

# WTC 2022

7<sup>th</sup> WORLD  
TRIBOLOGY CONGRESS

July 10-15 2022  
LYON FRANCE

PROGRAM BOOK



**QUARTZ**  
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**TotalEnergies**

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# WTC 2022

## Time to Reconnect In Person!

# Innovation: The core of sustainable rotation

Learn more about how our research enables real world applications at the SKF stand at the WTC.

DECARBONIZING  
IN PROGRESS

On behalf of the Organizing and Scientific committees, we are very happy to welcome you in Lyon for this new World Tribology Congress. WTC 2022 is the seventh edition of a series of congress organized every four years, following WTC 2017 (Beijing), WTC 2013 (Torino), WTC 2009 (Kyoto), WTC 2005 (Washington), WTC 2001 (Vienna) and the very first held in London in 1997. You have certainly noticed that almost five years have gone by between the last edition in Beijing and WTC 2022. Since March 2020, the world is going through an unprecedented health crisis, which has led, in our case, to postpone the 7<sup>th</sup> WTC by almost one year. Despite difficult conditions, the organizing committee has made every effort to make WTC 2022 a landmark tribology congress.

In this context, we would like to express our warmest gratitude for your presence and participation in WTC 2022. We would also like to extend our deepest thanks to all the partners who have been involved in the organization of WTC 2022, and without whom nothing would have been possible: institutional partners, sponsors, exhibitors, plenary/keynote/invited speakers, committees' members, chairs and co-chairs of scientific themes, reviewers, session chairs and volunteers.

The 7<sup>th</sup> World Tribology Congress aims to highlight recent important progress in all aspects of Tribology,

strengthen the links between tribologists from academy and industry, provide a unique opportunity for discussion concerning the latest developments in Tribology and to promote international collaborations and exchanges. The Congress will showcase 4 plenary and 4 keynote speakers, 30+ invited talks, 700+ oral presentations and 200+ posters on topics at the cutting edge of the various Tribology disciplines. It also offers a wide exhibition and various events, scientific and nonscientific, some of them dedicated towards PhD students and young tribologists.

Since the very beginning of this project, the LaMCoS (founded in 1962 by Professor M. Godet at INSA de Lyon) and the LTDS (founded in 1970 by Professor J.-M. Georges at École Centrale de Lyon) laboratories have been leading the organization of this 7<sup>th</sup> WTC in Lyon, in coordination with the International Tribology Council (ITC). The organizers would like to thank their institutions, INSA and École Centrale de Lyon, and their laboratories (LaMCoS and LTDS) for their strong support and for facilitating the participation of a large number of colleagues.

We are more than happy that worldwide tribologists will meet again and share their updated experience and knowledge. We wish you a nice and very fruitful congress, and an enjoyable time in Lyon.

For the WTC 2022 Organizing and Scientific committees,



**PHILIPPE KAPSA**  
Chair



**PHILIPPE VERGNE**  
Chair



**MICHEL BELIN**  
Co-chair





## SOCIAL EVENTS

### Welcome Reception

**SUNDAY 10 JULY | 18:00-19:30**

LYON CONVENTION CENTRE  
FOYERS FORUM

Enjoy a welcome drink in a jazzy musical atmosphere with students from the **Conservatoire National Supérieur Musique et Danse de Lyon**.



### Conference Gala Dinner

**WEDNESDAY 13 JULY | 19:30-22:00**

LYON CONVENTION CENTRE  
FORUM 4

**Lyon, City of lights**

The cocktail and banquet are organized around the emblematic heritage of lights emerging in Lyon in 1852.

Two shows are proposed:

**Dentelles d'Echass** during the cocktail and **Tweelux** during the dinner.

### Monday Live Show

**MONDAY 11 JULY | 18:30-19:15**

LYON CONVENTION CENTRE  
AMPHITHEATRE

**"A nos vertiges"**

Excerpt from a show by MPTA (*Compagnie les mains les pieds et la tête aussi*) Emma and Corentin form a duet in a space of play in perpetual evolution. He is looking for the verticals that keep him upright and what is his relationship to a moving ground, an unstable earth. She, with the straps, tends to escape in the airs, to get drunk of spirals, of suspensions.

From balance to imbalance, with ardor and elegance, they never cease to adapt their movements, to interact with this instability. Thus, they recompose places, space-time,...

## YOUNG TRIBOLOGISTS EVENTS

### 3-Minute-Thesis (3-MT)

**SUNDAY 10 JULY | 15:30-17:45 | ROOMS RHÔNE 1-2-3A**

**FRIDAY 15 JULY | 12:45-13:45 | AUDITORIUM PASTEUR**

**Promote your work in a different way!**

The 3-MT main round will be held on Sunday afternoon, in 3 parallel sessions, under the supervision of an international jury. Each candidate is given 180 second to present in a fun and yet serious manner his/her PhD thesis to the public and the jury. At the end of this first round, 9 finalists will be selected. The final round will take place on Friday during lunch time. It will follow the same rules as the main round. The best two presentations chosen by the international jury will be awarded during the closing ceremony.

Sponsored by



### Career fair and networking evening

**TUESDAY 12 JULY | 18:15-21:00 | ROOMS ROSERAIE 1-2-3**

**Job and career opportunities, networking evening with junior researchers!**

On Tuesday, young tribologists are invited to join the career fair and evening. The career fair is a unique opportunity to discuss and exchange with recruiters and junior researchers from the industry and the academia on job offers, career opportunities or mentoring. The evening will be followed by a networking cocktail. Come spend a nice evening and network with future colleagues and researchers from the industrial and academic world!

Sponsored by



### Poster awards

**FRIDAY 15 JULY | 16:00-17:00 | AUDITORIUM LUMIÈRE**

**The Poster Awards are sponsored by external partners and by the scientific organization of WTC 2022.**

They will reward a combination of excellent **research, innovation, and presentation** through 4 themes:

- ▶ **Innovation:** sponsored by Carnot I@L
- ▶ **Health:** sponsored by Cisten
- ▶ **Energy and Transport:** sponsored by Cetim
- ▶ **Sustainable development:** sponsored by Journal Lubricant

Young scientists can also compete for the best **WTC 2022 Poster Award**.

The awards ceremony will take place during the closing session on Friday 15 July.

Sponsored by



Young Tribologists Events are reserved to young tribologists no more than 32 years old by the end of 2022.

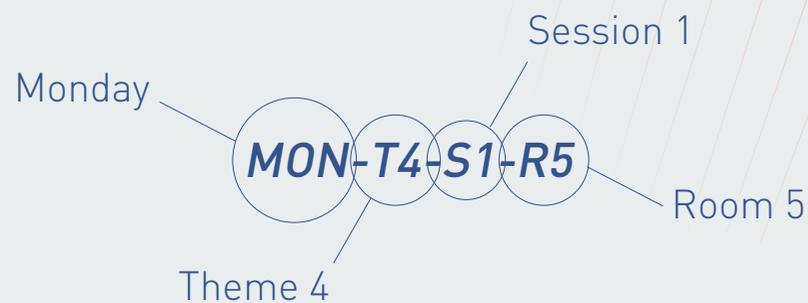
# SUNDAY 10 JULY

14:00 → 18:00	<b>REGISTRATION</b>	Hall Terreaux
15:30 → 17:45	<b>3-MINUTE-THESIS (3-MT)</b>	Rooms Rhône 1-2-3A
18:00 → 19:30	<b>WELCOME RECEPTION</b>	Foyer Forum 1

