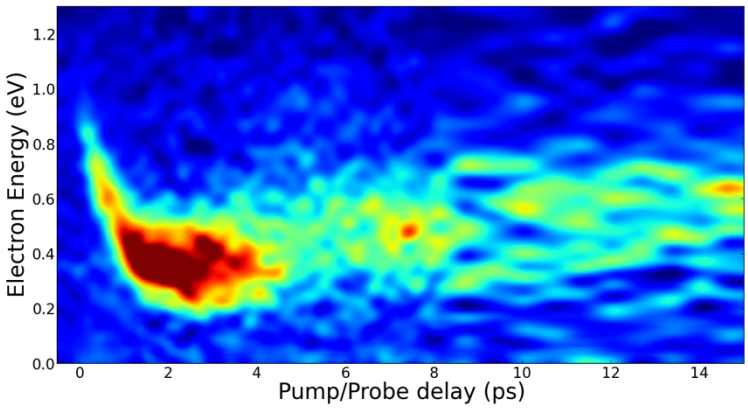
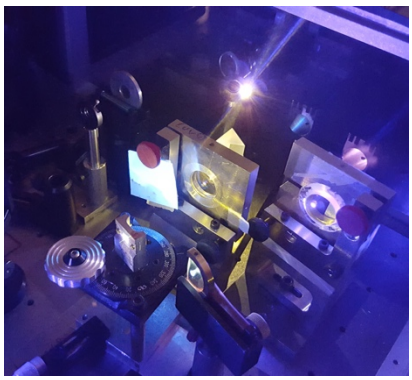
ÉCOLE DE
PHYSIQUE DES HOUCHES

Book of Abstracts

Multiscale Dynamics in Molecular Systems

Ecole de Physique des Houches
August 25th to August 30th, 2019





GDR
EMIE

université
PARIS-SACLAY
Département de Chimie

**Cette école bénéficie d'une aide Investissements d'Avenir du LabEx PALM (ANR-10-LABX-0039-PALM)
Elle bénéficie d'une aide du CNRS via les GDRs UP, EMIE, le Réseau FEMTO et la fédération CPPS.
Elle bénéficie d'une aide de l'Université Paris-Saclay via le département de chimie.**

Introduction

What happens to a molecule when it is excited via laser irradiation or upon collisions? What is the effect of the environment on the excitation energy dissipation? How can electronic and vibrational coherence be probed and controlled? These are some of the questions that will be addressed at the school Multiscale dynamics in molecular systems. Experimental spectroscopy techniques allow nowadays to access information about molecular processes in the attosecond regime, the typical time scale of electronic motion, and in the femtosecond regime, the typical time scale of ultrafast structural reorganization in molecules. At the same time, new theories are necessary to describe phenomena beyond the linear response of a microscopic system to strong fields, or to realistic account for the loss of coherence of a molecular complex into the environment.

These combined developments from the experimental and theoretical perspectives in the field of ultrafast processes are, thus, able to provide a clear, time-resolved description of the non-equilibrium dynamics of molecules at the microscopic length scale. However, novel questions are constantly emerging, while the field of ultrafast dynamics rapidly evolves. The goal of this workshop is the training of young scientists in this domain, as it is an essential part of the work of the GDRs.

The workshop Multiscale dynamics in molecular systems is addressed to doctoral students, young postdoctoral researchers, and permanent staff members of universities and research institutions. The topics will cover experimental and theoretical/computational state-of-the-art techniques to study molecular processes from the attosecond to the millisecond time scales. The physics of the processes drastically changes when going from isolated systems to complex molecules surrounded by an environment, therefore the role of the coherence versus decoherence effects will be addressed.

GDR EMIE

The mission of the research group Édifices moléculaires isolés et environnés (EMIE) is to bring together the French community of physicists and chemists working on atomic and molecular aggregates in the gas phase. The study of these systems makes it possible to characterize at the microscopic level the fundamental physical and chemical mechanisms that occur up to the macroscopic level. The strength of GDR EMIE is based on a common language and a wide variety of experimental techniques and theoretical tools, offering the possibility to address both fundamental issues and to study increasingly richer systems, in a more complete and detailed way.

