host in 2024 our large and live community of noise control technicians and scientists.

The participation to the event has been so large that it was suggested and accepted to extend for the first time the number of days of the conference. From Sunday to Thursday oral and poster presentations, plenary and keynote lectures, a large exhibition, meetings, professional programs and, last but not least, social activities, will accompanying us.

I am sure that we will all enjoy INTER-NOISE 2024. Thank you for supporting with your participation the congress.

A special thank you to the Organizing Committee and the French Society of Acoustics (SFA), for the great efforts in the organization and for bringing us this excellent program rich of shared novelties.

Luigi Maffei





Jean-Dominique Polack
French Society of Acoustics
President

Dear Colleagues,

It is a great honor for the French Acoustical Society (SFA) to host the Inter-Noise Congress in France for the third time. Welcome to all of you to Inter-Noise 2024.

Thanks to a very dedicated organizing team and the support of our entire scientific community, an ambitious technical program and industrial exhibition have been put in place. Together with a large participation, it promises rich exchanges and exceptional networking opportunities. I hope that all of our community, especially our younger colleagues, will take full advantage of these opportunities and that you will all enjoy the Congress and its surroundings, the city of Nantes, where Jules Verne was born.

On behalf of SFA, I would like to thank the Board of the International Institute for Noise Control Engineering (I-INCE) for entrusting SFA with the organization of its 53rd Congress. I also thank the Organizing Committee for preparing such an exciting program for what I am sure will be a very successful event.

Enjoy the congress and the city of Nantes!

Jean-Dominique Polack

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HOST ORGANIZATIONS



International Institute of Noise Control Engineering

The International Institute of Noise Control Engineering (I-INCE) was founded in 1974. It is a worldwide consortium of organizations concerned with noise control, acoustics, and vibration.

The mission of I-INCE is to help people to create a world free from unwanted sound and for this I-INCE facilitate and stimulate international cooperation and sharing on control, management and policies of noise and vibration.

I-INCE represents a worldwide platform for the exchange of knowhow, new developments, inspiration and to form a lively international community on noise and vibration control and acts as a catalyst by bringing parties together and so stimulate new developments.

I-INCE stimulates the access of everybody to noise and vibration control technology and it is an active partner in the struggle to suppress unwanted sound.

I-INCE sponsors the important INTER-NOISE Series of International Congresses on Noise Control Engineering, held annually since 1972 and co-sponsors the Conference Digital Library, where all papers published in the proceedings of INTER-NOISE Congresses, as well as INCE-USA's Noise-Con Conferences, are available.

I-INCE co-sponsors symposia on specialized topics within the I-INCE field of interest and jointly publishes with the Institute of Noise Control Engineering of the USA (INCE/USA) the magazine Noise/News International (NNI) which is freely available on-line.

I-INCE provides a Young Professional Program with activities (courses, grants) for young engineers and scientists.



Société Française d'Acoustique

The Société Française d'Acoustique (French Acoustics Society), SFA is an association founded in 1948 by the famous French physicist Yves Rocard, bringing together acousticians, French-speaking practitioners and academics. Its aim is to promote the circulation of scientific and technical information between the various players in the acoustics field, as well as contacts between research laboratories and industry. It currently has almost 1,000 individual members (researchers, teachers, engineers, musicians, audiologists, architects, etc.), as well as institutional members (industrial companies and laboratories specializing in acoustics).

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INSTITUTIONAL SUPPORTS

Le Mans University



Le Mans University has about 10,000 students, 630 professors, as well as 3 faculties, 2 institutes of technology and a school of engineering. It includes 15 research laboratories, 8 with the CNRS. The disciplines taught include science and technology, literature, languages, humanities, law, economics and management. Acoustics and vibration is one of the university's poles of excellence, with the Laboratoire d'Acoustique de l'Université du Mans (LAUM, with CNRS) boasting 170 members and around 300 students enrolled in bachelor, master as well as engineering degrees.

Université Gustave Eiffel



Université Gustave Eiffel is a research-based multidisciplinary university of national importance (17,000 students, 2,300 staff members). Research activities are organized along many subjects, among them, noise pollution, with a dedicated laboratory, the Environmental Acoustics Research Unit (UMRAE, 35 members), shared with the Cerema.

Centre for Studies and Expertise on Risks, the Environment, Mobility and Urban Planning



Cerema is the major French public agency for developing public expertise in the fields of urban planning, regional cohesion and ecological and energy transition for resilient and climate-neutral cities and regions. It has a staff of 2,600 people out of which 500 are dedicated to research and innovation activities. Cerema, accredited as a Carnot Institute under the Carnot Institute Clim'adapt initiative, serves as a genuine liaison between public research and the socio-economic sphere, and assists businesses and local authorities in addressing the climate challenge and navigating their transition towards a resource-efficient, decarbonized, and environmentally sustainable economy.

Centre d'information sur le bruit

The CidB is a non-profit organization under the French law of 1901. Its main mission is to inform, raise awareness, document and train people in the field of noise environment protection. Created in 1978 on the initiative of the French Ministry for the Environment, the CidB is a key contact for the general public and for public and private bodies involved in noise management.

European Acoustics Association

The European Acoustics Association (EAA) is a non-profit entity established in 1992 that includes in its membership societies predominantly in European countries interested in promoting development and progress of acoustics in its different aspects, its technologies and applications. EAA gathers 33 societies of acoustics and serves more than 9000 individual members all over Europe.

With the support of local authorities:

Région Pays de La Loire and Nantes Métropole.





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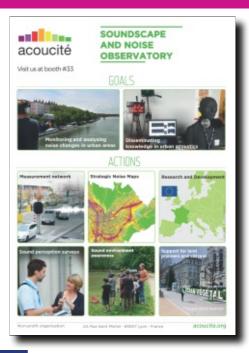


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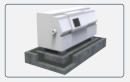


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See the Exhibitors map at pages 32-33 of the Program Book.