(UPDATE: 28 JUNE 2022)



## KEY FOR SESSION CODES How to read the session codes



### THEMES LIST

THEME 1	Interfacial flow and thin film lubrication
THEME 2	Wear of materials
THEME 3	Fundamentals of friction
THEME 4	Contact mechanics
THEME 5	Tribo-induced surface chemical and mechanical transformations
THEME 6	Multiscale approaches for multiphysics modelling and in situ experiments in tribology
THEME 7	Surface engineering in tribology
THEME 8	Biotribology, biomimetics
THEME 9	Tribology in manufacturing processes and industrial systems
THEME 10	Tribology to face the education and societal challenges
THEME 11	Partner Event - 47 <sup>th</sup> Leeds-Lyon Symposium on Tribology

### ROOMS LIST

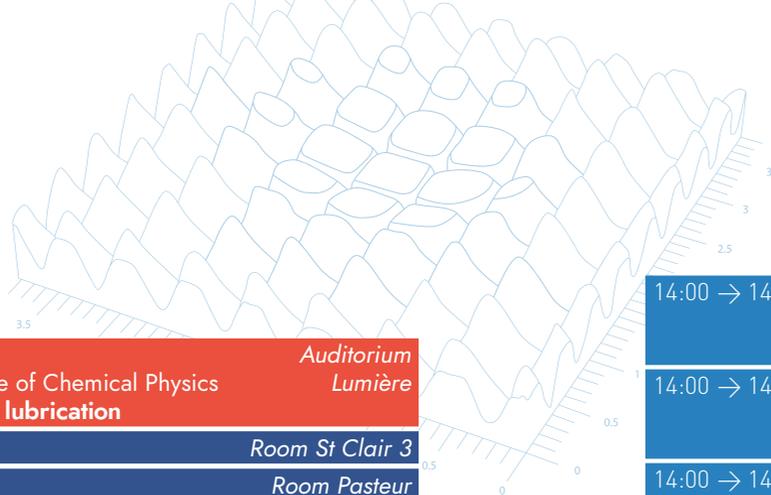
ROOM 1	Auditorium Lumière - Level -1
ROOM 2	Salon Pasteur - Level +1
ROOM 3	Auditorium Pasteur - Level +1
ROOM 4	Room St Clair 3 - Level +2
ROOM 5	Room Rhône 3A - Level +1
ROOM 6	Room Roseraie 1&2 - Level +3
ROOM 7	Room Rhône 1 - Level +1
ROOM 8	Room Rhône 2 - Level +1
ROOM 9	Room Rhône 3B - Level +1
ROOM 10	Room St Clair 2 - Level +2
ROOM 11	Room St Clair 1 - Level +2

# MONDAY 11 JULY

9:30 → 9:45	<b>OPENING CEREMONY</b>	Amphitheatre
9:45 → 10:30	<b>MON-PL01</b> <b>PLENARY LECTURE</b> Jean-François JOANNY   Collège de France Viscous and solid-like friction in biological systems	Amphitheatre
10:30 → 11:00	<b>COFFEE BREAK</b>	Exhibition Hall
11:00 → 11:45	<b>MON-PL02</b> <b>PLENARY LECTURE</b> Nicholas SPENCER   ETH Zürich, Switzerland Cartilage-inspired lubrication with polymer brushes and gels	Amphitheatre
11:45 → 12:30	<b>MON-PL03</b> <b>PLENARY LECTURE</b> Jay FINEBERG   The Hebrew University, Jerusalem, Israël Friction, Fracture and Earthquakes at the Interface of Sliding blocks	Amphitheatre
12:30 → 14:00	<b>LUNCH BREAK</b>	Foyer Forum
14:00 → 15:20	<b>MON-T1-S1-R4</b> Elastohydrodynamics 1	Room St Clair 3
14:00 → 15:20	<b>MON-T2-S1-R2</b> Wear particles	Room Pasteur
14:00 → 15:20	<b>MON-T4-S1-R5</b> Friction 1	Room Rhône 3A
14:00 → 15:20	<b>MON-T5-S1-R6</b> Surface Chemistry & Surface Physics	Room Roseraie 1&2
14:00 → 15:20	<b>MON-T8-S1-R7</b> Biomimetics	Room Rhône 1
14:00 → 15:20	<b>MON-T9-S1-R1</b> Grease 1	Auditorium Lumière
14:00 → 15:20	<b>MON-T9-S1-R11</b> Tribology in Machining	Room St Clair 1
14:00 → 15:20	<b>MON-T11-S1-R10</b> 47 <sup>th</sup> Leeds-Lyon Symposium   Energy & Health 1	Room St Clair 2
15:20 → 15:50	<b>COFFEE BREAK</b>	Exhibition Hall
15:50 → 17:30	<b>MON-T1-S2-R4</b> Elastohydrodynamics 2	Room St Clair 3
15:50 → 17:30	<b>MON-T2-S2-R2</b> Wear of Metals 1	Room Pasteur
15:50 → 17:30	<b>MON-T3-S2-R9</b> Fundamentals of friction 1	Room Rhône 3B
15:50 → 17:30	<b>MON-T4-S2-R5</b> Thermal effects	Room Rhône 3A
15:50 → 17:30	<b>MON-T5-S2-R6</b> Simulation	Room Roseraie 1&2
15:50 → 17:30	<b>MON-T6-S2-R8</b> EHL	Room Rhône 2
15:50 → 17:30	<b>MON-T7-S2-R3</b> Solid Lubrication 1	Auditorium Pasteur
15:50 → 17:30	<b>MON-T8-S2-R7</b> Hydrogels	Room Rhône 1
15:50 → 17:30	<b>MON-T9-S2-R1</b> Hydrodynamic Bearings 1	Auditorium Lumière
15:50 → 17:30	<b>MON-T9-S2-R11</b> Piston ring tribology	Room St Clair 1
15:50 → 17:30	<b>MON-T11-S2-R10</b> 47 <sup>th</sup> Leeds-Lyon Symposium Interaction with operating environment 1	Room St Clair 2
17:45 → 18:30	<b>MON-PL04</b> <b>PLENARY LECTURE</b>   Valérie Masson-Delmotte Commissariat à l'énergie atomique et aux énergies alternatives (CEA) & Intergovernmental Panel on Climate Change (IPCC), France	Amphitheatre
18:30 → 19:15	<b>LIVE SHOW</b>	Amphitheatre

(UPDATE: 28 JUNE 2022)

