

« Introduction of the EMR'25 Summer School »

Dr. Clément MAYET, Prof. Alain BOUSCAYROL

L2EP, University of Lille, France

- 1 Univ. Lille & L2EP**
- 2 EMR summer schools**
- 3 EMR'25 organization**

EMR'25, Lille (France)

« University of Lille & L2EP »

Pr. Alain BOUSCAYROL,
(Unv. Lille, L2EP)



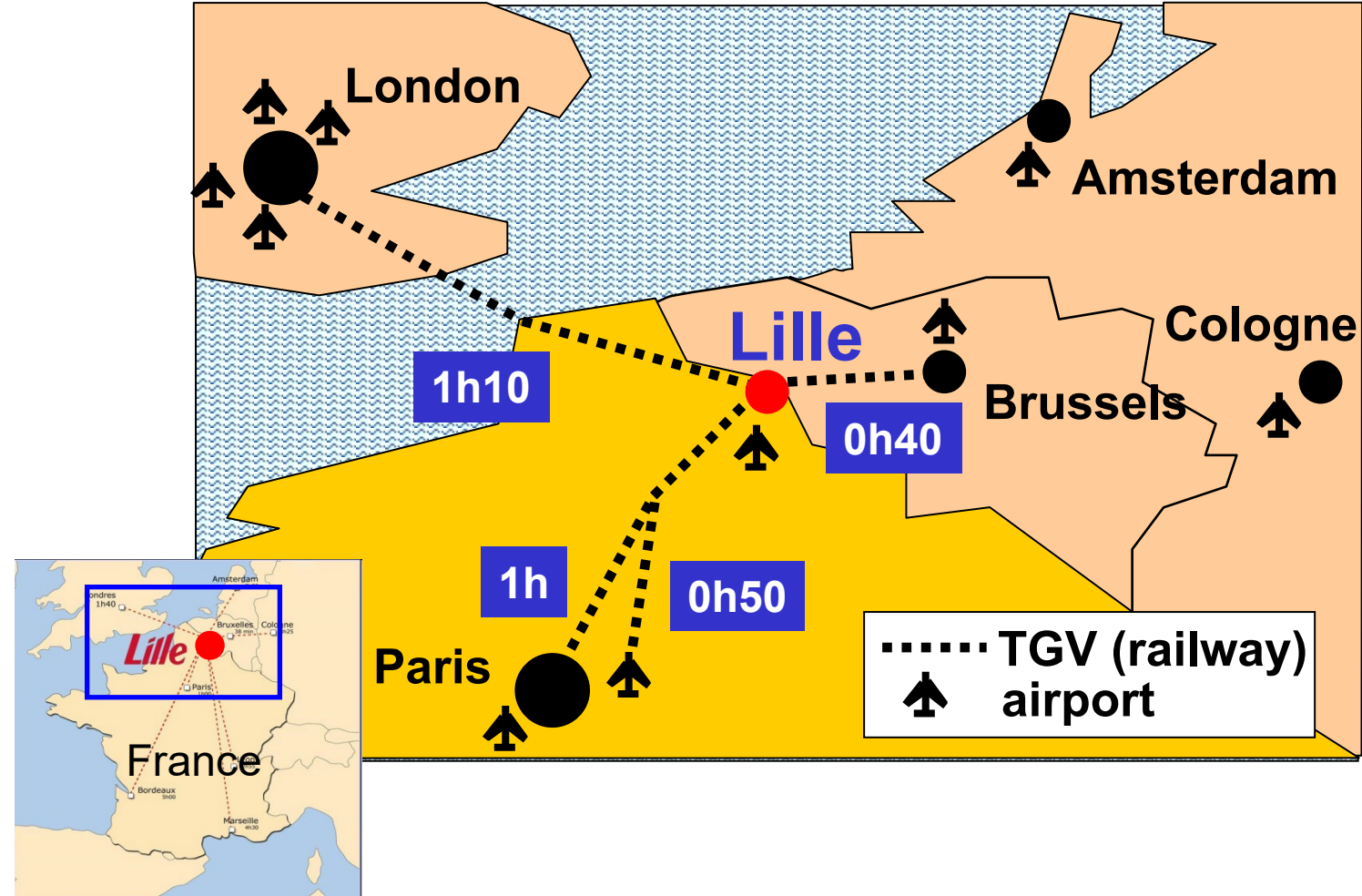
at the crossroad of Paris, London and Brussels