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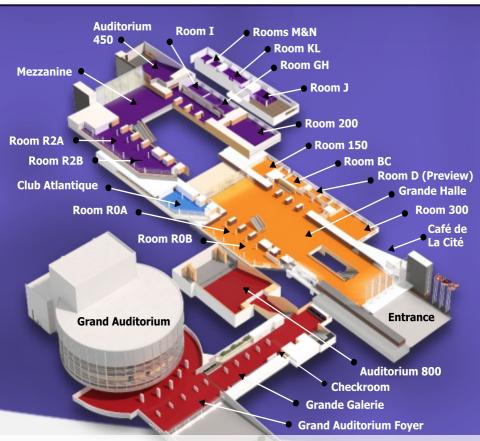




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Grande Halle (lower foyer)

- La Cité Entrance
- IN24 registration desk
- Exhibition
- Lunches & Coffee breaks
- Café de La Cité

Grande Galerie

- Grand Auditorium (Opening Ceremony)
- Checkroom

Mezzanine (upper foyer)

- Hybrid Poster and Online Sessions
- Young Professional lunch (Monday, 13:00)
- Women in Noise Control lunch (Tuesday, 13:00)
- I-Ince Full Future Congress Technical Planners Committee (Wednesday, 13:00)

Quiet rooms B317-318 & B320 (upper foyer)

• Freely accessible to all participants wishing to benefit from a quiet environment

La Cité Technical Rooms

- Auditorium 800 (Grande Galerie)
- Room 300 (lower fover)
- Room 150 (lower foyer)
- Room R0A (lower fover)
- Room ROB (lower foyer)
- Room BC (lower foyer)
- Auditorium 450 (upper foyer)
- Room 200 (upper fover)
- Room GH (upper foyer)
- Room I (upper foyer)
- Room R2A (upper foyer)
- Room R2B (upper foyer)
- Room J (upper fover, level 4)
- Room KL (upper fover, level 4)
- Club Atlantique (level 1)
- Room D Preview (lower foyer)

GENERAL INFORMATION

OPENING HOURS

Registration Desk (Grande Halle)

Sunday, August 25
Monday, August 26
Tuesday, August 27
Wednesday, August 28
Thursday, August 29
14:00-20:00
07:30-19:00
07:30-19:00
07:30-12:00

Exhibition (Grande Halle)

Monday to Wednesday 08:00-19:00
 Thursday, August 29 08:00-12:00

Preview (Room D)

Sunday, August 25
Monday to Wednesday
Thursday, August 29
14:00-16:00
07:30-18:30
07:30-10:20

Checkroom (Grande Galerie)

Drop off your luggage and clothes at the free checkroom:

Sunday, August 25
Monday to Wednesday
Thursday, August 29
13:00-21:00
07:30-19:30
07:30-14:30

Quiet rooms (B317-318 & B320)

These rooms are available to all participants wishing to benefit from a quiet environment (no conversation, no telephone, no music, no noise...). Rooms are equipped with tables and chairs.

• Monday to Wednesday 07:30-19:00

• Thursday, August 29 07:30-14:00

Café de La Cité (Grande Halle)

In this café linked to the world of culture, enjoy an evolving atmosphere for your breaks, work or relaxation.

• Monday to Friday 10:00-20:30



Internet Access

SSID: INTERNOISE2024 Password: julesverne



TRANSPORTATION

Public transport

Public transport (tramway, busway, navibus and bus) is totally free on Saturday and Sunday.

Organize your travel with the **'naolib'** smartphone app:



Free public transport for Inter-Noise delegates

At your request, a public transport pass can be given to you when you check in at the IN24 Registration desk. This pass gives you free access to public transport (except airport shuttle and trains). Subject to availability.

Coming to La Cité

Inter-Noise 2024 signposting is provided from the airport, outside the train station (South exit) and around La Cité.



■ La Cité des Congrès de Nantes, 5 rue de Valmy, BP 24102,

44041 Nantes cedex 1. Phone: +33 (0)2 51 88 20 00

• Tramway - Line 1 - Station "Duchesse Anne – Château des Ducs de Bretagne", just one stop from the TGV train station (north exit)

• Busway - Line 4 - Stop "Cité Internationale des Congrès"

 City centre shuttle from Nantes Atlantique Airport - Stop "Lieu Unique", departure every 20 minutes

• Car - La Cité provides a 420-space multistorey car park. In addition there are 2000 spaces in nearby carparks.

SOCIAL PROGRAM

Opening Ceremony

Venue: Grand AuditoriumDate: Sunday, August 25Time: 16:00-16:40

Opening Plenary

Venue: Grand AuditoriumDate: Sunday, August 25Time: 16:40-17:40

Opening Concert by Ophonius

Venue: Grand AuditoriumDate: Sunday, August 25Time: 17:40-18:40

Opening Reception

Venue: Grand Auditorium Foyer
Date: Sunday, August 25
Time: 18:40-20:40

Social Event with dinner

Registration required
Venue: Magmaa Food Hall
Date: Tuesday, August 27
Time: 20:00-23:00



By invitation only

Venue: O Deck RestaurantDate: Wednesday, August 28

• Time: 20:00-23:00

Volunteers dinner

• By invitation only

Venue: La Cantine du VoyageDate: Wednesday, August 28

• Time: 20:00-23:00 Closing Ceremony

Venue: Auditorium 800Date: Thursday, August 29Time: 12:20-13:00

Closing Reception by Inter-Noise 2025

• Venue: Grande Halle

• Date: Thursday, August 29

• Time: 13:00-14:00







OTHER EVENTS

Women in noise control lunch

This event is open to all women, whether students or professionals. It is an opportunity for women in noise control engineering to get together, network and discuss the development and challenges of women in noise control, in the convivial environment of a lunch. The participation is free. Please tick this event in your registration options in your personal IN24 account so that we know you are coming.

• Venue: Mezzanine

Date: Tuesday, August 27Time: 13:00-14:00

Discover how open-source research software is accelerating acoustic research. This workshop will spotlight groundbreaking open-source projects, their development journeys, challenges, community impact, and more.

Registration required (see IN24 website)

Venue: Room GH

• Thursday, August 29: 14:00-17:00

• Friday, August 30: 09:00-12:30

Jules Verne Exposition

Enjoy a series of 50 posters illustrating the greatest works of Jules Verne, offered by the Centre of Vernian Studies (Jules Verne Museum, Nantes).

• Venue: Grande Halle and Grande Galerie (La Cité)

Date: Conference opening hours



CATERING

Coffee break

Coffee breaks (drinks and cakes) are held in the mornings (between 09:20 and 10:20) and afternoons (between 16:00 and 17:00) according to the technical session schedule, from Monday to Thursday, in the Grande Halle and the Mezzanine, in the "catering buffet" areas (see map at pages 32 and 34). A self-service coffee bar is available after the break at one of the "catering buffet"

Lunch break

Lunches are served from 13:00 to 14:00, Monday to Thursday, in the Grande Halle and Mezzanine, on the "catering buffet" areas (see map at pages 32 and 34).

Areas are available on all levels of La Cité, and in particular in the Grande Galerie, to sit and relax during the lunch break.

Food constraints

Vegetarian dishes are available for lunch, subject to availability. In case of food allergy, please contact the catering staff and consult the allergen notice boards.

