

COST ACTION CA18223
SYMAT
FUTURE COMMUNICATIONS WITH
HIGHER-SYMMETRIC ENGINEERED
ARTIFICIAL MATERIALS

“Exploiting Symmetries in Artificial Materials for Antenna Applications”

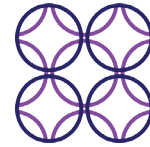
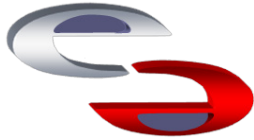
Paris, September 25-28 2023

Co-organized by
the European School of Antennas and the SyMat COST Action,
Coordinators: Guido Valerio, Oscar Quevedo-Teruel, and Enrica Martini
for information, write to: guido.valerio@sorbonne-universite.fr

Trainers:

Guido Valerio, Sorbonne Université, GeePs, France
Oscar Quevedo-Teruel, Royal Institute of Technology (KTH), Sweden
Enrica Martini, Università di Siena, Italy (on-line)
Astrid Algaba Brazalez, Ericsson Research, Ericsson AB (on-line)
Andrea Alù, The City University of New York, USA (on-line)
Simon Horsley, University of Exeter, United Kingdom
Francisco Mesa, Universidad de Sevilla, Spain
Eva Rajo-Iglesias, Universidad Carlos III de Madrid, Spain

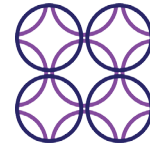
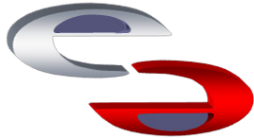




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Monday 25 September

8:45 - 9:00	Guido Valerio Introduction to the course
9:00 - 10:30	Guido Valerio An Introduction on periodic structures and dispersion analyses in electromagnetics
10:30 - 11:00	<i>Coffee break</i>
11:00 - 12:00	Guido Valerio Spatial symmetries in EM and properties of higher-order symmetries
12:00 - 13:00	Francisco Mesa Multi-modal transfer-matrix methods to compute the dispersion diagrams of periodic structures
13:00 - 14:00	<i>Lunch</i>
14:00 - 16:00	Francisco Mesa Circuit modelling of higher-symmetry periodic structures
16:00 - 16:30	<i>Coffee break</i>
16:30 - 17:30	Guido Valerio Mode matching approach for the analysis of periodic structures with higher symmetries



Tuesday 26 September

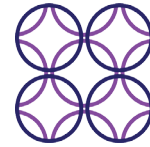
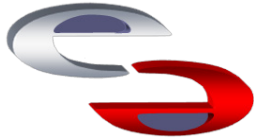
9:00 - 10:30	Simon Horsley Maxwell's equations and symmetry: Group theory in electromagnetism
10:30 - 11:00	<i>Coffee break</i>
11:00 - 13:00	Oscar Quevedo-Teruel Glide symmetries for lens antennas
13:00 - 14:00	<i>Lunch</i>
14:00 - 15:00	Oscar Quevedo-Teruel Glide symmetries for lens antennas
15:00 - 16:00	Enrica Martini (on-line) Complementarity, duality and symmetry
16:00 - 16:30	<i>Coffee break</i>
16:30 - 18:00	Andrea Alù (on-line) Tailoring wave propagation in metamaterials with broken symmetries 1

Discovery cruise on the Seine: the secrets of Paris

One-hour tour starting at 19:15

Meeting at 19:00 at [Square du Vert Galant, 75001 Paris](#)

Walking distance from the venue (25 minutes) or metro line 7, direction "La Courneuve-8-Mai-1945", stop "Pont Neuf"



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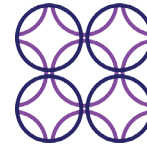
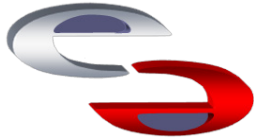
Wednesday 27 September

9:00 - 11:00	Simon Horsley What happens when two bands meet? Topology in electromagnetism
11:00 - 11:30	<i>Coffee break</i>
11:00 - 13:00	Eva Rajo-Iglesias Gap waveguide technology using higher symmetries II
13:00 - 14:00	<i>Lunch</i>
14:00 - 15:00	Enrica Martini (on-line) Complementarity, duality and symmetry
15:00 - 16:00	Enrica Martini (on-line) PTD symmetries
16:00 - 16:30	<i>Coffee break</i>
16:30 - 17:30	Andrea Alù (on-line) Tailoring wave propagation in metamaterials with broken symmetries 2

Social dinner at Bouillon Racine

Meeting at 19:20 at [3 rue Racine, 75006, Paris](#)

Walking distance from the venue (15 minutes) or metro line 10, direction “Boulogne”, stop “Cluny La Sorbonne”.