Lille and suburbs more than 1.5 million inhabitants

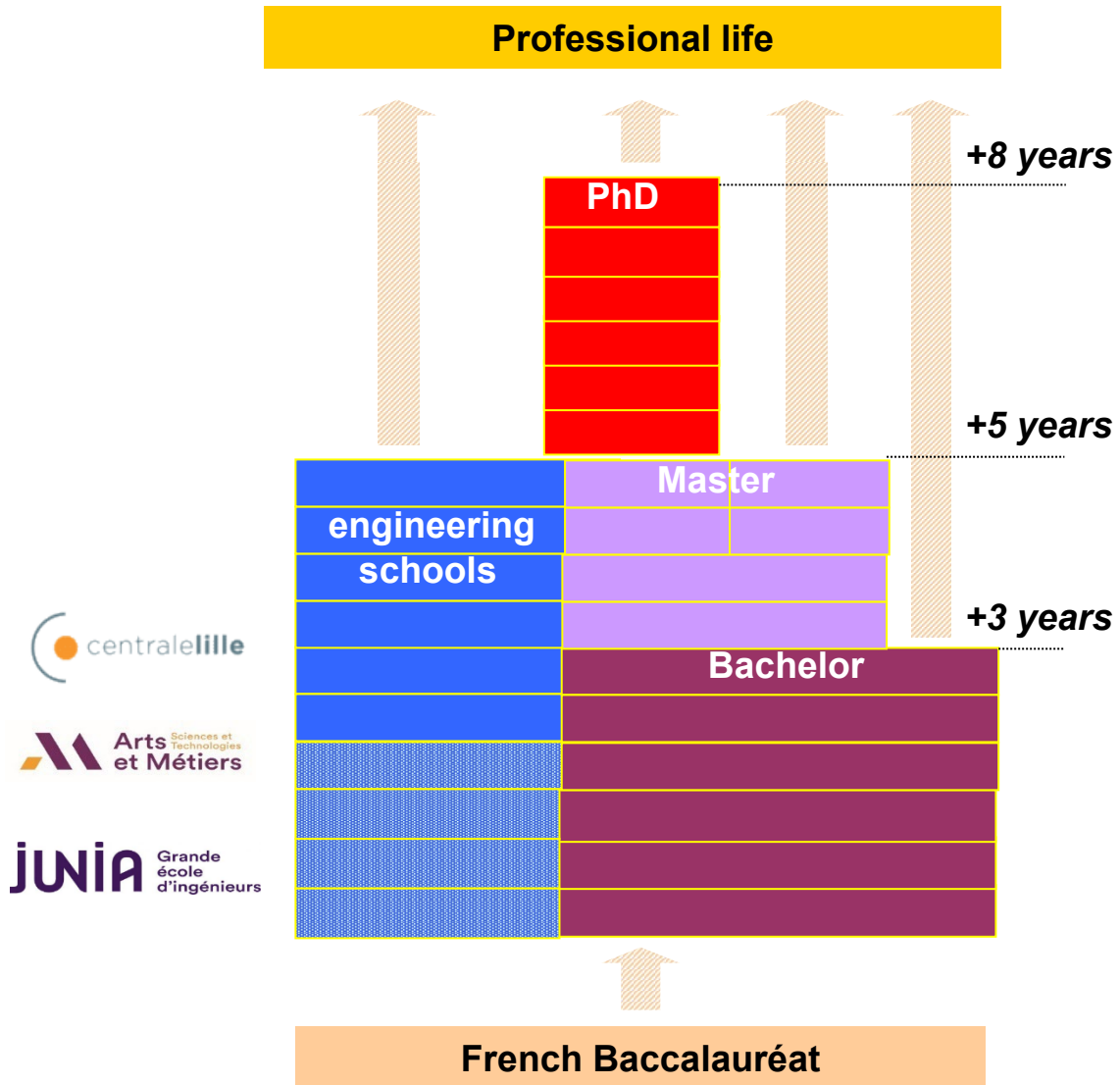


University of Lille in 2020

- 80,000 students (12% foreign students)
- 8,000 staff
- 64 research Labs
- About 400 PhD/year



<https://www.univ-lille.fr/en/>



Université de Lille



Fields of study at Univ. Lille

- Arts, literature, language
- Laws, economy, management
- Social and human sciences
- Health and Sport
- Sciences and technologies
 - ~ computer sciences
 - ~ control engineering
 - ~ **electrical engineering**
 - ~ mechanics engineering
 - ~ telecommunications...

Master « Electrical Systems & Automatic Control »

4 specialties including
“Electrical Engineering for Sustainable development”

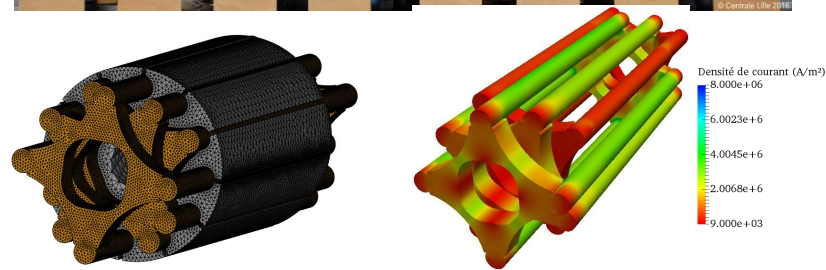
Introduction to EMR'25

- L2EP Lille -

<http://l2ep.univ-lille.fr/>

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More than 120 members : 40 professors and associate professors, 45 PhD students, 17 lab's staff, 25 Post-doctoral positions, Master students, etc.