Drinking water points

Several drinking water points are located throughout La Cité (see map at pages 32 and 34). You can use the free water bottles handed out at check-in. For optimum waste management, no water bottles are handed out at lunchtime.

Le Café de La Cité

Drinks and snacks are also available in the Café de La Cité (paid service), from 10:00 to 20:30, Monday to Friday.

TECHNICAL VISITS

• Date: Thursday, August 29

• Time: 14:00-18:00

• Venue: Tour Departure from La Cité Pre-registration is required from the IN24 account (only 1 visit per participant; all visits take place at the same time). Maximum number of visitors: 40 people per visit (the list of participants is validated by the hosting institute) Information available on the IN 2024 website.

Visit #1: Jules Verne climatic wind tunnel and PULSE laboratory (CSTB)

Visit #2: Major facilities of the Université Gustave Fiffel

Visit #3: IRT Jules Verne

Persons with reduced mobility

La Cité areas are adapted for people with reduced mobility and their companions. Specific seats are saved to guarantee the best possible treatment for all visitors. Please contact La Cité staff for more information.

La Cité, an ecofriendly venue

- Limit energy consumption by choosing low-energy electrical appliances and turning them off at night.
- Favour green form of transport by promoting more responsible modes of transport such as cycling, taking the bus or tramway, train or car-sharing
- Remember to bring your water bottle; water fountains are available on site.
- Contribute to the recycling of waste by respecting the sorting instructions in place at La Cité.



Emergency Call

In case of emergency, contact a member of La Cité immediately or Call 112 (free European emergency number).





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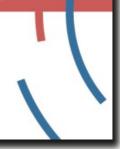


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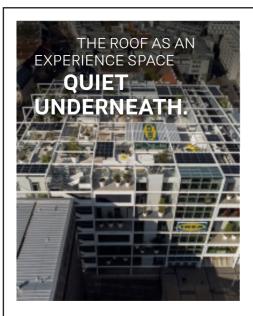
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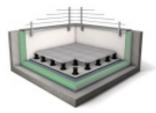


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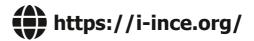
* Scanning rooms requires a device with a LiDAR sensor and at least iOS 16
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I-INCE ACTIVITIES



Congress Selection Committee (CSC)

The purpose of the committee is to provide guidance in the selection of venues for future INTER-NOISE Congresses.

By invitation onlyVenue: Room J

• Date: Saturday, August 24

• Time: 08:00-12:00

Board of Directors

By invitation onlyVenue: Room J

• Date: Saturday, August 24

• Time: 13:00-18:00

The FCTP may offer advice on all aspects of a congress including the maximum number of parallel sessions, the type of Structured Sessions, the need for Poster Sessions, etc. The FCTP may recommend new concepts for future INTER-NOISE Congresses. The concepts may involve items that are specific to a particular congress and which depend upon local circumstances and local ideas.

The TPP meeting is an informal meeting wherein the minutes of the previous FCTP meeting are discussed, and the technical plans for the next congress are explained

By invitation onlyVenue: Room E

Date: Sunday, August 25Time: 09:30-12:00

By invitation onlyVenue: Room J

Date: Sunday, August 25Time: 08:00-12:00

General Assembly

The I-INCE General Assembly will be attended by Corresponding members (representatives) of Member Societies of I-INCE and by Members of the Board of Directors of I-INCE.

Representatives of Sustaining Members, Institutional Members, Affiliated Organizations, and other organizations in liaison with I-INCE and any member of a Member Society of I-INCE may attend the meeting of the General Assembly without vote.

· Venue: Room GH

Date: Sunday, August 25Time: 13:00-15:30

Full Future Congress Technical Planners (FCTP) Committee

The full FCTP meeting discusses the technical plan for the next two congresses and the experience of the congress that is just ending. Attendance at FCTP meetings is open to all attendees of an INTERNOISE Congress.

• Venue: Mezzanine

• Date: Wednesday, August 28

• Time: 13:00-14:00

Board of Directors

By invitation onlyVenue: Room J

• Date: Thursday, August 29

• Time: 14:00-15:00



YOUNG PROFESSIONALS

YOUNG PROFESSIONALS (YP)

Young and early career acousticians can be either undergraduate or postgraduate students, postdoctoral, or young acousticians or noise control engineers working in industry.

YP Market

Get a chance to meet with potential employers and find your next job. The market will happen throughout the 4 days of the Congress. Exhibitors will have access to the CV database and will be able to contact you to discuss and schedule in-person meetings. Different meeting locations are available in the venue, from the exhibitor booths to private meeting rooms.

• To participate, you must have submitted your CV and completed an online form in your personal IN24 account.

Venue: Exhibitors will contact you
Date: Monday to Thursday
Time: Exhibitors will contact you

YP Lunch

Overlooking the exhibition, a special lunch place will be reserved for Young Professionals to meet and mingle. A number of seasoned acousticians will also be present and this event will allow you to kickstart your networking for the week.

• Venue: Mezzanine

• Date: Monday, August 26

• Time: 13:00-14:00

YP Award & Reception

In 2010, I-INCE initiated a grant program for noise control engineering students and young professionals who were within the first ten years of their careers. The goals of the grant is to expose students and young acousticians to senior professionals, give them experience in public presentation and paper writing, and assist them in the development of networking abilities. This grant enabled these young professionals and students to attend the INTER-NOISE Congress and network with senior engineers.

People: By invitation only
Venue: Café de La Cité
Date: Monday, August 26

• Time: 16:40-18:30

YP Social Event

Meet your peers and forge new contacts from around the world in a relaxed atmosphere. The first round is on us and the rest of the evening is yours to enjoy. We will gather in the center of Nantes and the exact location will be announced later.

Venue: Somewhere in the City!Date: Monday, August 26Time: 20:00-23:00

YP Flash Talks Challenge

4 minutes, one slide and whatever you can carry on stage by yourself... that's all it takes to make yourself known to the community and present your research topic in a fun and engaging way (16 spots for presenters available, plenty in the audience).

• To take part, you must have submitted your application online, from your personal IN24 account.

Venue: Mezzanine

• Date: Wednesday, August 28

• Time: 14:20-17:00

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ACCOMPANYING PERSON PROGRAM

Opening ceremony and reception

• Venue: La Cité (Grand Auditorium Foyer)

• Date: Sunday, August 25 - 16:00-20:40

Nantes History Museum

Set in the historic heart of Nantes, the Château des ducs de Bretagne is the city's most important historic building, along with the Cathedral St. Pierre.

Venue: Nantes History MuseumDate: Monday, August 26

• Time: 09:15-11:15



Cruise along the Estuary of Loire

From the heart of Nantes to the gates of the Atlantic, Estuaire is an open-air collection like no other. A total of 33 works of art line the 60 km of the estuary.