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Thursday 28 September

9:00 - 10:00	Guido Valerio Homogenization of glide-symmetric metamaterials
10:00 - 11:00	Eva Rajo-Iglesias Gap waveguide technology using higher symmetries I
11:00 - 11:30	<i>Coffee break</i>
11:30 - 13:00	Astrid Algaba Brazalez (on-line) Higher-symmetry research for antenna applications at Ericsson
13:00 - 14:00	<i>Lunch</i>
14:00 - 15:30	Astrid Algaba Brazalez (on-line) Higher-symmetry research for antenna applications at Ericsson
15:30 - 16:00	<i>Coffee break</i>
16:00 - 17:00	Final exam

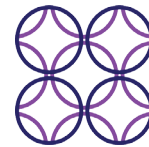
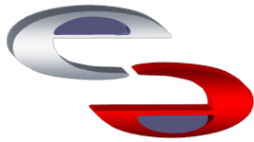
Farewell cocktail

Zamansky tower panoramic observation deck, Sorbonne Université

Meeting at 18h30 at the 24th floor (room 2400) of the [Zamansky tower](#).

How to validate the school: a 1-hour final test will be done on Thursday afternoon on the entire program of the school. The attendance of the entire week is mandatory to validate the school.

European Credits: 5



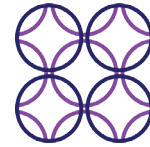
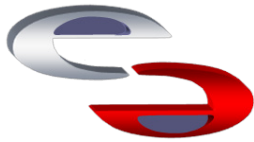
How to reach Paris from airports

From Charles de Gaulle Airport

1. Taxi to the left bank (62 €)
<https://www.parisaeroport.fr/en/passengers/access/paris-charles-de-gaulle/taxi>
2. RER B to Paris Center (11.45 €)
stops in right bank: Gare du Nord, Chatelet-Les Halles
stops in left bank: Saint-Michel-Notre-Dame, Luxembourg, Port Royal, Denfert-Rochereau, Cité Universitaire
<https://www.parisaeroport.fr/en/passengers/access/paris-charles-de-gaulle/public-transport/rer-b>
3. RoissyBus to right-bank Opéra (16.20 €)
close connections to Opéra metro 3,7,8, Auber RER A, Chaussée d'Antin metro 7,9, Havre-Caumartin metro 3,9
<https://www.parisaeroport.fr/en/passengers/access/paris-charles-de-gaulle/public-transport/roissybus>

From Orly Airport

1. Taxi to the left bank (35 €)
<https://www.parisaeroport.fr/en/passengers/access/paris-orly/taxi>
2. OrlyVal to Antony station + RER B from Antony station to Paris Center (15.40 €)
stops in left bank: Cité Universitaire, Denfert-Rochereau, Port Royal, Luxembourg, Saint-Michel-Notre-Dame
stops in right bank: Chatelet-Les Halles, Gare du Nord
<https://www.parisaeroport.fr/en/passengers/access/paris-orly/public-transport/rer-b-orlyval>
3. OrlyBus to left-bank Denfert-Rochereau (11.20 €)
connection to metro line 6
<https://www.parisaeroport.fr/en/passengers/access/paris-orly/public-transport/orlybus>



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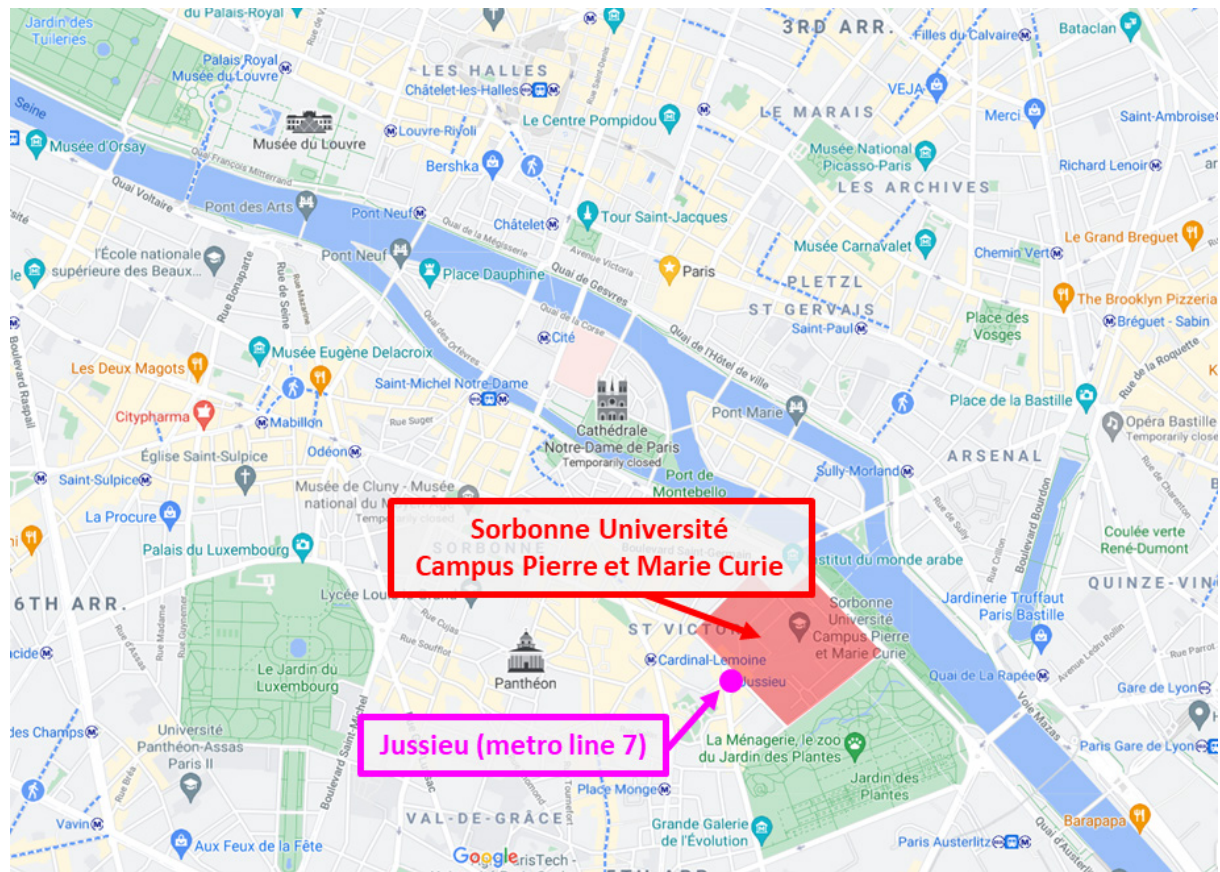
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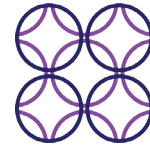
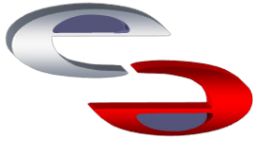
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How to reach the venue:

Sorbonne Université, Campus Pierre et Marie Curie

4 place Jussieu 75252, Paris (metro lines 7 and 10, Jussieu)





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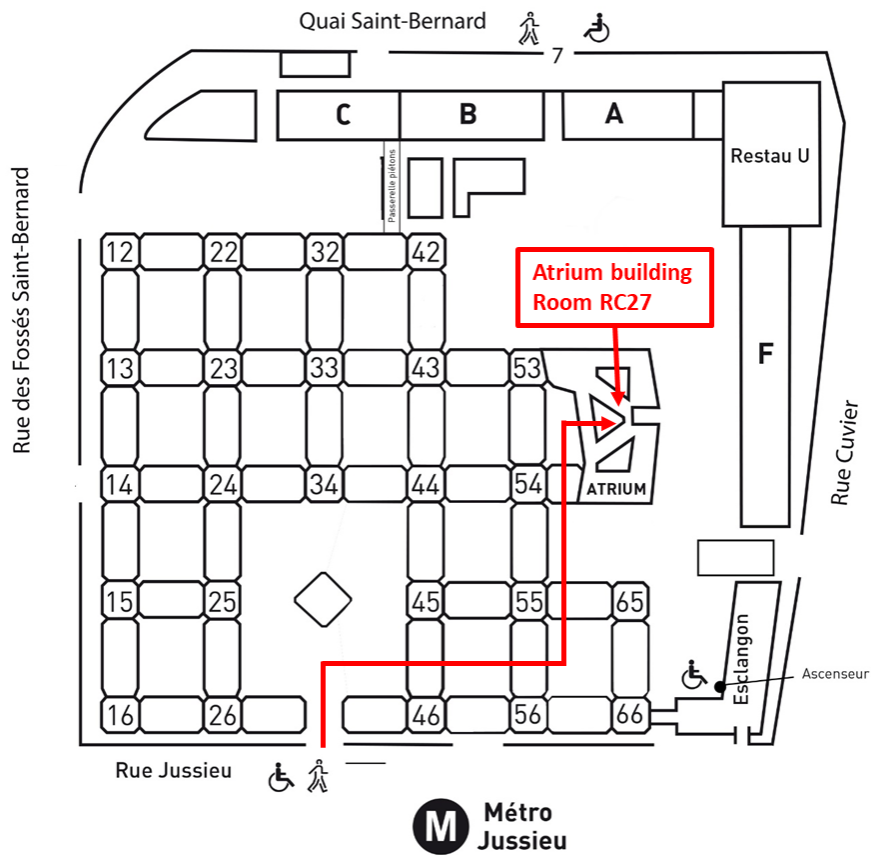
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How to reach the room inside the Campus:

Room RC27, Atrium building

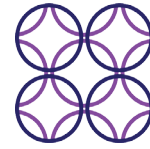
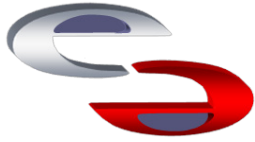
(**downstairs** after entering the Atrium building)



The Atrium building coming from the metro



The Atrium facade opposite to the metro



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In Paris beyond the school...

The tourist office website is <https://en.parisinfo.com/>

Another website with suggested activities in Paris is <https://quefaire.paris.fr/> (in French).