GDR UP

The mission of the Ultrafast phenomena (UP) research group is to bring together the French community of experimenters and theorists who study matter in all its states at ultra-short time scales: attosecond, femtosecond, picosecond.

Ecole de Physique des Houches

Les Houches is a village located in Chamonix valley, in the French Alps. Established in 1951, the Physics School is situated at 1150 m above sea level in natural surroundings, with breathtaking views on the Mont-Blanc mountain range.

Les Houches Physics School is UMS 2002 run by Université Grenoble Alpes (UGA). The 5 school partners of are UGA, the Centre National de la Recherche Scientifique (CNRS), the Commissariat à l'Enerie Atomique (CEA), the Institut National Polytechnique (Grenoble-INP), and the Ecole Normale Supérieure de Lyon (ENS Lyon).

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Sunday, 25th August

15:00 – 19:30 Registration

19:30 – 20:30 Dinner

Monday, 26th August

7:45 – 8:45 Breakfast

9:00 – 9:05 Introductory remarks

9:05 – 10:30 **Fernando Martin**, XChem, Universidad Autonoma de Madrid, Spain
Real-time observation of electron and nuclear dynamics in molecules: from the attosecond to the picosecond

10:45 – 12:15 **Pascal Parneix**, ISMO, Université Paris-Saclay, France
Intramolecular dynamics from statistical theories

12:30 – 13:30 Lunch

15:45 – 17:15 **Patrick Rousseau,** CIMAP, Normandie Université, France
Experimental studies of decays at long timescales

17:30 – 19:00 **Sophie Carles**, IPR, Université de Rennes, France
Kinetic studies of ion-molecule reaction in gas phase: models and experiments

19:00 – 19:30 Welcome reception

19:30 – 20:30 Dinner

Tuesday, 27th August

7:45 – 8:45 Breakfast

9:00 – 10:30 **Federica Agostini**, LCP, Université Paris-Saclay, France
Trajectory-based approaches to excited-state dynamics

10:45 – 12:15 **Johanna Brazard**, IPCMS, Université de Strasbourg, France
Two-dimensional electronic spectroscopy (2DES)

12:30 – 13:30 Lunch

16:00 – 19:15 **Workshops**
Federica Agostini, LCP, Université Paris-Saclay, France
Theoretical: Photodynamics of thiophene
Vincent Loriot, iLM, Université Claude Bernard – Lyon 1, France
Experimental: Toolbox for ultrafast experiments

19:30 – 20:30 Dinner

Wednesday, 28th August

7:45 – 8:45 Breakfast

9:00 – 10:30 **Benjamin Lasorne**, ICGM, Université de Montpellier, France
Nonadiabatic dynamics - current methods and challenges

10:45 – 12:15 **Alexander Kuleff**, IPC, Universität Heidelberg, Germany
Correlation driven attosecond hole migration in molecules

12:30 – 13:30 Lunch

19:30 – 20:30 Dinner

Thursday, 29th August

7:45 – 8:45 Breakfast

9:00 – 10:30 **Manuel Joffre**, LOB, Institut Polytechnique de Paris, France
Multi-dimensional infrared spectroscopy: experimental methods and applications

10:45 – 12:15 **Cyril Falvo**, ISMO, Université Paris-Saclay, France
Modeling coherent multidimensional vibrational spectroscopy

12:30 – 13:30 Lunch

16:00 – 17:30 **Aurélien de la Lande**, LCP, Université Paris-Saclay, France
Physical models to rationalize charge transfers between electron donors-acceptors, from attosecond to microsecond time scales

17:45 – 19:15 **Satchin Soorkia**, ISMO, Université Paris-Saclay, France
Electron and proton transfers