- Departure point: Ferry terminal (Marine et Loire cruise)
- Date: Monday, August 26
- Boarding at 14:45 (duration 1h30)



Half-day Voyage through Nantes' Vineyards

Taking the route through the region's vineyards is like taking a brief trip to Italy by just stepping outside the gates of Nantes.

- Departure point: La Cité (Grande Halle entrance)
- Date: Tuesday, August 27
- Departure at 13:00 (duration 4h30)



Les Machines de l'Île

"Les Machines de l'Île" is a totally unprecedented artistic project. Situated on the exceptional site of the former shipyards and created thanks to François Delarozière and Pierre Orefice's imaginations, it is at the crossroads between Jules Verne's "invented worlds", the mechanical universe of Leonardo da Vinci and Nantes' industrial history.

- Venue: Les Machines de l'Île (entrance)
- Date: Wednesday, August 28
- Starting at 09:30 (duration 2h)

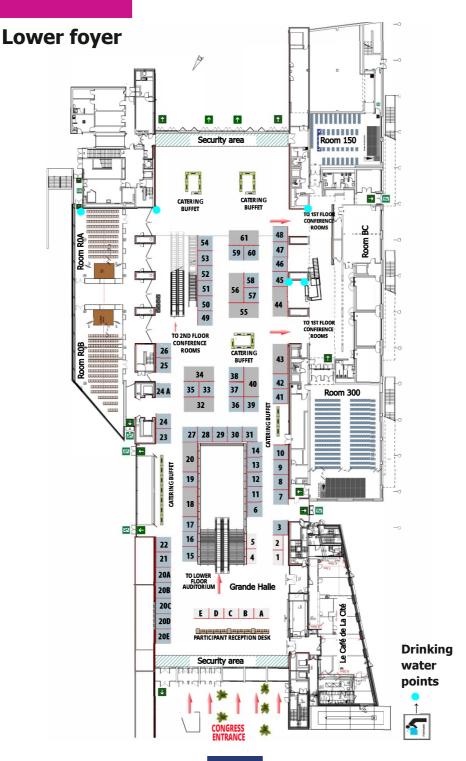


Closing ceremony and reception

• Venue: La Cité

• Date: Thursday, August 29

• Time: 12:20-14:00



Exhibition

Exhibitor booths

- 1 HOLOMETRIX
- 2 ALMACOUSTIC
- **3** MASON INDUSTRIES
- 4 SKYTED
- 5 VIBISCUS
- 6 MECALC
- 7 GROUPE VIVERDE
- **8** GEOMOD BY COEXYA
- 9 GFAI Tech
- **10** PCB PIEZOTRONICS
- 11 ORBIWISE SA
- **12** VIBRATEC
- 13 GERB
- 14 MICROFLOWN TECHNOLOGIES
- **15** 4SILENCE
- **16** WAVELY
- **17** SONITUS SYSTEMS
- **18** ROCKWOOL ROCKFON
- 19 ATELIER 7HZ ACOUSTIQUE
- 20 ISOVER PLACO®
 - SAINT-GOBAIN ECOPHON
- **20A** BARRISOL
- **20B** PHONOTECH
- **20C** HANGZHOU CRYSOUND ELECTRONICS
- **20D** METACOUSTIC
- **20E** CEF POLYMERES
- 21 ANSYS
- **22** CIRRUS RESEARCH
- 23 ACOUSTB
- **24** TRANQUILITY ACOUSTRONICS
- 24A NTEK SRL
- 25 ODEON AS
- **26** METECNO SOUND
- **27** BRUITPARIF
- 28 ALLIANTECH
- 29 DATAKUSTIK GMBH
- 30 SEVEN BEL
- **31** HEAD ACOUSTICS
- **32** HOTTINGER BRUEL & KJAER
- **33** ACOUCITÉ
- **34** ACOEM
- **35** GETZNER
- **36** GROUPE BOËT

- 37 BSWA TECHNOLOGY
- **38** POLYTEC FRANCE
- **39** EOMYS
- **40** CDM STRAVITEC
- 41 GROUPE GAMBA
- **42** WÖLFEL
- 43 NTI AUDIO
- **44** SVANTEK
- **45** STAPELFELDT
- **46** IMPEDANCE
- 47 DGMR SOFTWARE
- **48** DASSAULT SYSTEMES
- **49** MATELYS RESEARCH LAB
- **50** VIAXYS
- **51** ONO SOKKI CO., LTD.
- 52 CINOV GIAC
- **53** CALENBERG INGENIEURE
- **54** SOUNDPLAN
- 55 SIGICOM
- **56** AMC MECANOCAUCHO
- **57** TREBLE TECHNOLOGIES
- **58** BEDROCK AUDIO
- **59** WAVEBREAKER
- **60** REGUPOL ACOUSTICS
- **61** RION / NORSONIC

Institutionnal exhibitor booths

- A FRENCH ACOUSTICAL SOCIETY
- **B** UNIV. EIFFEL & CEREMA
- C INSTITUT D'ACOUSTIQUE
- D CIDB
- **E** IN 2025 SÃO PAULO BRAZIL

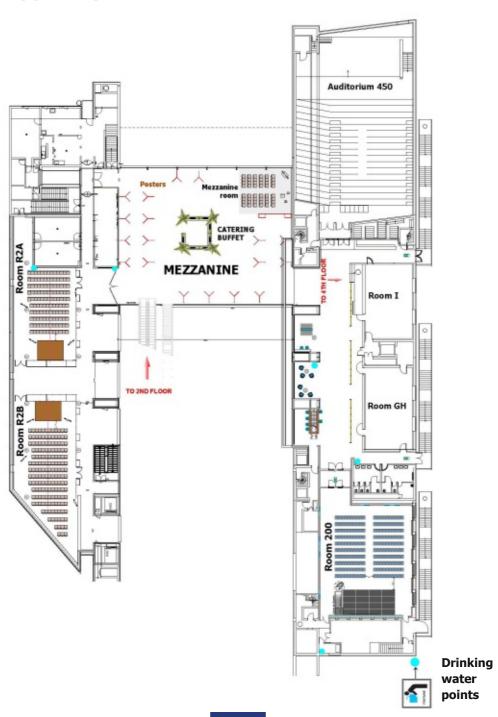
Exhibitor workshops

Subject to availability.

During the Industrial Sessions scheduled just after the lunch break on Monday, August 26 and Tuesday, August 27, exhibitors will offer 40-minute workshops within dedicated time slots outside the scientific sessions. They are free to all congress delegates, and to One-Day Exhibition Visitors on their day of booking. Registration of participants to the workshops will be available by logging in to their online IN24 personal account.