# TUESDAY 12 JULY



8:30 → 9:10	<b>TUE-KN01</b>	<b>KEYNOTE LECTURE</b> Feng ZHOU   Lanzhou Institute of Chemical Physics China   <b>Bioinspired adaptive lubrication</b>	Auditorium Lumière
9:20 → 10:40	<b>TUE-T1-S3-R4</b>	Elastohydrodynamics 3	Room St Clair 3
9:20 → 10:40	<b>TUE-T2-S3-R2</b>	Wear of Metals 2	Room Pasteur
9:20 → 10:40	<b>TUE-T3-S3-R9</b>	Elastomer and polymer friction 1	Room Rhône 3B
9:20 → 10:40	<b>TUE-T4-S3-R5</b>	RCF 1	Room Rhône 3A
9:20 → 10:40	<b>TUE-T5-S3-R6</b>	Reactions on the Surface	Room Roseraie 1&2
9:20 → 10:40	<b>TUE-T6-S3-R8</b>	Machine Elements 1	Room Rhône 2
9:20 → 10:40	<b>TUE-T7-S3-R3</b>	DLC 1	Auditorium Pasteur
9:20 → 10:40	<b>TUE-T8-S3-R7</b>	Texture perception and discrimination	Room Rhône 1
9:20 → 10:40	<b>TUE-T9-S3-R1</b>	Grease 2	Auditorium Lumière
9:20 → 10:40	<b>TUE-T9-S3-R11</b>	Tribology in Forming 1	Room St Clair 1
10:40 → 11:30	<b>POSTER SESSION &amp; COFFEE BREAK</b>		Exhibition Hall
11:30 → 12:30	<b>TUE-T3-S4-R9</b>	Elastomer and polymer friction 2	Room Rhône 3B
11:30 → 12:30	<b>TUE-T6-S4-R8</b>	Machine Elements 2	Room Rhône 2
11:30 → 12:30	<b>TUE-T7-S4-R3</b>	DLC 2	Auditorium Pasteur
11:30 → 12:30	<b>TUE-T8-S4-R7</b>	Fabrics and touch	Room Rhône 1
11:30 → 12:30	<b>TUE-T9-S4-R1</b>	Tribology in Additive Manufacturing	Auditorium Lumière
11:30 → 12:30	<b>TUE-T11-S4-R10</b>	<b>47<sup>th</sup> Leeds-Lyon Symposium</b> Energy & Health - 2	Room St Clair 2
11:30 → 12:30	<b>TUE-T1-S4-R4</b>	Elastohydrodynamics 4	Room St Clair 3
11:30 → 12:30	<b>TUE-T2-S4-R11</b>	Wear in Electrical Contacts	Room St Clair 1
12:45 → 13:45	<b>LUNCH BREAK</b>		Forum 3
12:30 → 13:15	<b>TUE-KN02</b>	<b>KEYNOTE SPONSOR LECTURE</b> Bernie VAN LEEUWEN   SKF, The Netherlands Make tribology accessible - and help the world to 'Net Zero carbon'	Auditorium Pasteur
14:00 → 14:30	<b>TUE-T1-R4</b>	<b>INVITED</b>   Anand JAGOTA   <b>Lubricated Friction and Mixed-EHL Transition in Patterned Soft Surfaces</b>	Room St Clair 3
14:00 → 14:30	<b>TUE-T2-R2</b>	<b>INVITED</b>   Richard CHROMIK   <b>Cold-Sprayed Metal Matrix Composites and Their Third Bodies</b>	Room Pasteur
14:00 → 14:30	<b>TUE-T3-R9</b>	<b>INVITED</b>   Astrid DE WIJN   <b>Understanding the friction of atomically thin layered materials</b>	Room Rhône 3B
14:00 → 14:30	<b>TUE-T4-R5</b>	<b>INVITED</b>   Izabela SZLUFARSKA   <b>The Role of Mechanics and Chemistry in Contact Evolution</b>	Room Rhône 3A
14:00 → 14:30	<b>TUE-T5-R6</b>	<b>INVITED</b>   Robert W. CARPICK   <b>Nanoscale in situ Studies of Anti-Wear Tribochemical Film Formation</b>	Room Roseraie 1&2

(UPDATE: 28 JUNE 2022)

14:00 → 14:30	<b>TUE-T6-R8</b>	<b>INVITED</b>   Tomoko HIRAYAMA <b>In-Situ Observation of Solid-Liquid Interface and Its Nanotribological Property</b>	Room Rhône 2
14:00 → 14:30	<b>TUE-T7-R3</b>	<b>INVITED</b>   Esteban BROITMAN <b>CVD and PVD Hard Coatings for Industrial Applications: Present Status and Future Needs</b>	Auditorium Pasteur
14:00 → 14:30	<b>TUE-T8-R7</b>	<b>INVITED</b>   Daniele DINI   <b>Unravelling and Exploiting the Complex Mechanisms Responsible for the Superior Tribological Behaviour of Natural Systems</b>	Room Rhône 1
14:00 → 14:30	<b>TUE-T9-R1</b>	<b>INVITED</b>   Marion MERKLEIN   <b>Investigation of workpiece side parameters and application of innovative surface engineering technology for improving the tribological performance within hot stamping</b>	Auditorium Lumière
14:00 → 14:30	<b>TUE-T10-R11</b>	<b>INVITED</b>   W. Gregory SAWYER <b>Tribology Tackles Cancer and COVID-19</b>	Room St Clair 1
14:00 → 14:30	<b>TUE-T11-R10</b>	<b>INVITED</b>   Ken'ichi HIRATSUKA <b>Time Effect on the Wear of Iron</b>	Room St Clair 2
14:30 → 15:50	<b>TUE-T1-S5-R4</b>	Ionic Liquids 1	Room St Clair 3
14:30 → 15:50	<b>TUE-T2-S5-R2</b>	Wear of Coatings 1	Room Pasteur
14:30 → 15:50	<b>TUE-T3-S5-R9</b>	Nanotribology 1	Room Rhône 3B
14:30 → 15:50	<b>TUE-T4-S5-R5</b>	Friction 2	Room Rhône 3A
14:30 → 15:50	<b>TUE-T5-S5-R6</b>	Surface Analysis	Room Roseraie 1&2
14:30 → 15:50	<b>TUE-T6-S5-R8</b>	Lubricated Friction 1	Room Rhône 2
14:30 → 15:50	<b>TUE-T7-S5-R3</b>	DLC 3	Auditorium Pasteur
14:30 → 15:50	<b>TUE-T9-S5-R1</b>	Wear & wear testing	Auditorium Lumière
14:30 → 15:50	<b>TUE-T9-S5-R11</b>	Rolling Bearings 1	Room St Clair 1
14:30 → 15:50	<b>TUE-T11-S5-R10</b>	<b>47<sup>th</sup> Leeds-Lyon Symposium</b> Transient Process in tribology - 1	Room St Clair 2
15:50 → 16:20	<b>COFFEE BREAK</b>		Exhibition Hall
16:20 → 18:00	<b>TUE-T1-S6-R4</b>	Ionic Liquids 2	Room St Clair 3
16:20 → 18:00	<b>TUE-T2-S6-R2</b>	Wear of MMCs	Room Pasteur
16:20 → 18:00	<b>TUE-T3-S6-R9</b>	Nanotribology 2	Room Rhône 3B
16:20 → 18:00	<b>TUE-T4-S6-R5</b>	Adhesion	Room Rhône 3A
16:20 → 18:00	<b>TUE-T5-S6-R6</b>	Simulation & Data science	Room Roseraie 1&2
16:20 → 18:00	<b>TUE-T6-S6-R8</b>	Lubricated Friction 2	Room Rhône 2
16:20 → 18:00	<b>TUE-T8-S6-R7</b>	Human tissues	Room Rhône 1
16:20 → 18:00	<b>TUE-T9-S6-R1</b>	Machine Elements	Auditorium Lumière
16:20 → 18:00	<b>TUE-T11-S6-R10</b>	<b>47<sup>th</sup> Leeds-Lyon Symposium</b> Transient Process in tribology - 2	Room St Clair 2
18:15 → 19:15	<b>YOUNG TRIBOLOGISTS CAREER FAIR</b>		Room Roseraie 1&2
19:30 → 21:00	<b>YOUNG TRIBOLOGISTS EVENING</b>		Room roseaie 3

(UPDATE: 28 JUNE 2022)