Introduction to EMR'25

- Research at L2EP -

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Prof. Betty LEMAIRE-SEMAIL

Control

Prof. Alain BOUSCAYROL



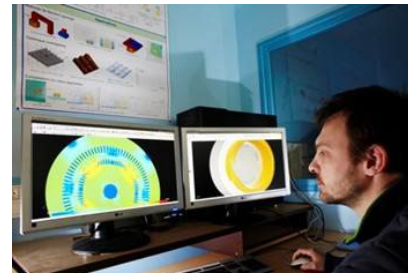
Power electronics

Prof. Nadir IDIR



Numerical tools & methods

Prof. Abdelmounaim TOUNZI



Power grids

Prof. Benoit ROBYNS




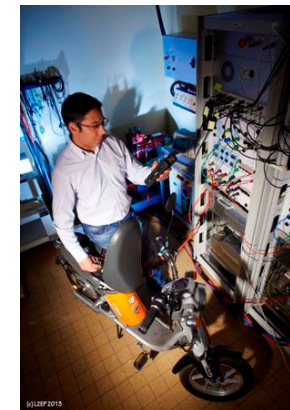
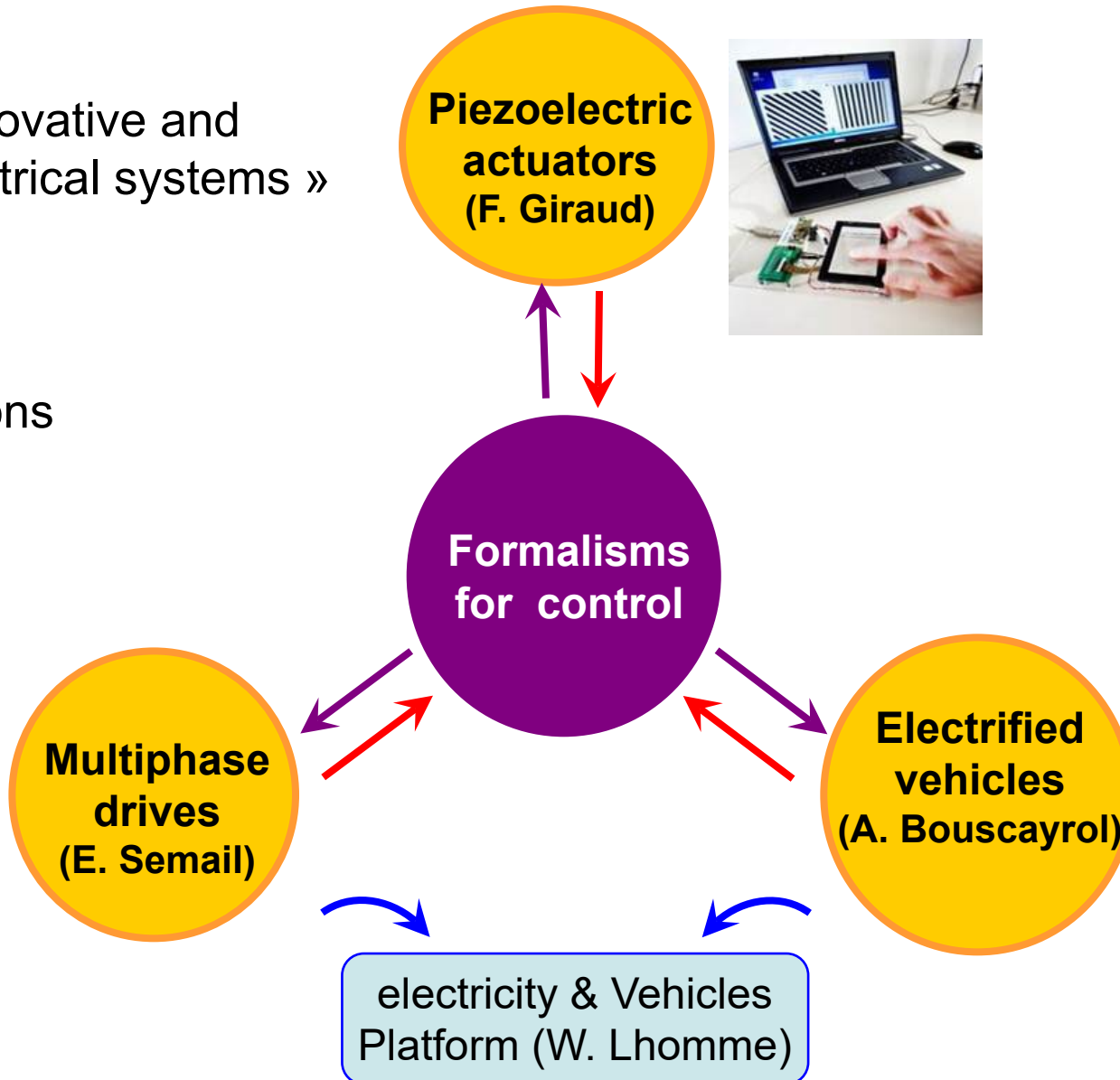
Objective:

Control for innovative and efficient « electrical systems »

Key aspects

- Unified methodology
- Experimental validations

Top Down  Bottom Up 



April 2025
5 Professors
5 Associate Prof.
2 Engineers
1 Technician
5 Post-Doc
13 PhD students
6 Master students

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Energetic Macroscopic Representation (EMR)

Dr. Clément MAYET,
(Univ. Lille, L2EP)