- Venue: see IN24 app and website
- Date: Monday, August 26: 13:40-14:20
- Date: Tuesday, August 27: 13:40-14:20

Upper foyer



SESSION FORMAT

IN-PERSON ORAL SESSIONS

- Each paper corresponds to a 20-min time slot including 15 min of presentation followed by 3 min for questions/discussion and 2 min for speaker change.
- All 15-min talks are recorded (screen capture and speaker's voice) so that they can be viewed on the Congress app up to one month after the end of the Congress.
- Presenting authors are asked to arrive 20 min before the start of the session to announce themselves to the Session Chair and check the technical aspects.
- As far as possible, 20-minute time slots for session discussion will be included in the program in order to facilitate scientific exchanges. Session discussion slots are animated by the session Chair persons.

HYBRID POSTER AND ON-LINE SESSIONS

- Poster sessions are organized in an interactive format and are combined with online contributions.
- All poster sessions will take place on the Mezzanine floor, where all posters are displayed all along the congress, so they can also be seen outside their scheduled session.
- A number is assigned to each poster. Speakers are invited to set up their poster if possible as soon as they arrive at the conference, and in any case before the start of the Session.
- Coffee break facilities are set up on the Mezzanine floor for more convivial interactions.
- Each poster session brings together ~10 papers and a few on-line contributions, both belonging to the same technical field. The session lasts 1h40min in total, and is driven by a Session Chair. It consists of 2 phases:
- 1- The pitch phase (40 min in the Mezzanine room), with Series of flash presentations. Each author presents in 2 min max the context, objectives and major

technical elements of his/her paper. **Flash pre-recorded presentations from on- line authors** follow the same instructions and are played at the opening of the session, before the in-person poster pitches.

- 2- The discussion phase (1 h around the posters). It is a time for more detailed presentations by the authors of their poster and in-depth discussions with the audience.
- Full pre-recorded presentations from online authors are viewable on the Congress app at any time. Interaction with on-line authors is possible through a dedicated chat, as for all papers of the technical program.

Keep in touch with the IN24 community with the Congress app.

You will have access to the complete schedule, all the speakers, all the abstracts/papers/videos, all the partners & sponsors, and if you log in, to the chat and networking functionalities to discuss with the authors (you need to be connected on the app).

To download the app, just flash the QR code on your smartphone, download the app, and select the INTERNOISE2024 event:







If you want to consult the program from your browser, visit: https://www.eventool.com/pwa/INTERNOISE2024/





PLENARY LECTURES

PLENARY LECTURE #1 | Grand Auditorium | Sunday, August 25 | 16:40-17:40

Ocean Noise and its Effects on Marine Mammals



Christine Erbe
Curtin University, Perth, WA, Australia
COEST, Curtin Mauritius, Moka, Mauritius

Christine Erbe is the Director of the Centre for Marine Science and Technology (CMST) at Curtin University in Perth, Australia, and the Director of the Centre of Ocean and Earth Science and Technology (COEST) at Curtin Mauritius. With a background in Physics (M.Sc., Dortmund University) and Geophysics (Ph.D., University of British Columbia), she is studying marine soundscapes, underwater noise generation and propagation, marine bioacoustics, and the

effects of noise on animals. She is a Fellow of the Acoustical Society of America, Board member of the International Commission for Acoustics, and member of the intersessional expert group on underwater noise and light pollution of the International Seabed Authority. She chaired the international conference series on the Effects of Noise on Aquatic Life for several years. She has worked on ISO working groups on underwater noise and on the scientific committee to assess operations in Antarctica for the German Environmental Protection Agency.

PLENARY LECTURE #2 | Auditorium 800 | Wednesday, August 28 | 12:00-13:00

Advanced Characterization of Urban Sound Environments



Arnaud CanUniversité Gustave Eiffel, Nantes, France
Ghent University, Belgium



Pierre Aumond Université Gustave Eiffel, Nantes, France

Dr. Arnaud Can is a researcher at the Gustave Eiffel University, in the Joint Research Unit in Environmental Acoustics (UMRAE). He also holds a part-time position of associate professor in Ghent University. His research interests deal with the characterization of urban noise environments, including participatory and citizen-based approaches, and the evaluation of the links between mobility and urban sound environments, relying on mobility and road traffic modeling at different spatial scales. He is currently the coordinator of the ANR SYMEXPO and ANR SONOREZE II projects, and the animator of the axe "Urban Sound Environments" at the Research Federation IRSTV (CNRS FR2488). Dr. Pierre Aumond, a researcher in environmental acoustics at Gustave Eiffel University's UMRAE laboratory, is dedicated to understanding the interplay between the physics and perception of urban sound environments. He actively contributes to the development of numerical modeling methodologies for urban soundscapes and serves as the main animator of NoiseModelling, an opensource noise mapping tool.









À L'ÉCOUTE **DES VIBRATIONS** DU MONDE













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KEYNOTE LECTURES

KEYNOTE LECTURE #1 | Auditorium 800 | Monday, August 26 | 12:00-13:00

Listening to Simulations: Audio-rate Virtual Acoustics and Sound Synthesis

Stefan Bilbao

Acoustics and Audio Group, University of Edinburgh, United Kingdom



Stefan Bilbao (B.A. Physics, Harvard, 1992, MSc., PhD Electrical Engineering, Stanford, 1996 and 2001 respectively) is currently Professor of Acoustics and Audio Signal Processing in the Acoustics and Audio Group at the University of Edinburgh, and previously held positions at the Sonic Arts Research Centre, at the Queen's University Belfast, and the Stanford Space Telecommunications and Radioscience Laboratory. He has been concerned mainly with time domain

simulation of linear and nonlinear systems in both musical and architectural acoustics. He led the NESS project (Next Generation Sound Synthesis) and WRAM project (Wave-based Room Acoustics Modeling), both funded by the European Research Council, and running jointly between the Acoustics and Audio Group and the Edinburgh Parallel Computing Centre at the University of Edinburgh between 2012 and 2018. He is the author of more than 200 publications, including two monographs. He is a co-founder of Physical Audio Ltd., has been an associate editor of the IEEE Transactions on Audio Speech and Language Processing, and was the general chair of the 20th International Conference on Digital Audio Effects, held in Edinburgh in 2017. He was born in Montreal, Quebec, Canada.