# WEDNESDAY 13 JULY

8:30 → 9:10	WED-KN03	<b>KEYNOTE LECTURE</b> Michael MOSELER   University of Freiburg, Germany Controlling friction in carbon and ceramic systems by mechano-chemistry	Auditorium Lumière
9:20 → 10:40	WED-T1-S7-R4	Boundary Lubrication 1	Room St Clair 3
9:20 → 10:40	WED-T2-S7-R2	Automotive Wear	Room Pasteur
9:20 → 10:40	WED-T3-S7-R9	Gel friction	Room Rhône 3B
9:20 → 10:40	WED-T4-S7-R5	Rough Contacts 1	Room Rhône 3A
9:20 → 10:40	WED-T5-S7-R6	ZDDP	Room Roseraie 1&2
9:20 → 10:40	WED-T6-S7-R8	Single Asperity Contact & Rough surfaces	Room Rhône 2
9:20 → 10:40	WED-T7-S7-R3	Coating 1	Auditorium Pasteur
9:20 → 10:40	WED-T8-S7-R7	Tribology of cartilage	Room Rhône 1
9:20 → 10:40	WED-T9-S7-R1	Lubricants 1	Auditorium Lumière
9:20 → 10:40	WED-T9-S7-R11	Tribology in Forming 2	Room St Clair 1
10:40 → 11:10		<b>COFFEE BREAK</b>	Exhibition Hall
11:10 → 12:30	WED-T1-S8-R4	Boundary Lubrication 2	Room St Clair 3
11:10 → 12:30	WED-T2-S8-R2	Wear of Polymers 1	Room Pasteur
11:10 → 12:30	WED-T3-S8-R9	Fundamentals of friction 3	Room Rhône 3B
11:10 → 12:30	WED-T4-S8-R5	Plasticity	Room Rhône 3A
11:10 → 12:30	WED-T5-S8-R6	Rolling contact	Room Roseraie 1&2
11:10 → 12:30	WED-T6-S8-R8	Dry Contact at the Nanoscale	Room Rhône 2
11:10 → 12:30	WED-T7-S8-R3	Coating 2	Auditorium Pasteur
11:10 → 12:30	WED-T8-S8-R7	Implants 1	Room Rhône 1
11:10 → 12:30	WED-T9-S8-R1	Sensors in Tribology	Auditorium Lumière
11:10 → 12:30	WED-T9-S8-R11	Rolling bearings 2	Room St Clair 1
11:10 → 12:30	WED-T11-S8-R10	47 <sup>th</sup> Leeds-Lyon Symposium Multifacets of tribology - 1	Room St Clair 2
12:45 → 13:45		<b>LUNCH BREAK</b>	Forum 3
12:30 → 13:15	WED-KN04	<b>KEYNOTE SPONSOR LECTURE</b> Sophie BIRÉ   TotalEnergies, France The importance of tribology to TotalEnergies' ambition	Auditorium Pasteur
14:00 → 14:30	WED-T1-R4	INVITED   Feng GUO   Enhancement of Film Lubrication by Tailored Surface Wettability	Room St Clair 3
14:00 → 14:30	WED-T2-R2	INVITED   Kathryn WAHL   Examining tribocorrosion of passivating steels - new materials and methods	Room Pasteur
14:00 → 14:30	WED-T3-R9	INVITED   Oded HOD   Structural Superlubricity Meets Grain Boundaries	Room Rhône 3B
14:00 → 14:30	WED-T4-R5	INVITED   Tevis JACOBS   Adhesion of hard, rough contacts	Room Rhône 3A

(UPDATE: 28 JUNE 2022)

14:00 → 14:30	WED-T5-R6	INVITED   Jean-Michel MARTIN Achieving Superlubricity under Boundary Lubrication	Room Roseraie 1&2
14:00 → 14:30	WED-T6-R8	INVITED   Roland BENNEWITZ Nanoscale friction at the solid-liquid interface: in-situ force microscopy of complex layers	Room Rhône 2
14:00 → 14:30	WED-T8-R7	INVITED   Markus WIMMER   Cartilage Tribology: Understanding Structure-Function Relationships	Room Rhône 1
14:00 → 14:30	WED-T9-R1	INVITED   Tatsuhiko AIZAWA   In Situ Solid Lubrication in Cold Dry Forging of Titanium by Isolated Free Carbon from Carbon-Supersaturated Dies	Auditorium Lumière
14:00 → 14:30	WED-T10-R11	INVITED   Mitjan KALIN   Green Tribology as an Indispensable Part of Sustainable Future and Associated Knowledge Challenges	Room St Clair 1
14:00 → 14:30	WED-T11-R10	INVITED   Alison DUNN Simulation and experiments of contact with soft materials having a gradient of stiffness	Room St Clair 2
14:30 → 15:50	WED-T1-S9-R4	Boundary Lubrication 3	Room St Clair 3
14:30 → 15:50	WED-T2-S9-R2	Tribocorrosion	Room Pasteur
14:30 → 15:50	WED-T3-S9-R9	Superlubricity 1	Room Rhône 3B
14:30 → 15:50	WED-T4-S9-R5	Mechanical Systems 1	Room Rhône 3A
14:30 → 15:50	WED-T5-S9-R6	Coating & Tribometer	Room Roseraie 1&2
14:30 → 15:50	WED-T6-S9-R8	Solid Friction	Room Rhône 2
14:30 → 15:50	WED-T7-S9-R3	Coating 3	Auditorium Pasteur
14:30 → 15:50	WED-T8-S9-R7	Lubrication in biotribology 1	Room Rhône 1
14:30 → 15:50	WED-T9-S9-R1	Hydrodynamic Bearings 2	Auditorium Lumière
14:30 → 15:50	WED-T11-S9-R10	47 <sup>th</sup> Leeds-Lyon Symposium Multifacets of tribology - 2	Room St Clair 2
15:50 → 16:50		<b>POSTER SESSION &amp; COFFEE BREAK</b>	Exhibition Hall
16:50 → 18:30	WED-T1-S10-R4	Mixed Lubrication	Room St Clair 3
16:50 → 18:30	WED-T2-S10-R2	Wear of Polymers 2	Room Pasteur
16:50 → 18:30	WED-T3-S10-R9	Superlubricity 2	Room Rhône 3B
16:50 → 18:30	WED-T4-S10-R5	Rough Contacts 2	Room Rhône 3A
16:50 → 18:30	WED-T5-S10-R6	Tribofilm & Scuffing	Room Roseraie 1&2
16:50 → 18:30	WED-T6-S10-R8	Boundary Lubrication	Room Rhône 2
16:50 → 18:30	WED-T7-S10-R3	Coating 4	Auditorium Pasteur
16:50 → 18:30	WED-T8-S10-R7	Lubrication in biotribology 2	Room Rhône 1
16:50 → 18:30	WED-T9-S10-R1	Coatings & Solid Lubricants	Auditorium Lumière
16:50 → 18:30	WED-T10-S10-R11	Session 10	Room St Clair 1
16:50 → 18:30	WED-T11-S10-R10	47 <sup>th</sup> Leeds-Lyon Symposium Multifacets of tribology - 3	Room St Clair 2
19:30 → 22:30		<b>CONFERENCE GALA DINNER</b>	Forum 4

(UPDATE: 28 JUNE 2022)