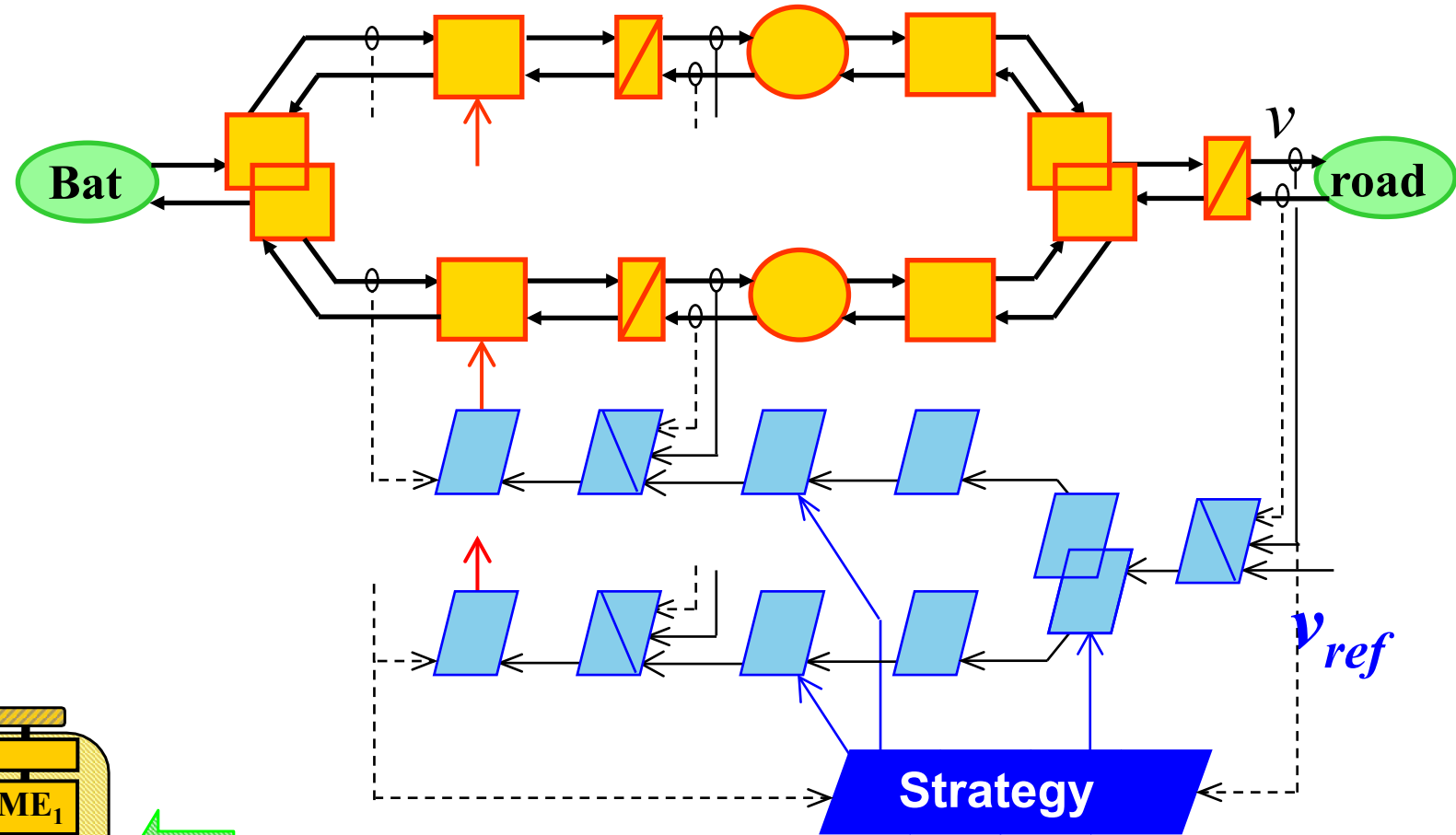
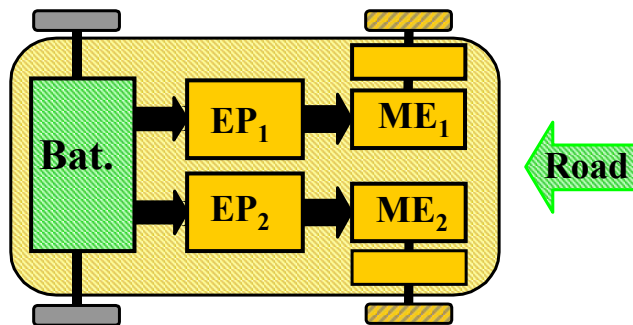
EMR
(graphical description)

=

organization
of models of
complex systems



Systematic deduction
of organization of
control schemes



- **University of Lille, Polytech Lille, Centrale Lille**

- Master 1: EMR initiation
- Master 2: EMR further development

- **Other French Universities and Engineering Schools**

- Cachan (2004) Belfort (2006), ParisTech (2010),
- Polytech'ParisSud (2018), etc.