KEYNOTE LECTURE #2 | Auditorium 450 | Monday, August 26 | 12:00-13:00

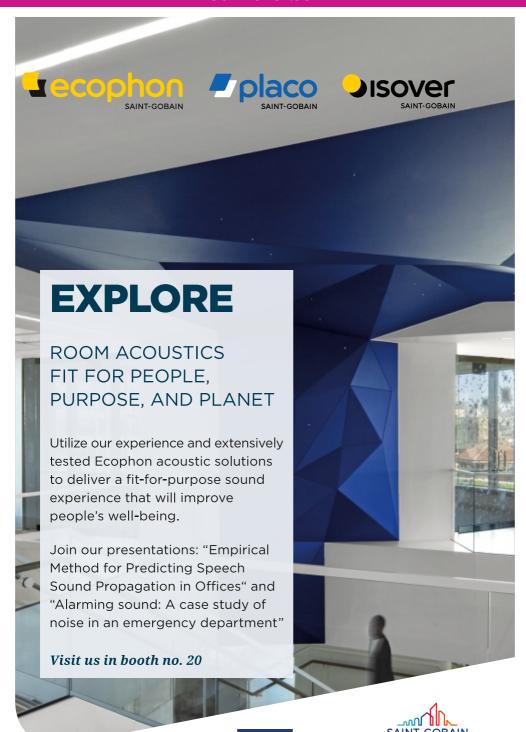
From the Laboratory to the Field: the Development of In-Situ Measurements on Noise Barriers



Massimo Garai University of Bologna, Italy

Dr. Massimo Garai is full Professor at the University of Bologna, Italy, where he teaches Applied Physics and Applied Acoustics. He received an MSc in Physics (honors) and a Ph.D. in Applied Physics from the University of Bologna. Massimo participated in many research projects in different fields of acoustics, often as principal investigator, and authored about 320 papers and 4 books. He contributes standardization work significantly as President of the Italian

Acoustics and Vibration Committee, convenor of two CEN working groups, and member of several ISO working groups. He is also active as a consultant with more than 30 years of experience in acoustics for national road and railway authorities, strategic projects, airports, industrial plants, and buildings. Massimo received some best paper awards at international congresses and the Scolari Prize 2022 from the Italian standardization body (UNI). He is a full member of the EAA, the Acoustical Society of America, and the Institute of Noise Control Engineering of the USA.



KEYNOTE LECTURE #3 | Auditorium 450 | Tuesday, August 27 | 12:00-13:00

The Opportunities and Challenges in Additively Manufacturing Acoustical Materials



Bhisham SharmaMichigan Technological University, MI, USA

Dr. Sharma joined the department of Mechanical Engineering-Engineering Mechanics as an Associate Professor in August 2023. Prior to joining Michigan Tech, he was an Assistant Professor in the Department of Aerospace Engineering at Wichita State University. His overall research our goal is to make engineering structures safer, quieter, and more efficient. To achieve this, his research mission is to create new knowledge and address technology

challenges at the intersection of structural mechanics, dynamics, and acoustics. At one end, his research focuses on understanding the fundamental mechanics of novel engineered material systems such as acoustic metamaterials, phononic structures, architected lattice structures, and stochastic foams. At the other end of the spectrum, his group focuses on translating this knowledge to create performance-tailored solutions to critical engineering problems across various industries.

KEYNOTE LECTURE #4 | Auditorium 800 | Tuesday, August 27 | 12:00-13:00

A Child Perspective on Noise Exposure and Health Effects – Challenges and Strategies



Kerstin Persson WayeGothenburg University, Sweden

Kerstin Persson Waye is full Professor in Environmental Medicine at the School of Public Health and Community Medicine at Gothenburg University, Sweden. She was appointed Docent 2006, and holds a PhD within the medical faculty in Environmental Medicine (1995), Gothenburg University along with a Bachelors degree in Environmental Health and Protection, Umeå University. Her PhD focussed on community low-frequency noise effects, a research area that was

later extended to impacts on work performance, stress and sleep and later pioneering wind turbine noise studies. She held an associate professorship within Acoustics at Aalborg University from 2002 to 2005, and a visiting professorship within Hearing research, at the University of Örebro during 2019-2020. Her primary research focus on human response and long term health impacts to sounds, emphazising perceptual qualities. She leads a multi-disciplinary team — the Sound and Health research unit. Their research include hearing disorders in communication-intensive workplaces, mechanisms for noise and vibration induced sleep disturbance and the long term impact of environmental noise on sleep and health. The prime aim is to comprehend sound exposure mechanisms and health outcomes. Her current research studies takes a child and life course perspective on perception and reactions to noise and the effect on wellbeing, mental health and hearing. She has contributed internationally as a member of the WHO's General Guideline Group for noise criteria and on the expert panel of the Canadian Council of Academies for wind turbine and health reports. She has been a member of the board of International Commission for Acoustics (ICA), chair of ICBEN team 3, and currently a member of the executive committe at ICBEN. Presently she is Vice president within I-INCE for Europe and Africa, 2022-2025.

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Meet us at booth #52



PROGRAM AT A GLANCE

Sunday, August 25 (La Cité)

14:00 - Registration Desk opens

15:00 - Exhibition Inauguration (by invitation only)

16:00 - Opening Ceremony

16:40 - Plenary Lecture

17:40 - Scientific Concert by Ophonius

18:40 - Opening Reception

| 13:00 | | |
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| 15:20 | Exhibition Inauguration Grande Halle | |
| 15:40 | Grande Halle | |
| 16:00 | Opening Ceremony | |
| 16:20 | Grand Auditorium | |
| 16:40 | Plenary #1 | |
| 17:00 | Grand Auditorium | |
| 17:20 | Grand Additorium | |
| 17:40 | Scientific Concert by Ophonius | |
| 18:00 | Grand Auditorium | |
| 18:20 | Grand Additionally | |
| 18:40 | | |
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| 19:20 | Opening Reception | |
| 19:40 | Grand Auditorium Foyer | |
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Ophonius Quintet Jazz & Science

Ophonius was born at the end of the twentieth century from the meeting of saxophonists and acoustic research professors with a passion for music. The combination of professional musicians and acoustic research professors inevitably led the group to combine the arts and sciences, and to propose an original and innovative concept: scientific concerts. On the occasion of the Inter-Noise 2024 conference, the group is proposing an original creation using elements from several shows.





Concert at Les Saulnières (Le Mans), November 2018, credits CSZ photographie.

The program below may have changed slightly since the program was printed. Please consult the online information (web and mobile application) and the latest version of the full program on the website, for up-to-date information.