# THURSDAY 14 JULY

8:30 → 9:10	<b>THU-KN05</b>	<b>KEYNOTE LECTURE</b> Hong LIANG   Texas A&M University, United States Toughening Materials for Ultimate Resistance to Wear	Auditorium Lumière
9:20 → 10:40	<b>THU-T1-S11-R4</b>	Hydrodynamics 1	Room St Clair 3
9:20 → 10:40	<b>THU-T2-S11-R2</b>	Wear of Polymers 3	Room Pasteur
9:20 → 10:40	<b>THU-T2-S11-R1</b>	Wear of PMCs	Auditorium Lumière
9:20 → 10:40	<b>THU-T5-S11-R6</b>	Lubricants	Room Roseraie 1&2
9:20 → 10:40	<b>THU-T6-S11-R8</b>	Mark Robbins Memorial Session 1	Room Rhône 2
9:20 → 10:40	<b>THU-T7-S11-R5</b>	Surface modification 1	Room Rhône 3A
9:20 → 10:40	<b>THU-T7-S11-R3</b>	Surface Texturing 1	Auditorium Pasteur
9:20 → 10:40	<b>THU-T8-S11-R7</b>	Implants 2	Room Rhône 1
9:20 → 10:40	<b>THU-T9-S11-R9</b>	Testing and Measurement in Tribology 1	Room Rhône 3B
9:20 → 10:40	<b>THU-T9-S11-R11</b>	Rolling Bearings 3	Room St Clair 1
10:40 → 11:30	<b>POSTER SESSION &amp; COFFEE BREAK</b>		Exhibition Hall
11:30 → 12:30	<b>THU-T1-S12-R4</b>	Hydrodynamics 2	Room St Clair 3
11:30 → 12:30	<b>THU-T1-S12-R10</b>	Rheology 1	Room St Clair 2
11:30 → 12:30	<b>THU-T2-S12-R2</b>	Wear of Polymers 4	Room Pasteur
11:30 → 12:30	<b>THU-T2-S12-R1</b>	Wear of Elastomers	Auditorium Lumière
11:30 → 12:30	<b>THU-T3-S12-R9</b>	Metal Dichalcogenides	Room Rhône 3B
11:30 → 12:30	<b>THU-T5-S12-R6</b>	CNx & MoS2	Room Roseraie 1&2
11:30 → 12:30	<b>THU-T6-S12-R8</b>	Mark Robbins Memorial Session 2	Room Rhône 2
11:30 → 12:30	<b>THU-T7-S12-R3</b>	Surface Texturing 2	Auditorium Pasteur
11:30 → 12:30	<b>THU-T8-S12-R7</b>	Implants 3	Room Rhône 1
11:30 → 12:30	<b>THU-T8-S12-R5</b>	Tribology and health	Room Rhône 3A
11:30 → 12:30	<b>THU-T9-S12-R11</b>	Tribology in Braking	Room St Clair 1
12:30 → 14:00	<b>LUNCH BREAK</b>		Forum 3
14:00 → 14:30	<b>THU-T1-R4</b>	INVITED   Andreas ALMQVIST Optimisation of bearing geometry for linear sliders lubricated with piezo-viscous fluids	Room St Clair 3
14:00 → 14:30	<b>THU-T2-R2</b>	INVITED   Alfons FISCHER   Wear Scars do not represent Wear Loss ? A Fretting Corrosion Example	Room Pasteur
14:00 → 14:30	<b>THU-T3-R9</b>	INVITED   Elisabeth CHARLAIX   Friction of complex fluids: from slip length to Navier's friction coefficient	Room Rhône 3B
14:00 → 14:30	<b>THU-T4-R5</b>	INVITED   Bo PERSSON Theory of the leakage of seals with applications	Room Rhône 3A
14:00 → 14:30	<b>THU-T5-R6</b>	INVITED   Carsten GACHOT   Tribofilm formation in helicopter gears and how novel lubricants overcome loss of lubrication conditions	Room Roseraie 1&2

(UPDATE: 28 JUNE 2022)

14:00 → 14:30	<b>THU-T6-R8</b>	INVITED   Jean-François MOLINARI   Rough surfaces and interactions between micro contacts	Room Rhône 2
14:00 → 14:30	<b>THU-T7-R3</b>	INVITED   Bharat BHUSHAN   Lessons from Nature: Bioinspired Mechanically Durable and Self-healing Superliquiphilic/phobic Surfaces	Auditorium Pasteur
14:00 → 14:30	<b>THU-T8-R7</b>	INVITED   Matt CARRE   Synthetic test-beds for assessing human-object tribological interactions	Room Rhône 1
14:00 → 14:30	<b>THU-T9-R1</b>	INVITED   Jorge SEABRA   Torque loss model for axially pre-loaded tandem rolling element bearings	Auditorium Lumière
14:00 → 14:30	<b>THU-T10-R11</b>	INVITED   Alan HASE   A Novel Method of Introductory Education for Tribology through Problem-solving Game Activity: How Do You Win the Hearts and Minds of Children and Young People Who Will Bear the Future?	Room St Clair 1
14:00 → 14:30	<b>THU-T11-R10</b>	INVITED   Lars PASTEWKA Interaction with operating environment - II	Room St Clair 2
14:30 → 15:50	<b>THU-T1-S13-R4</b>	Hydrodynamics 3	Room St Clair 3
14:30 → 15:50	<b>THU-T2-S13-R2</b>	Wear Modelling & Experiments	Room Pasteur
14:30 → 15:50	<b>THU-T4-S13-R5</b>	Seals and Leakage	Room Rhône 3A
14:30 → 15:50	<b>THU-T5-S13-R6</b>	a-C:H & ta-C	Room Roseraie 1&2
14:30 → 15:50	<b>THU-T6-S13-R8</b>	Mark Robbins Memorial Session 3	Room Rhône 2
14:30 → 15:50	<b>THU-T7-S13-R3</b>	Surface Texturing 3	Auditorium Pasteur
14:30 → 15:50	<b>THU-T7-S13-R11</b>	Surface modification 2	Room St Clair 1
14:30 → 15:50	<b>THU-T8-S13-R7</b>	Hair and eyes	Room Rhône 1
14:30 → 15:50	<b>THU-T9-S13-R1</b>	Tribology in forming 3	Auditorium Lumière
14:30 → 15:50	<b>THU-T11-S13-R10</b>	47 <sup>th</sup> Leeds-Lyon Symposium Interaction with operating environment - 2	Room St Clair 2
15:50 → 16:20	<b>COFFEE BREAK</b>		Exhibition Hall
16:20 → 18:00	<b>THU-T1-S14-R4</b>	Grease Lubrication	Room St Clair 3
16:20 → 18:00	<b>THU-T1-S14-R7</b>	Roughness and capillarity	Room Rhône 1
16:20 → 18:00	<b>THU-T2-S14-R2</b>	Predictive Maintenance	Room Pasteur
16:20 → 18:00	<b>THU-T2-S14-R9</b>	Abrasive Wear / Erosion	Room Rhône 3B
16:20 → 18:00	<b>THU-T4-S14-R5</b>	Fretting	Room Rhône 3A
16:20 → 18:00	<b>THU-T5-S14-R6</b>	DLC, ZDDP & Graphene	Room Roseraie 1&2
16:20 → 18:00	<b>THU-T9-S14-R8</b>	Lubricants 2	Room Rhône 2
16:20 → 18:00	<b>THU-T9-S14-R1</b>	Seals	Auditorium Lumière
16:20 → 18:00	<b>THU-T9-S14-R11</b>	Gears & Gearboxes	Room St Clair 1
16:20 → 18:00	<b>THU-T11-S14-R10</b>	47 <sup>th</sup> Leeds-Lyon Symposium Interaction with operating environment - 3	Room St Clair 2
18:15 → 19:25	<b>TRIBOLOGY AWARDS CEREMONY</b>		Auditorium Lumière