19:30 – 20:30 Regional dinner

Friday, 30th August

7:45 – 8:45 Breakfast

9:00 – 10:30 **Yann Mairesse**, CELIA, Université de Bordeaux, France
Measuring attosecond dynamics in molecules

10:45 – 12:15 **Françoise Remacle**, MOLSYS, Université de Liège, Belgium
Photoinduced electronic and nuclear dynamics in molecules

12:30 – 13:30 Lunch

13:30 End of the school & departure

Real-time observation of electron and nuclear dynamics in molecules

Fernando Martin (XChem, Universidad Autonoma de Madrid, Spain)

Sudden excitation or ionization of a molecule by visible, UV or XUV light is usually followed by charge redistribution on a time scale ranging from hundreds attoseconds to a few-femtoseconds, which is usually followed by fragmentation of the remaining molecular cation up to a few picoseconds. Such complex dynamics arises from the coherent superposition of electronic states covered by the broadband pulse and from rearrangements in the electronic structure of the molecular cation due to electron correlation. To investigate these ultrafast processes, attosecond pump-probe and transient absorption spectroscopies have been shown to be very valuable tools [1-8]. In this lecture, I will present the results of molecular pump-probe experiments and theoretical simulations in which several molecules, from the simplest H_2 one to the aminoacid tryptophan, are ionized and subsequently probed in order to obtain the complete molecular movie. The results of these pioneering works will certainly serve as a guide of future experimental efforts in more complicated molecules and may open the door to the control of charge transfer in biologically relevant processes [9].

[1] G. Sansone, F. Kelkensberg, J. F. Pérez-Torres, F. Morales, M. F. Kling, W. Siu, O. Ghafur, P. Johnsson, M. Swoboda, E. Benedetti, F. Ferrari, F. Lépine, J. L. Sanz-Vicario, S. Zherebtsov, I. Znakovskaya, A. L'Huillier, M. Yu. Ivanov, M. Nisoli, F. Martín, and M. J. J. Vrakking, Nature 465, 763 (2010).
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[3] A. Palacios, A. González-Castrillo and F. Martín, Proc. Natl. Acad. Sci. 111, 3973 (2014).
[4] P. Ranitovic, C. W. Hogle, P. Rivière, A. Palacios, X.-M. Tong, N. Toshima, A. González-Castrillo, L. Martina, F. Martín, M. M. Murnane, and H. Kapteyn, Proc. Natl. Acad. Sci. 111, 912 (2014)
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[6] M. Lara-Astiaso, D. Ayuso, I. Tavernelli, P. Decleva, A. Palacios, and F. Martín, Faraday Discussions 194, 41 (2016)
[7] M. Lara-Astiaso, M. Galli, A. Trabattoni, A. Palacios, D. Ayuso, F. Frassetto, L. Poletto, S. De Camillis, J. Greenwood, P. Decleva, I. Tavernelli, F. Calegari, M. Nisoli, and F. Martín, J. Phys. Chem. Lett. 9, 4570 (2018)
[8] L. Cattaneo, J. Vos, R. Y. Bello, A. Palacios, S. Heuser, L. Pedrelli, M. Lucchini, C. Cirelli, F. Martín, and U. Keller. Nature Physics 14,733 (2018)
[9] M. Nisoli, P. Decleva, F. Callegari, A. Palacios, and F. Martín, Chem. Rev. 117, 10760 (2017).

Intramolecular dynamics from statistical theories

Pascal Parneix (ISMO, Université Paris-Saclay, France)

Upon a rovibronic excitation, non adiabatic dynamics generally occurs on a short sub-ps time scale. Following this short electronic relaxation, the molecule can be found on the ground electronic state with a large amount of internal energy. Consequently different competitive intramolecular processes like, fragmentation, isomerisation, radiative emission have thus to be taken into account to properly describe the complete vibrational relaxation of the molecule on a long time scale (ns-ms). In this course, I will present some statistical theories which can be used to follow such intramolecular dynamics on the ground electronic state.