P1: 1.1, 1.2, 1.4, 1.5, 2.1, 2.2, 2.4, 2.5

P2: 3.0, 3.1, 3.2, 3.5, 4.0, 4.2, 4.5

P3: 15.3, 15.5, 16.6, 17.0, 17.2, 17.4, 17.5, 17.6, 19.3 P7: 5.0, 5.1, 5.2, 6., 7.2, 7.3

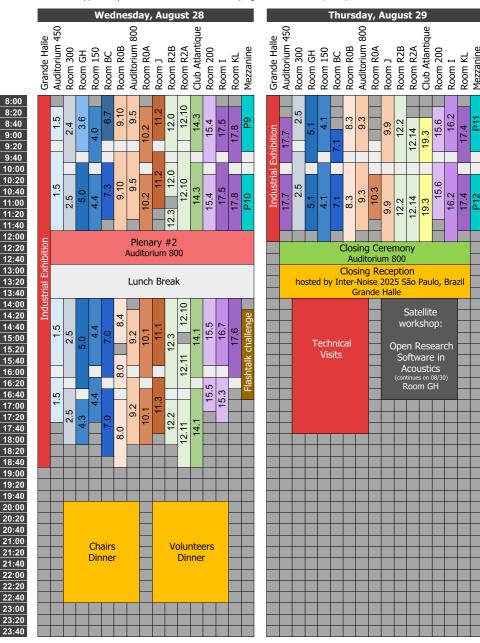
P4: 12.9, 12.1, 12.11, 12.12, 12.13

P5: 12.0, 12.2, 12.3, 12.4, 12.5

P6: 15.0, 15.1, 15.2, 15.4, 15.6

P8: 8.1, 8.3, 10.1, 10.2, 10.3, 11.0, 11.2

The program below may have changed slightly since the program was printed. Please consult the online information (web and mobile application) and the latest version of the full program on the website, for up-to-date information.



Hybrid poster & on-line sessions:

P9: 16.0, 16.1, 16.2, 16.5, 21.0

P10: 9.2, 9.4, 9.6,9.11

Hybrid poster & on-line sessions:

P11: 13.0, 13.1, 13.2, 13.3, 14.1, 14.2, 14.3

P12: 9.5, 9.9, 9.10, 18.2, 18.3







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TECHNICAL SESSIONS

Physical Acoustics & Elastic Waves

- 1.0. Physical Acoustics & Elastic Waves: General
- 1.1. Nonlinear Acoustics & Vibration
- 1.2. Sound Propagation in Heterogeneous Media (grouped with Session 1.0)
- 1.3. Sound Interaction with Natural Media (removed)
- 1.4. Elastic & Mechanical Metamaterials: Waves and Dynamics (grouped with Session 1.5)
- 1.5. Metamaterials & Phononic Materials

Measurement Methods

- 2.0. Measurement Methods: General
- 2.1. Microphone Array Techniques
- 2.2. Spatial Capture & Reproduction (grouped with Session 2.0)
- 2.3. Measurement Instrumentation
- 2.4. Measurement Standards
- 2.5. Measurement Methods for Smart Cities and Noise Monitoring

Modeling & Simulation Techniques

- 3.0. Modeling & Simulation Techniques: General
- 3.1. Light Computational Models for Acoustics and Vibration Simulation
- 3.2. Acoustics and Vibration Modeling of Electrical Machines
- 3.3. Nonlinear Acoustics & Vibration (grouped with Session 1.1)
- 3.4. Artificial Intelligence and Machine Learning for Diagnosis in Acoustics & Vibration
- 3.5. Data-driven and Machine Learning Methods for Modeling and Design in Acoustics & Vibration
- 3.6. Acoustic Design using Optimization Methods

Vibro-acoustics & Structure-Borne Noise

- 4.0. Vibro-acoustics & Structure-Borne Noise: General
- 4.1. Numerical Methods in Vibro-acoustics
- 4.2. Experiments in Vibro-acoustics
- 4.3. Use of Micro Perforated Panels in Vibro-acoustics
- 4.4. Inverse Problems in Vibro-acoustics
- 4.5. Passive Control of Noise & Vibration Using Acoustic Black Hole Effect

Signal Processing, Reproduction & Diagnostics

- 5.0. Signal Processing, Reproduction & Diagnostics: General
- 5.1. Spatial Audio (Renamed 5.1. Spatial Audio & Audio Transducers
- 5.2. Sound Reinforcement (grouped with Session 5.0.)
- 5.3. Audio Transducers (grouped with Session 5.1.)

Aero- & Thermo-Acoustics

- 6.0. Aero- & Thermo-Acoustics: General (grouped with Session 6.4.)
- 6.1. Thermoacoustics & Combustion
- 6.2. Thermoacoustic Engines
- 6.3. Computational Methods in Flow-induced Noise & Vibration
- 6.4. Experiments in Flow-induced Noise & Vibration
- 6.5. Rotor & Turbomachinery Noise (common session with Session 11.3)
- 6.6. Duct Aero-acoustics: Propagation and Noise Reduction in Industrial and Academical Problems

6.7. (Aero-)acoustic Material Design

Active Systems for Noise & Vibration Control

- 7.0. Active Systems for Noise & Vibration Control: General
- 7.1. Hybrid Active-Passive Systems & Active Metamaterials for Noise & Vibration Control (renamed)
- 7.2. Signal Processing & Algorithms for Noise & Vibration Control
- 7.3. New Applications of Active Control
- 7.4. Artificial Intelligence for Active Systems in Noise & Vibration Control (grouped with Session 7.0.)
- 7.5. Nonlinear Active Metamaterials (grouped with Session 7.1.)
- 7.6. Active Metamaterials for Noise & Vibration Control (grouped with Session 7.1.)

Aircraft Noise

- 8.0. Aircraft Noise: General
- 8.1. Aircraft Interior Noise (grouped with Session 8.2.)
- 8.2. Aircraft interior& exterior noise
- 8.3. Airport Noise
- 8.4. Advanced Monitoring & Measurement
- 8.5. Supersonic Aircraft Noise (grouped with Session 8.0.)
- 8.6. Urban Air Mobility Noise

Ground Transportation and Industrial Noise & Vibration

- 9.0. Ground Transportation and Industrial Noise and Vibration: General
- 9.1. Measurement Methods for Tire/Road Noise
- 9.2. Acoustic Properties of Road Pavements
- 9.3. Acoustic Properties of Tires for Exterior Noise
- 9.4. Vehicle Acoustics
- 9.5. Railway Noise: Detection, Mitigation and Modelling
- 9.6. Noise Barriers and Noise Mitigation Methods
- 9.7. Auralisation of Transportation Noise
- 9.8. Vibration from Ground Transportation: Sources and Propagation
- 9.9. Industrial Noise Control
- 9.10. Wind Turbine Noise
- 9.11. Road Traffic Noise: Calculation Method

Underwater, Ship & Offshore Acoustics

- 10.0. Underwater, Ship & Offshore Acoustics: General (removed)
- 10.1. Underwater Marine System Noise Radiation and Control
- 10.2. Underwater Acoustic Propagation
- 10.3. Target Detection & Classification

Flow-induced Noise & Vibrations

- 11.0. Flow-induced Noise & Vibrations: General
- 11.1. Experiments in Flow-induced Noise & Vibration
- 11.2. Numerical Methods in Flow-induced Noise & Vibration
- 11.3. Rotor & Turbomachinery Noise (common session with Session 6.5.)
- 11.4. Control of Flow Noise (grouped with Session 6.7.)