(UPDATE: 28 JUNE 2022)

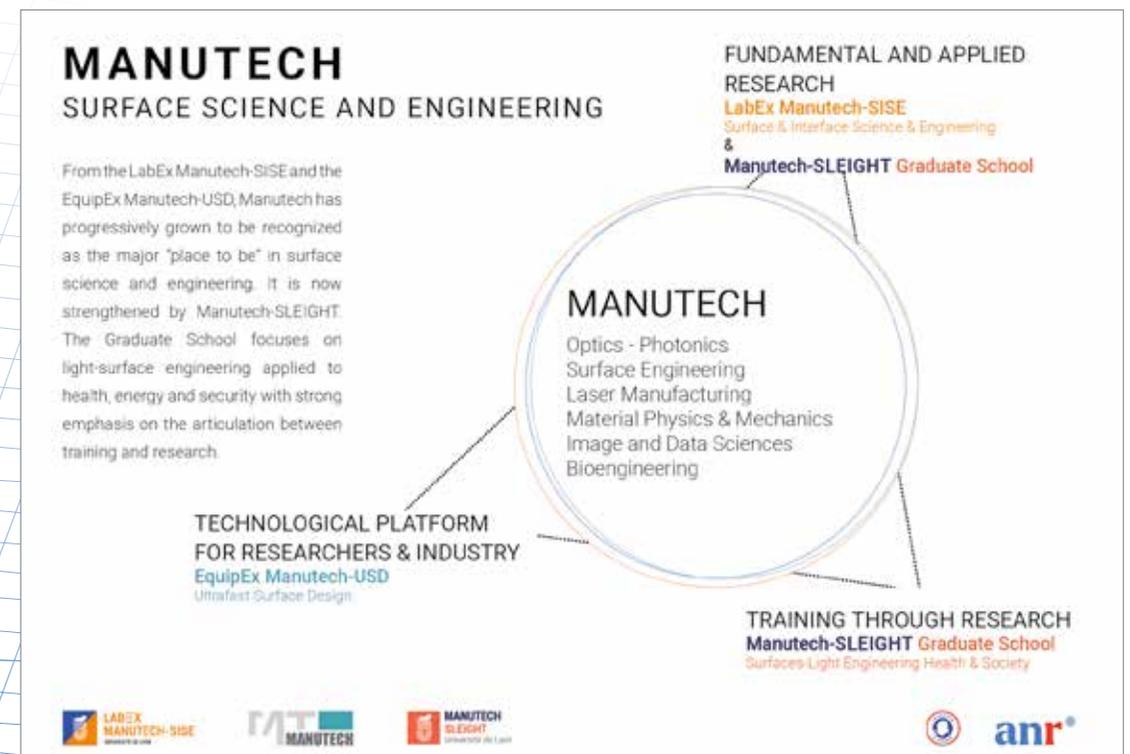
# FRIDAY 15 JULY

8:30 → 9:10	FRI-KN06	<b>KEYNOTE LECTURE</b>   Luis SAN ANDRES Texas A&M University, United States <b>On Pump Annular Seals Operating with Multiple-Phase Conditions: Measurements and Gas Injection to Increase Seal Centering Stiffness</b>	Auditorium Lumière
9:20 → 10:40	FRI-T1-S15-R4	Hydrodynamics 4	Room St Clair 3
9:20 → 10:40	FRI-T1-S15-R11	Water-based Lubrication	Room St Clair 1
9:20 → 10:40	FRI-T2-S15-R2	Wear in Rolling Contacts 1	Room Pasteur
9:20 → 10:40	FRI-T2-S15-R9	Sliding and Lubricated Wear 1	Room Rhône 3B
9:20 → 10:40	FRI-T4-S15-R5	Soft Matters 1	Room Rhône 3A
9:20 → 10:40	FRI-T5-S15-R6	Additives	Room Roseraie 1&2
9:20 → 10:40	FRI-T7-S15-R3	Surface texturing 4	Auditorium Pasteur
9:20 → 10:40	FRI-T7-S15-R8	Surface modification 3	Room Rhône 2
9:20 → 10:40	FRI-T9-S15-R7	Hydrodynamic Bearings 3	Room Rhône 1
9:20 → 10:40	FRI-T9-S15-R1	Tribology in grinding & polishing	Auditorium Lumière
10:40 → 11:10		<b>COFFEE BREAK</b>	Exhibition Hall
11:10 → 12:30	FRI-T1-S16-R7	Complex interfaces	Room Rhône 1
11:10 → 12:30	FRI-T2-S16-R2	Fretting Wear	Room Pasteur
11:10 → 12:30	FRI-T2-S16-R9	Wear in Rolling Contacts 2	Room Rhône 3B
11:10 → 12:30	FRI-T4-S16-R8	Mechanical Systems 2	Room Rhône 2
11:10 → 12:30	FRI-T5-S16-R6	Additives in Engine Oil	Room Roseraie 1&2
11:10 → 12:30	FRI-T7-S16-R3	Surface texturing 5	Auditorium Pasteur
11:10 → 12:30	FRI-T7-S16-R10	Solid Lubrication 2	Room St Clair 2
11:10 → 12:30	FRI-T9-S16-R1	Lubricants 3	Auditorium Lumière
12:30 → 14:00		<b>LUNCH BREAK</b>	Forum 3
12:45 → 13:45		<b>3-MINUTE-THESIS FINAL</b>	Auditorium Pasteur
14:00 → 14:30	FRI-T2-R2	<b>INVITED</b>   Siegfried FOUVRY <b>Multiphysics modelling of fretting wear phenomena</b>	Room Pasteur
14:00 → 14:30	FRI-T4-R5	<b>INVITED</b>   Stanislav GORB   <b>From insect adhesion to snake slithering: tribology and contact mechanics aspects of biological surfaces</b>	Room Rhône 3A
14:00 → 14:30	FRI-T5-R6	<b>INVITED</b>   Nicole DÖRR   <b>Bridging the gap between nanoscale lubricant chemistry and its macroscale performance demonstrated by engine oils</b>	Room Roseraie 1&2
14:00 → 14:30	FRI-T7-R3	<b>INVITED</b>   Pancho STOYANOV   <b>Advanced tribological coating solutions for next generation mechanical systems in extreme environments</b>	Auditorium Pasteur

(UPDATE: 28 JUNE 2022)

14:00 → 14:30	FRI-T8-R7	<b>INVITED</b>   Marc MASEN   <b>Synthetic test-beds for assessing human-object tribological interactions</b>	Room Rhône 1
14:00 → 14:30	FRI-T10-R11	<b>INVITED</b>   Mathias WOYDT   <b>The importance of tribology in climate discussions and for sustainability goals</b>	Room St Clair 1
14:30 → 15:50	FRI-T1-S17-R4	Confined fluids	Room St Clair 3
14:30 → 15:50	FRI-T2-S17-R9	Sliding and Lubricated Wear 2	Room Rhône 3B
14:30 → 15:50	FRI-T2-S17-R8	Wear Testing	Room Rhône 2
14:30 → 15:50	FRI-T4-S17-R5	Soft Matters 2	Room Rhône 3A
14:30 → 15:50	FRI-T5-S17-R6	Nanoparticles & Nanosheets	Room Roseraie 1&2
14:30 → 15:50	FRI-T7-S17-R3	Surface texturing 6	Auditorium Pasteur
14:30 → 15:50	FRI-T7-S17-R7	Solid lubrication 3	Room Rhône 1
14:30 → 15:50	FRI-T9-S17-R1	Testing and Measurement in Tribology 2	Auditorium Lumière
14:30 → 15:50	FRI-T10-S17-R11	Session 17	Room St Clair 1
14:30 → 15:50	FRI-T11-S17-R10	<b>47<sup>th</sup> Leeds-Lyon Symposium</b> Energy & Health - 3	Room St Clair 2
16:00 → 17:00		<b>CLOSING SESSION &amp; AWARDS</b>	Auditorium Lumière

(UPDATE: 28 JUNE 2022)



# SPONSORS & PARTNERS

WTC 2022 would like to thank its precious sponsors, partners and exhibitors for their participation and support to the congress.