Experimental studies of decays at long timescales

Patrick Rousseau (CIMAP, Normandie Université, France)

In this lecture, we will focus on experimental studies of the relaxation processes of an isolated complex system occurring on timescales longer than nanoseconds. Complex systems possess numerous degrees of freedom and one can expect a wealth of competing processes depending on the excitation and the timescale. Usually the electronic excitation is distributed in various vibrational modes. Thus, unimolecular reaction (dissociation), vibrational radiative cooling, and electron emission allow for the dissipation of the excess energy and these processes can be described by statistical methods. In some case the reverse process from vibrational states to electronic states, i.e. the inverse internal conversion, could lead to the emission of fluorescence photon.

From an experimental point of view, dynamics at long timescales can be observed in the microsecond range using time-of-flight spectrometer. With the advent in the 1990s of electrostatic storage devices (ESDs) such as trap and rings, it is possible to study millisecond timescales. Present state-of-the-art ESDs are cryogenically cooled allowing to access even longer timescales and also to prepare the system in some given states.

Kinetic studies of ion-molecule reaction in gas phase: models and experiments

Sophie Carles (IPR, Université de Rennes, France)

The ion-molecule reactions can be a 1st step for the nucleation process. The knowledge of the rate coefficient and the branching ratios for each exit channel of a reaction is important to understand a possible molecular growth. The basics of molecular kinetics in gas and the capture models used for estimate the rate constant in the case of an ion-molecule reaction are presented. Some experiments to determine the reactivity parameters are described.

Trajectory-based approaches to excited-state dynamics

Federica Agostini (LCP, Université Paris-Saclay, France)

Excited-state dynamics is at the heart of Photophysics and Photochemistry. Nonadiabatic transitions are induced by the strong coupling between electronic dynamics and the ultrafast motion of the nuclei, and are observed in phenomena such as photosynthesis, photovoltaics, and exciton transport in pi-conjugated complexes. An essential part of the research efforts in these fields is directed towards developing theoretical and computational approaches to describe conformational changes, energy dissipation, or quantum decoherence, i.e., the signature aspects of excited-state processes. In this context, among the most successful frameworks for molecular dynamics simulations of excited-state processes stand *trajectory-based quantum-classical methods*, as they give access to the study of complex molecular systems. Trajectory-based approaches combine a classical description of nuclear dynamics with a quantum-mechanical description of electronic dynamics.

In this talk, I will give an overview on the formalism generally used to study nonadiabatic, excited-state processes, and I will describe in detail some trajectory-based approaches employed in simulations.

Two-Dimensional Electronic Spectroscopy (2DES)

Johanna Brazard (IPCMS, Université de Strasbourg, France)

Since 2001[1] two-dimensional optical spectroscopies have been extended to the visible range, targeting electronic transitions: two-dimensional electronic spectroscopy (2DES). 2DES experiments provide simultaneously high temporal and spectral resolution by resolving the excitation frequency with an interferometric method.[2] 2DES is a method of choice for the disentanglement of processes in systems with multiple degrees of freedom: electronic or vibrational couplings, competing ultrafast photochemical processes and heterogeneities.[3]
In this lecture, we will describe the implementation of 2DES and its challenges. We will provide examples highlighting the real advantages of using 2DES in complex condensed phase systems.

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[3] M. Maiuri and J. Brazard, Top. Curr. Chem. **376**, 10 (2018).

Theoretical Workshop: Photodynamics of thiophene

Federica Agostini (LCP, Université Paris-Saclay, France)

During this practical session we will study the photo-dynamics of thiophene based on the trajectory surface hopping method. Surface hopping is a quantum-classical approach widely used to simulate excited-state dynamics in molecular systems. Within a quantum-classical description of the problem, usually electrons are treated at a quantum-mechanical level, while the nuclei are approximated as classically-moving particles. Quantum-classical simulations, therefore, rely on the combination of electronic-structure theory and of classical (molecular) dynamics. Based on surface hopping, the photo-dynamics of the thiophene molecule is simple enough to allow for a discussion of the crucial steps to set up and perform a simulation of a photo-activated process. We will thus present: (i) how to select the initial conditions for the dynamics, (ii) how to compute a photo-absorption spectrum to identify the effect of the photo-excitation, and (iii) how to perform the dynamics calculations. Finally, we will also learn how to extract electronic and structural information based on the results of several independent calculations.