Building & Room Acoustics

- 12.0. Building & Room Acoustics: General
- 12.1. Requirements, Classification Schemes & Standards in Building Acoustics
- 12.2. Measurement and Prediction of Airborne and Impact Sound Insulation
- 12.3. Measurement and Prediction of Sound Absorption in Reverberation Rooms

- 12.4. Structure-borne Sound and Equipment Noise in Buildings
- 12.5. Addressing Noise and Vibration Problems in Buildings
- 12.6. Low-frequency Measurements and Uncertainty for Building Noise (grouped with Session 12.0.)
- 12.7. Acoustics of Wooden Buildings
- 12.8. Low-carbon Acoustic Treatments and Design Solutions (removed)
- 12.9. Acoustics of Hospital and Healthcare Spaces
- 12.10. Acoustics of Education Spaces
- 12.11. Acoustics of Workspaces
- 12.12. Computational Tools for Room Acoustics Prediction
- 12.13. Artificial Intelligence & Machine Learning for Built Environment (grouped with Session 16.7.)
- 12.14. Façade Insulation using Partially Open Windows for Natural Ventilation

Outdoor Sound Propagation

- 13.0. Outdoor Sound Propagation: General
- 13.1. Urban Sound Propagation
- 13.2. Techniques and Applications of Infrasound Propagation
- 13.3. Advances in Noise Mapping

Materials & Passive Treatments

- 14.0. Materials & Passive Treatments: General
- 14.1. Absorption & Transmission of Biobased and Geobased Materials
- 14.2. Acoustic Multi-dynamic Materials and Metamaterials
- 14.3. Measurements and Characterization Methods for Acoustic & Visco-elastic Materials
- 14.4. Computational Methods for Acoustic Materials & Sound Packages (removed)
- 14.5. Visco-elasticity of Materials (grouped with Session 14.3.)

Community Noise & Health

- 15.0. Community Noise & Health: General
- 15.1. Occupational Noise and Health
- 15.2. Healthy Planning and Building
- 15.3. Environmental Impact Assessment
- 15.4. Community Response to Noise
- 15.5. Noise and Health
- 15.6. Noise and Health in Children
- 15.7. Implementation of Sound Policy in Emerging and Developing Countries (removed)

Soundscape

- 16.0. Soundscape: General
- 16.1. Indoor Soundscaping
- 16.2. Psychological and Physiological Evaluation in Soundscape Studies
- 16.3. Soundscape Policies and Standards
- 16.4. Soundscape Design Interventions
- 16.5. Innovative and Multisensory Approaches in Soundscape Studies
- 16.6. Soundscapes from the Perspective of Arts/Human Sciences
- 16.7. Machine Learning for Acoustic Scene Understanding

Perceptual Evaluation of Sounds and Product Noise

- 17.0. Perceptual Evaluation of Sounds and Product Noise: General
- 17.1. Psychological Evaluation of Product Noise (renamed)
- 17.2. Product Sound Quality (grouped with Session 17.1.)
- 17.3. Information Technology Equipment and Household Appliance Noises

- 17.4. Sound Design
- 17.5. Perception and Sound Design for Electric Vehicles
- 17.6. Psychological Evaluation of Transportation Noise: Train, Aircraft, and Road Traffic Noise
- 17.7. Combined Exposure to Vibration and Noise: Annoyance Perception, Cognitive Performance, Interaction and Design
- 17.8. Impulsive Sound
- 17.9. Data Sonification (removed)

Noise & Impacts on biodiversity

- 18.0. Noise & Impacts on Biodiversity
- 18.1. Impacts of Noise Generated by Renewable Energy on Biodiversity (grouped with Session 18.0.)
- 18.2. Impacts of Transportation Noise on Biodiversity (grouped with Session 18.0.)
- 18.3. Ecoacoustics and Analysis of Soundscape (grouped with Session 18.0.)

Art, Music & Science

- 19.0. Art, Music & Science: General (grouped with Sessions 19.2. and 19.3.)
- 19.1. Modeling, Numerical Methods and AI
- 19.2. Vibration and Acoustic Measurements of Musical and Sound Sources
- 19.3. Musical instruments: From Physics to Perception

Education & Popularization

- 20.0. Education & Popularization
- 20.1. Innovative Classroom Teaching Materials: Web-based, Interactive Supports, Demonstrations, Comics, Videos (grouped with Session 20.0.)
- 20.2. Experiential and/or Out-of-the-classroom Teaching Approaches: Mobile teaching, Flipped Classroom, Project-based Learning (grouped with Session 20.0.)
- 20.3. General Public Initiatives: Art, Exhibitions, University Open House, Events (grouped with Session 20.0.)

Noise Control & Social Sciences

- 21.0. Noise Control & Social Sciences
- 21.1. Non Auditory Effects of Noise Exposure on Communication and Performance (grouped with Session 21.0.)

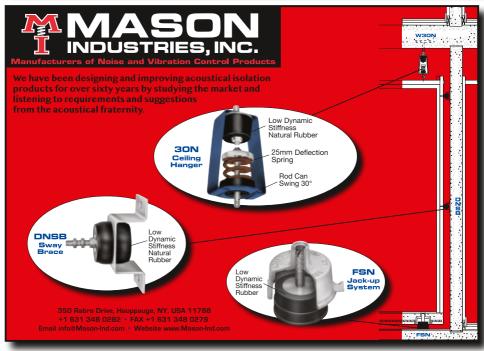
Detailed session schedule

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Julien PREUILH (Acoem)

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Haarien PUJOL (Acoem)

Innovative design of façade elements

Thierry MAZOYER (Acoem

Construction site environmental pollution management – Initiatives, innovation and research

Florent MASSON (Metravib Engineering)

How IA can help gas leak detection

Florent MASSON (Metravib Engineering)

Assessing and mitigating environmental noise pollution: a case study of a metallurgy company

Marco VIDOTI, Michael KLEIN EDSON,
Bruno BENATTI (Accem)

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