 	  	 
<b>PLATINUM</b>	<b>GOLD</b>	<b>SILVER</b>

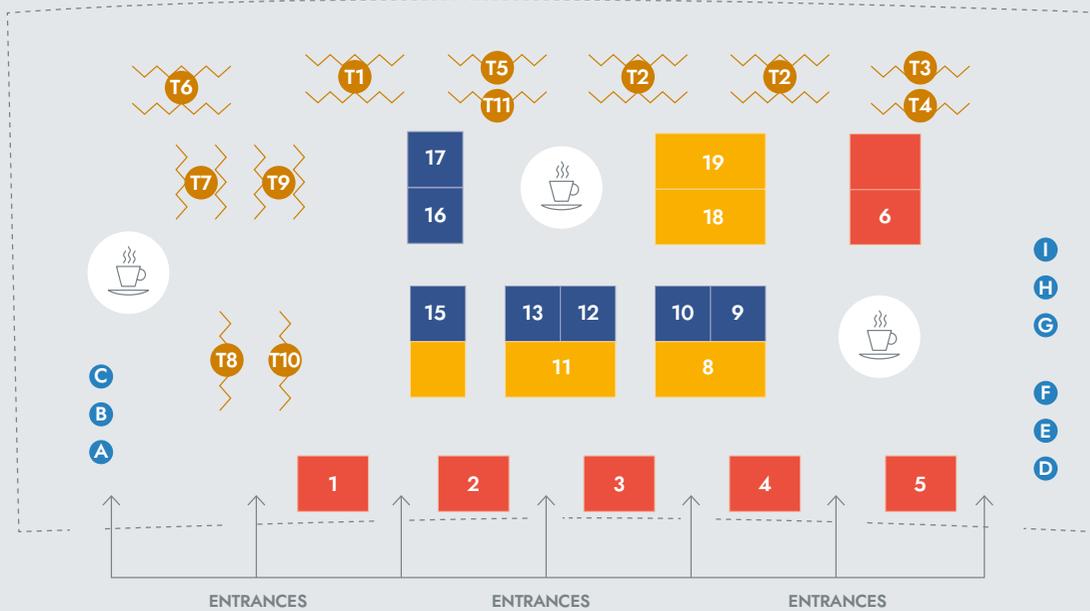
				
				
				
<b>INSTITUTIONAL PARTNERS</b>				

		
		
<b>YOUNG TRIBOLOGISTS EVENTS SPONSORS</b>		

# EXHIBITORS

 <p>Booth 6</p>	 <p>Booth 4</p>	 <p>Booth 19</p>
 <p>Table-top C</p>	 <p>Booth 16</p>	 <p>Table-top B</p>
 <p>Table-top G</p>	 <p>Booth 9</p>	 <p>table-top H</p>
 <p>Table-top A</p>	 <p>Table-top F</p>	 <p>Table-top I</p>
 <p>Booth 1</p>	 <p>Booth 2</p>	 <p>Booth 15</p>
 <p>Booth 17</p>	 <p>Booth 18</p>	 <p>Booth 5</p>
 <p>Booth 3</p>	 <p>Booth 13</p>	 <p>Booth 8</p>
 <p>Booth 11</p>	 <p>Booth 12</p>	 <p>Booth 10</p>

# EXHIBITION FLOORPLAN



## BOOTH

9M<sup>2</sup>12M<sup>2</sup>18M<sup>2</sup>

## TABLE-TOP

## POSTERS

- |                        |  |
|------------------------|--|
| 1 KYODO YUSHI          | A INSA/LAMCOS  |
| 2 MANUTECH             | B ECOLE CENTRALE LYON/LTDS   |
| 3 RTEC                 | C CNRS   |
| 4 ANTON PAAR           | D STLE   |
| 5 PHOENIX TRIBOLOGY    | E JAST   |
| 6 ADEKA                | F INSTITUT CARNOT  |
| 8 SKF                  | G EDEN INSTRUMENTS   |
| 9 FALEX                | H INP YAMOUSSOUKRO   |
| 10 TRIBOTONIC          | I KOEHLER INSTRUMENT   |
| 11 TOTALENERGIES       | T1 Interfacial flow and thin film lubrication  |
| 12 TRIBOTECHNIC        | T2 Wear of materials   |
| 13 SIMTEC              | T3 Fundamentals of friction  |
| 15 NTN-SNR             | T4 Contact mechanics   |
| 16 DUCOM INSTRUMENTS   | T5 Tribo-induced surface chemical and mechanical transformations                         |
| 17 OPTIMOL INSTRUMENTS | T6 Multiscale approaches for multiphysics modelling and in situ experiments in tribology |
| 18 PCS INSTRUMENTS     | T7 Surface engineering in tribology  |
| 19 BRUKER              | T8 Biotribology, biomimetics   |
|                        | T9 Tribology in manufacturing processes and industrial systems                           |
|                        | T10 Tribology to face the education and societal challenges                              |
|                        | T11 Partner Event - 47 <sup>th</sup> Leeds-Lyon Symposium on Tribology                   |

# PRACTICAL INFORMATION

## Registration desk Hall Terreaux

SUNDAY 10 JULY	14:00-19:00
MONDAY 11 JULY	07:30-19:30
TUESDAY 12 JULY	08:00-19:00
WEDNESDAY 13 JULY	08:00-19:30
THURSDAY 14 JULY	08:00-19:30
FRIDAY 15 JULY	08:00-17:30

## Badges info

For security reasons, you are required to wear your badge at all times while at the Conference. Conference and exhibitor badges give access to the welcome reception, sessions, posters and industrial exhibition, coffee breaks, official ceremonies.

## Cloakroom

A cloakroom and baggage room is available near the registration desk. But for security reasons, we suggest that you leave your belongings at your hotel.

► For 'Lost and found' items: please check at the registration desk.

## Coffee breaks

The coffee breaks are served in the Exhibition Hall - Level -2.

MONDAY 11 JULY	10:30-11:00 / 15:20-15:50
TUESDAY 12 JULY	10:40-11:30 / 15:50-16:20
WEDNESDAY 13 JULY	10:40-11:10 / 15:50-16:50
THURSDAY 14 JULY	10:40-11:30 / 15:50-16:20
FRIDAY 15 JULY	10:40-11:10

## Poster sessions

The poster sessions will take place in the Exhibition Hall of Lyon Convention Centre, along with the industrial exhibition and coffee breaks.

► Posters sessions are scheduled on:

TUESDAY 12 JULY	10:40-11:30
WEDNESDAY 13 JULY	15:50-16:50
THURSDAY 14 JULY	10:40-11:30

## Lunches

Registration fees do not include lunches. They are proposed as additional tickets, either as seated lunch or lunch bag. There is no guarantee of lunch tickets availability on-site.