- **Universities abroad France**

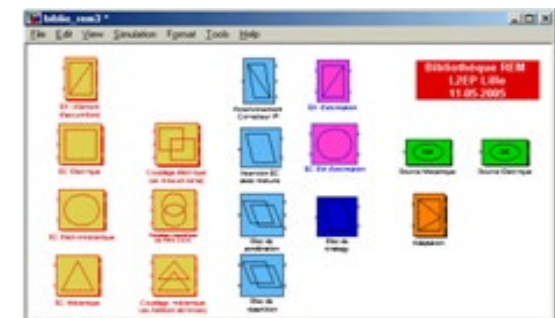
- Canada (Trois-Rivières, 2002, Sherbrooke 2015)
- Switzerland (EPF Lausanne, 2005, Univ. Sion, 2014)
- Spain (Barcelona, 2010, Madrid 2013, Oviedo, 2016)
- Portugal (Coimbra, 2014) Colombia (Santander, 2016)
- China (Tsinghua, 2008, Harbin 2013) Vietnam (Hanoi, 2017)
- Colombia (Santander, 2019), Romania (Cluch 2020),
- India (Amity, 2024)...



Simulation session, EMR'08, Harbin



EMR'17, Lille, June 2017



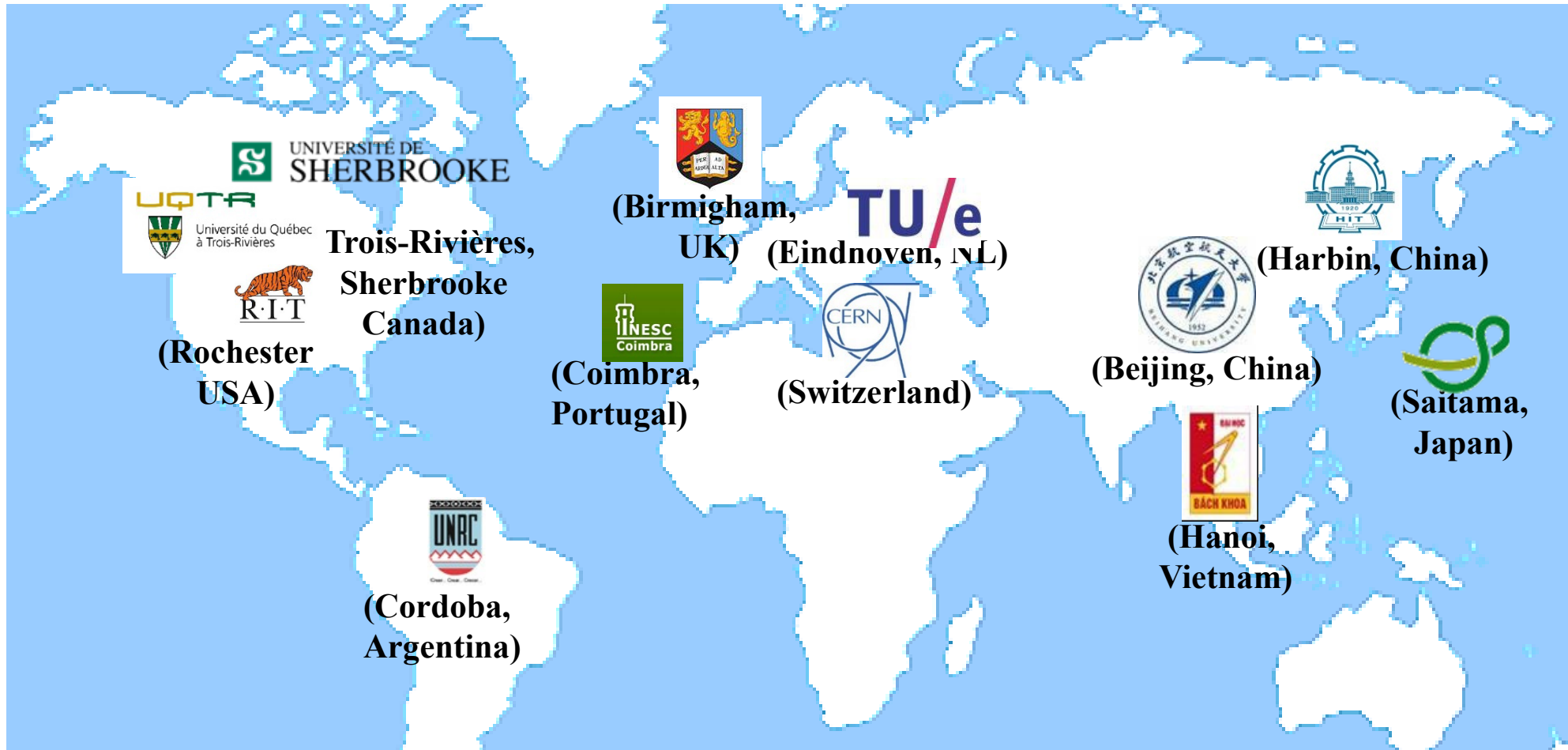
EMR Simulink library

Introduction to EMR'25

- EMR & collaboration -

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Industry



Introduction to EMR'25

- EMR Summer Schools -

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Starting 2006, since 2011 annual, since 2013 odd years in Lille, even years abroad