Experimental Workshop: Toolbox for ultrafast experiments

Vincent Loriot (iLM, Université Claude Bernard – Lyon 1, France)

In this workshop, we present the essential ingredients of a molecular dynamics experiment. On one hand, the global acquisition architecture for 1D to nD acquisition and its corresponding solutions to extract the relevant information are discussed. On the other hand, we introduce the standard modules adapted to this kind of experiment such as (i) the ultrafast lasers (femtosecond and attosecond) and their characterization and (ii) the charged particle detection in mass resolved and energy resolved are presented through the introduction of the time of flight (ToF) experiment and the velocity imaging (VMI) experiment. To become familiar with such techniques, some packages (in m code: octave, matlab) that simulate the standard observable (ToF/VMI/SHG) for a single shot laser pulse will be provided. The participant will hence simulate its complete experiment in a simple program that use the toolboxes. The program will be personalized as a function of the interest center of the participant. A previous installation of octave/matlab software is strongly recommended.

Nonadiabatic dynamics - current methods and challenges

Benjamin Lasorne (ICGM, Université de Montpellier, France)

This lecture will provide an overview of the general formalism and current methods devoted to theoretical and computational photochemistry, with special emphasis placed on nonadiabatic dynamics.
Central concepts such as conical intersections, adiabatic or diabatic representations, and nonadiabatic couplings will be reviewed, as well as typical approaches for handling them within the framework of quantum or semiclassical dynamics simulations.
A selection of recent, representative application cases will be presented, so as to illustrate current challenges in the field.

Correlation driven attosecond hole migration in molecules

Alexander Kuleff (IPC, Universität Heidelberg, Germany)

The lecture will give a concise overview of the problem of describing quantum mechanically the correlated motion of electrons and nuclei in a molecule. The focus will be put on the methodology allowing to study the ultrafast, pure electron dynamics triggered by ionization of a molecule. It will be shown that due to the electron correlation the removal of an electron from a molecular orbital can create electronic coherences manifesting in the migration of the positive charge throughout the system on a few-femtosecond time scale; a phenomenon known as correlation-driven charge migration. A way to describe the decoherence of the charge migration dynamics by the coupling to the nuclear motion will be presented. Some interesting perspectives for designing schemes to influence the chemical reactivity of the molecule by manipulating the charge migration dynamics will also be briefly discussed.

Multi-dimensional infrared spectroscopy: experimental methods and applications

Manuel Joffre (LOB, Institut Polytechnique de Paris, France)

Multidimensional mid-infrared (2DIR) spectroscopy is a variant of multidimensional spectroscopy allowing to probe molecular vibration dynamics and coupling between specific vibrational modes. In this lecture, we will discuss a variety of experimental methods that have been developed in the context of 2DIR spectroscopy for the generation, shaping and characterization of femtosecond mid-infrared pulses. Different 2DIR spectrometer architectures will be described and illustrated with a few applications to specific molecular systems.

Modeling coherent multidimensional vibrational spectroscopy

Cyril Falvo (ISMO, Université Paris-Saclay, France)

Over the past decades, multidimensional infrared spectroscopy has proven to be a unique tool to investigate structural and dynamical properties at the femtosecond timescale of complex molecular systems in condensed phase. For example, it is possible to probe the hydrogen bond dynamics in liquid water, amide-I dynamics in peptides and proteins, complex formation and dissociation in liquids, as well as conformational and chemical kinetics.
In this lecture, I will present the theoretical foundation of multidimensional spectroscopy and specifically describe its application to 2D-IR spectroscopy. I will review the different simulation approaches introduced to model 2D-IR spectroscopy and discuss their limitations. On the basis of a few examples, I will show how simulations combined with 2D-IR measurements allow for extraction of meaningful information for the dynamics in molecular systems.