► Lunch bags can be enjoyed either in the Convention Centre or in the Parc de la Tête d'Or (2 min. walk).

## Dress code

The dress code for the conference and social events is **casual/informal**.

## Language

English is the official language of the conference.

## Covid conditions

At the time of editing this program book, there are no specific health restrictions in France and in Lyon Convention Centre.

► Should you need additional information or assistance regarding a specific health issue, please proceed to the registration desk.

## Help

Should you have questions or require help, please ask the registration desk or liaise with our wonderful team of volunteers wearing red T-shirts!

## CONGRESS VENUE

### ► Lyon Convention Centre

50, QUAI CHARLES DE GAULLE  
69006 LYON  
CITÉ INTERNATIONALE  
[www.ccc-lyon.com](http://www.ccc-lyon.com)

### ► Access by public transport

Each participant will be offered a 24h pass per conference day, activated on the first entry on the TCL network, and providing an unlimited access to subways, trams, buses and funiculars.



#### BUS STOP | MUSÉE DES BEAUX-ARTS

- Line C1-C2: from Part Dieu station
- Line C5: from Bellecour metro station
- Line C4: from Jean Macé metro station



#### CAR PARKS

- P1 - P2 - P0 public car parks
- 2 to 10 min. walking distance



#### VELO'V BIKE RENTAL

- 4 bike rental stations in the Cité Internationale
- 1 to 3 days passes

## WTC 2022, AN ECO-FRIENDLY EVENT

Lyon is one of the smartest destination in Europe: the City was granted by the European Union the "European Capital of Smart Tourism 2019" Award and in 2021, Lyon Airports obtained the ISO 14001 for its environmental performance. However, reducing the environmental impact of WTC 2022 in Lyon was one of our major challenges. The organizers, OnlyLyon, the Lyon Convention Centre and all WTC 2022 partners have worked together on this topic to make the congress an eco-friendly event, with concrete actions and incentives:



Carbon calculator suggested to delegates in order to estimate their personal impact

Encouragement to use train for travelling in France

24h pass offered for each conference day to use on local public transports: tramway, subway, bus and funicular

Organization and Scientific committees have been mainly organized remotely in order to reduce travel impact

Carbon compensation: the organizers will support a NGO, selected for its eco-policy

Awareness-raising to sustainable topics with a plenary talk dedicated to global climate change



Use of paper has been drastically limited: a reduced Program Book format, an online interactive program and book of abstracts, encouragement to all sponsors and exhibitors to replace their printed brochures by a single "bookmark" delivered in the delegates' kit

No plastic bottle provided during the congress: a personal isothermal mug is offered to each participant and water fountains are available throughout the Convention Centre

Intelligent waste management in the Convention Centre, including sorting and recycling of biowaste

Optimization of energy and water consumption in the venue, as well as reducing CO<sub>2</sub> emissions by promoting electric vehicles and offering respective recharging stations

Upcycling of the badges pouches at the end of the congress



Local food production, short supply chains, accessibility and distribution, seasonal and organic products

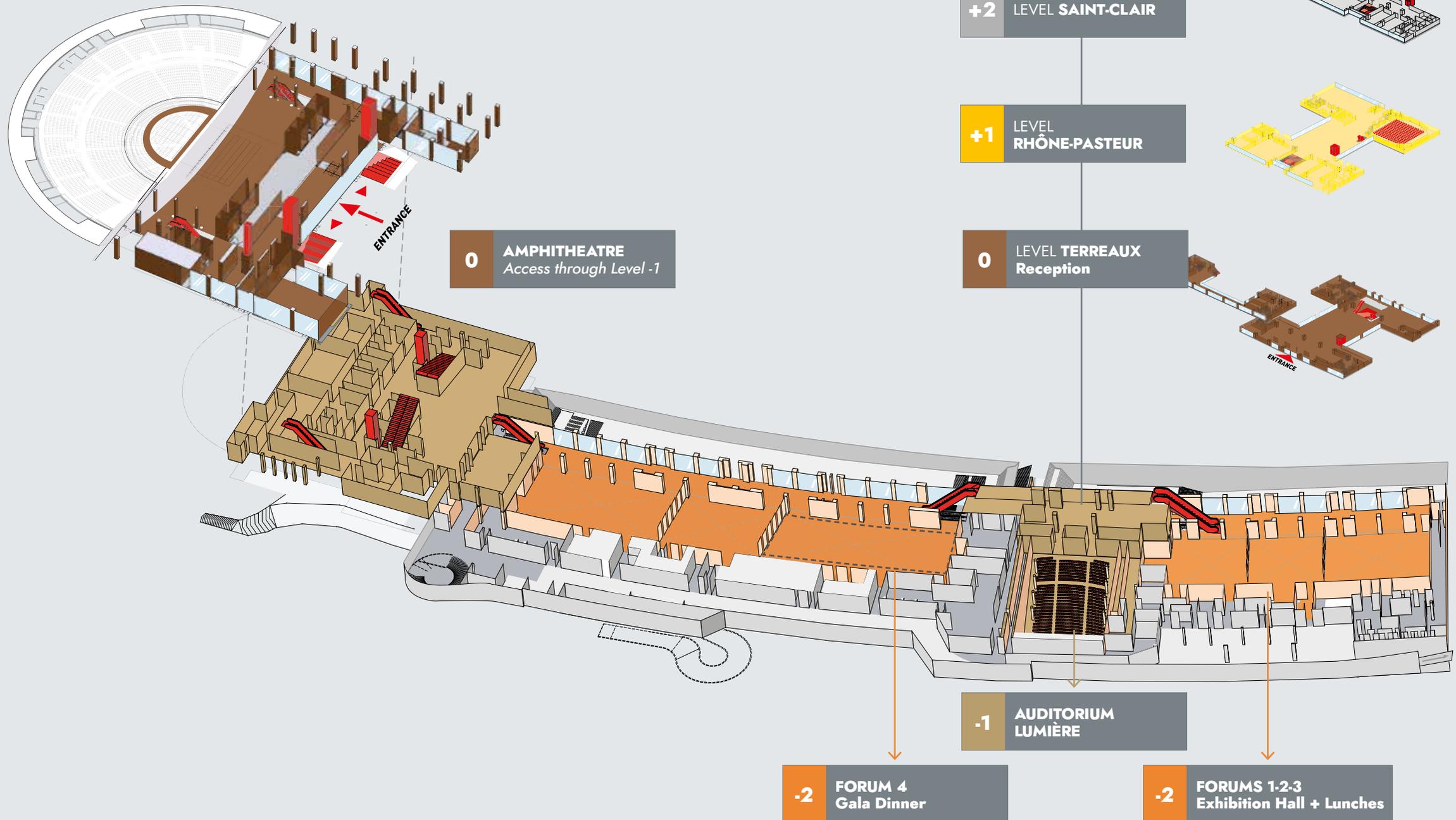
Limitation of food waste by daily collection of unconsumed products and meals for charities, in conformity with health regulations

Sourcing of local suppliers, within 100km of Lyon at the most

The organizers expect all participants to reduce use of energy and resources, during the conference

Together, let us act for a sustainable world,  
Tribology can actively contribute to this purpose!

# CONVENTION CENTRE FLOORPLAN



**EVERYTHING  
YOU NEED TO KNOW  
ON WTC 2022:**

[www.wtc-2022.org](http://www.wtc-2022.org)

JUN 2022 | Design by supernova-design.fr