EMR'09, Trois-Rivières
Université du Québec à Trois-Rivières

EMR'14, Coimbra
INESC Coimbra

EMR'12, Madrid
Universidad Carlos III de Madrid

EMR'16, Montréal
UNIVERSITÉ DE SHERBROOKE

EMR'11, Lausanne
EPFL

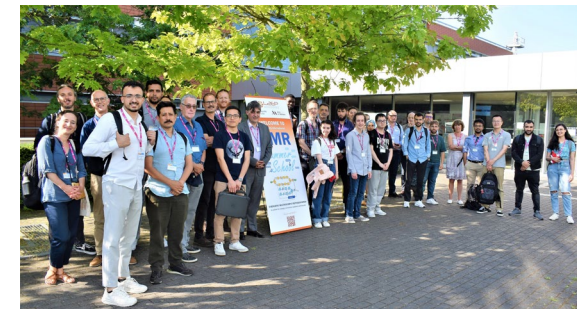
EMR'21, Sion
Hes-so

EMR'08, Harbin
哈爾濱工業大學
HARBIN INSTITUTE OF TECHNOLOGY

EMR'18, Hanoi
AMITY UNIVERSITY

EMR'25, Noida
AMITY UNIVERSITY

EMR'06, EMR'13, EMR'15, EMR'17, EMR'19, EMR'21, EMR'23, EMR 25 Lille
Université Lille 1 Sciences et Technologies
L2EP
Université de Lille



EMR'25, Lille (France)

EMR'25 Organization

Dr. Clément MAYET,
(Univ. Lille, L2EP)





hybrid mode!

128 participants

21 countries

57 in-presence

71 on-line

Introduction to EMR'25

- Hybrid Organization -

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concept lectures

application lectures

simulation

Montreal UCT-4	Paris UTC+2	Hanoi UTC+7	Tuesday 8	Wednesday 9	Thursday 10	Friday 11	
3:00	9:00	14:00		Simulation part 1	Simulation part 2	Simulation part 3	simulation connexion from Africa Asia Europe
3:30	9:30	14:30					
4:00	10:00	15:00					
4:30	10:30	15:30		Polytech'Lille & on-line	Polytech'Lille & on-line	Polytech'Lille & on-line	
5:00	11:00	16:00					
5:30	11:30	16:30	Registration ESPRIT				
6:00	12:00	17:00				and VISITS	
6:30	12:30	17:30					
7:00	13:00	18:00	Lunch ESPRIT	Lunch ESPRIT	Lunch ESPRIT	Lunch ESPRIT	
7:30	13:30	18:30					
8:00	14:00	19:00	Fundaments 1	CUMIN	MEGEVH	Transport Applications	lectures on concepts applications
8:30	14:30	19:30					
9:00	15:00	20:00					
9:30	15:30	20:30	Fundaments 2	Power Systems	IEEE-VTS 1	HIL testing	LILLIAD building
10:00	16:00	21:00					
10:30	16:30	21:30					
11:00	17:00	22:00	Sotf./Hard. Tools	E-bikes	Interdisciplinary	IEEE-VTS 2	
11:30	17:30	22:30					
12:00	18:00	23:00					
12:30	18:30	23:30					
13:00	19:00	0:00	Simulation part 1	Simulation part 2	Simulation part 3		simulation connexion from America
13:30	19:30	0:30					
14:00	20:00	1:00					
14:30	20:30	1:30	on-line	on-line	on-line		
15:00	21:00	2:00					
15:30	21:30	2:30					
16:00	22:00	3:00					

local + on-line for Asia, Africa Europe

On-line for North & South America

1. Matlab-Simulink

In-presence

C-006 & C-008, Polytech building
Univ. Lille

Classical for the summer school
no particular needs!



2. Matlab-Simulink On-line Using ZOOM

With your own Matlab-Simulink
No particular needs!

The image displays a MATLAB Live Editor window with the following code:

```
16 % L2EP Lille
17
18
19 cic; clear all; close all;
20
21 disp(' ');
22 disp('***** Initialisation EV_dcm *****');
23 disp('***** started *****');
24 disp(' ');
```

Below the code is a table of 'VEHICLE PARAMETERS':

*****	*****	*****
*****	*****	*****
BATp_V_batt = 400;		
BATp_ns = 96;		
BATp_np = 2;		
BATp_Ccell = 59;		

Next is a library of EMR blocks categorized by color and function:

- Source:** Unifrom Source, Downstream Source
- Converter:** Lossy DC-DC Converter, Lossless DC-DC Converter
- Accumulation:** Accumulation Element
- Coupling:** Mass-spring coupling, Lossy spring coupling
- Adaptation:** Adaptation
- Conversion Inversion:** Converter Inversion
- Accumulation Inversion:** Accumulation Inversion Element
- Coupling Inversion:** Weighing DCM Inversion, Inverse DCM Inversion
- Estimation:** Estimation
- ETC:** ETC
- Strategy:** Strategy

Finally, a Simulink model diagram is shown with the title 'EMR'25 Training Electric Vehicle with DC Machine (c) L2EP Lille (May 2025)'. The diagram includes a battery block, a DC machine block, and a road block.

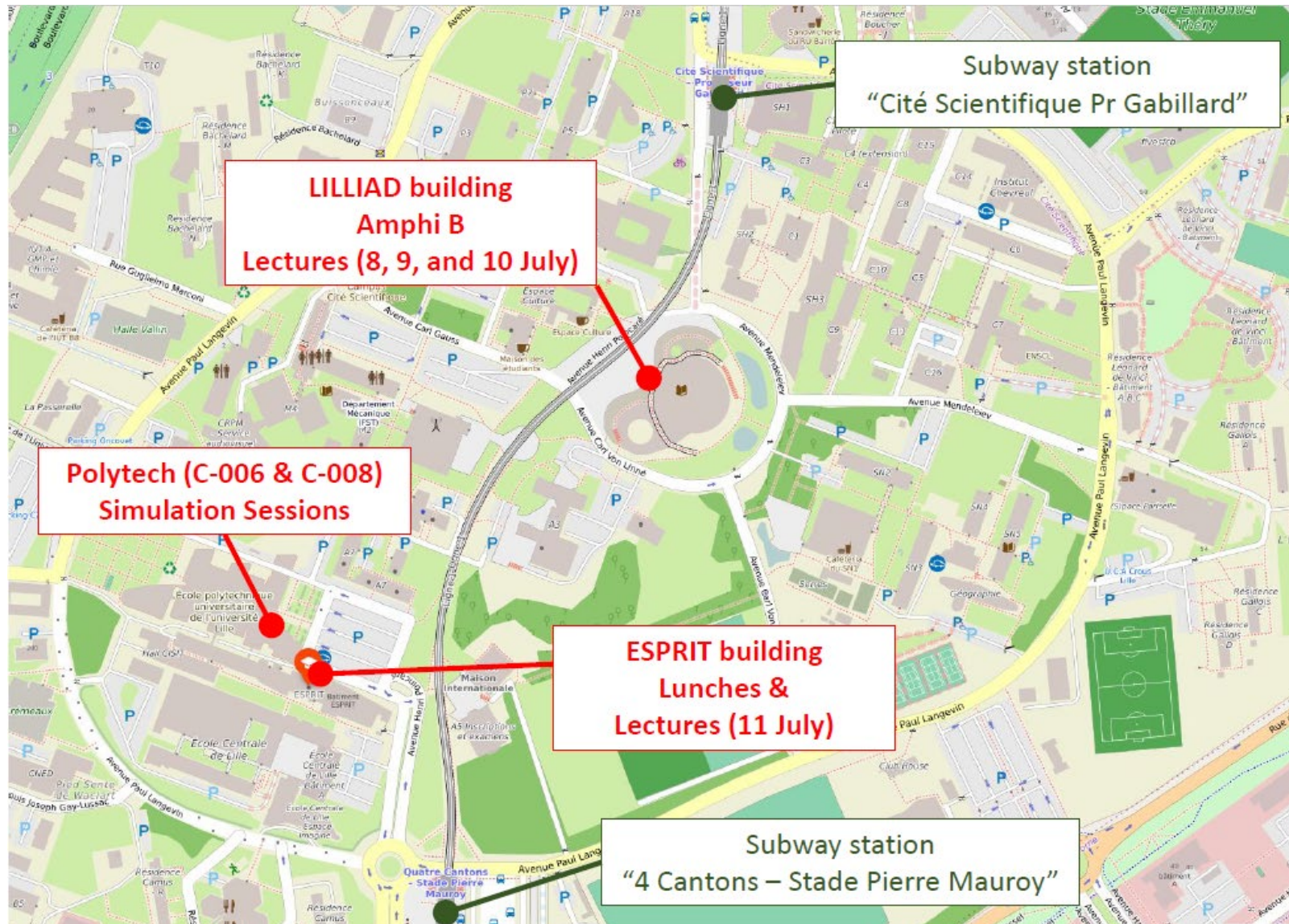
Our simulation team (12 volunteers) will help you!

Introduction to EMR'25

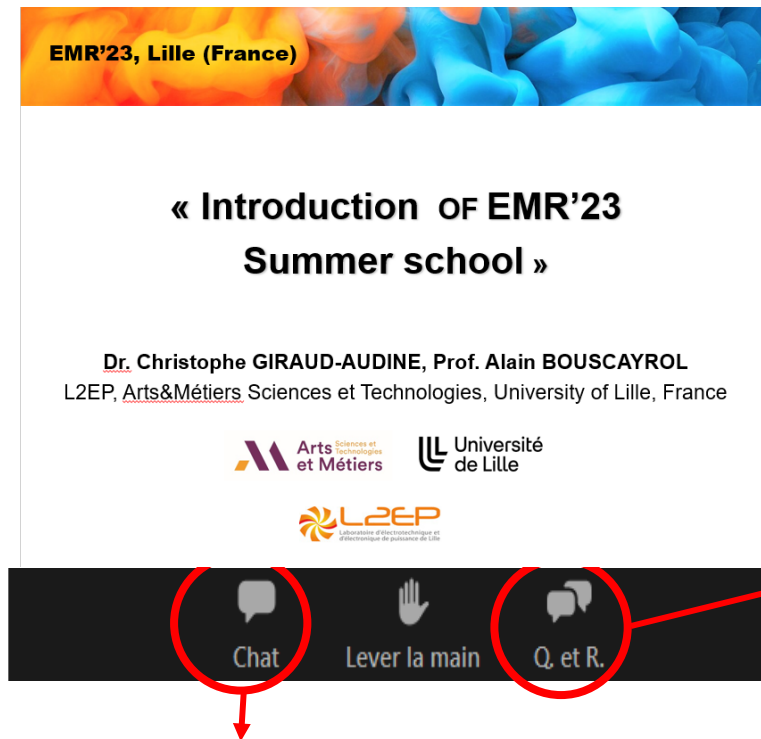
- Locations for in-person participants -

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Problem with ZOOM?
Stop & Restart = 75% of solutions



During lectures

- turn off microphone
- open your mind!

(increase of the flow quality)

For questions

- ask your question by Q&R
- chairman gives you the floor
- turn on your microphone
- give your name & affiliation
- and take the question

(no question = no interest)



CHAT: for general issues or info only
(lack of sound, screen share, etc.)

During EMR25: EMR-cloud (guidelines, simulation files, presentations the day after)
see your information e-mail

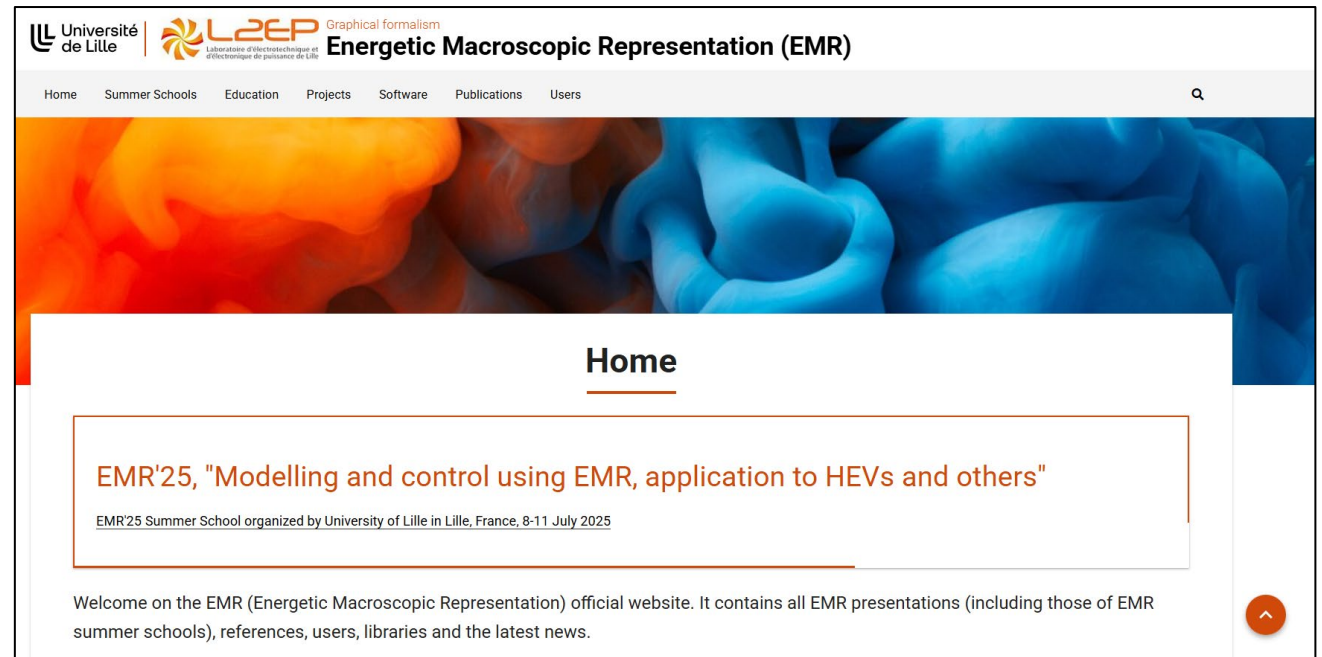


After EMR25:
EMR web-site

All documents available
next week at

<https://emr-website.univ-lille.fr/>

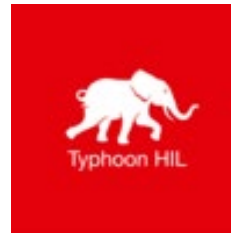
- Summer schools
- Publications
- Education
- Users
- Projects



Any question: clement.mayet@univ-lille.fr



Thanks to our valuable supports!





EMR'25, Lille (France)

« Biographies and references »



Dr. Clement MAYET, University of Lille, L2EP,
PhD in Electrical Engineering at University of Lille in 2016
Associate Prof. at CNAM Paris from 2018 to 2023
Associate Prof. at Univ. Lille since 2023
Associate Editor of IEEE VTS Magazine since 2020
Co-chair of IEEE VPP Technical Committee since 2022
Research topics: EMR formalism, railway applications

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Prof. Alain BOUSCAYROL, University of Lille, L2EP,
Head of the Master “Automatic control & Electrical Systems”
Coordinator of the CUMIN interdisciplinary programme
Chair of the steering committee of IEEE-VPP Conference
PhD in Electrical Engineering at University of Toulouse (1995)
Research topics: EMR formalism, HIL testing, control & EV-HEVs

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EMR'25, Lille (France)

Thanks for your attention !