Physical models to rationalize charge transfers between electron donors-acceptors, from attosecond to microsecond time scales

Aurélien de la Lande (LCP, Université Paris-Saclay, France)

In this presentation, I will introduce kinetic theories adapted to the description of electron transfers taking place in the biological media. The structure and dynamics of biopolymers (proteins or DNA) determine the mechanisms of transfers, eventually pushing standard theories such as the Marcus theory beyond their limits of validity. Strategies to go beyond these limitations will be introduced. They will be illustrated by examples from the literature covering electron transfers operating on the picosecond timescale to microsecond time scale.

Electron and proton transfers

Satchin Soorkia (ISMO, Université Paris-Saclay, France)

A detailed understanding of radiative and nonradiative processes in molecular species containing an aromatic chromophore requires the knowledge of the nature and energy levels of low-lying excited states that could be coupled to the bright $^1\pi\pi^*$ excited state. Isolated species provide benchmark cases to study, at the atomistic level, the photoinduced processes that govern their excited state dynamics. Recent advances in gas phase laser spectroscopy with the possibility of conformer selection have paved the way to a better, yet not fully complete, understanding of the influence of intramolecular interactions on the properties of aromatic chromophores. In this talk, I will focus on the photophysics and photochemistry at play in model systems such as protonated aromatic amino acids and DNA bases, with a particular emphasis on charge (electron and proton) transfer processes.

Measuring attosecond dynamics in molecules

Yann Mairesse (CELIA, Université de Bordeaux, France)

The progress of attosecond metrology in the past two decades now makes it possible to routinely produce 50 as light pulses in the extreme ultraviolet range. Such pulses can be used to trigger or probe ultrafast dynamics in molecules. From an experimental point of view, one of the main difficulties is to determine what is the best observable reflecting the ongoing dynamics. I will review a few experiments based on the detection of photons, photoelectrons, and photoions, in the weak and strong field regimes. We will see that these configurations offer complementary pictures of attosecond molecular dynamics.

Photoinduced electronic and nuclear dynamics in molecules

Françoise Remacle (MOLSYS, Université de Liège, Belgium)

Few-cycle ultrashort IR and UV pulses allow exciting coherently coupled electronic states towards steering nuclear motions in molecules. The progress of the non stationary vibronic density towards the products can be monitored using a second pulse, by transient absorption or XUV photoionization. We will present the methodology that we have developed to follow such a coherent molecular quantum dynamics. The excitation and probing by short pulses are included in the Hamiltonian which provides a quantum mechanical description of both the photoexcitation and the photoionization processes that shape the ensuing coupled electronicnuclear dynamics. The dynamics is described by solving numerically the time-dependent Schrodinger equation at nuclear grid points using the partitioning technique with a subspace of several coupled bound states and a subspace of discretized continuous states for the photoionization continua, including the non adiabatic coupling driven by nuclei motion. Our methodology provides a visualization in space and in time of the correlation between the vibronic wave packet in the neutral states and the wave packet of the outgoing photoelectron. Illustrative examples on diatomic and small polyatomic molecules will be discussed.

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ÉCOLE DE PHYSIQUE DES HOUCHES

PRACTICAL INFORMATION

You are going to participate to a session at the Les Houches School of Physics. Website.

In order for you to have an enjoyable stay, please find below some practical information that we strongly recommend you read up to the end!

SITE / LOCATION

The Les Houches School of Physics is located in the Chamonix Valley, in a mountain area (altitude 1150 m).

In the winter (until April), appropriate equipment is essential:

- **Appropriate clothes and shoes for the snow.**
- **Snow tires and/or snow chains for vehicles.**

In the summer, temperatures can be very low, depending on the weather conditions. **Clothing adapted to the cold and rain**, and **comfortable shoes** are useful for walking along the school's paths.

ACCESS

By plane:

From Geneva airport, shuttle reservation (back and forth) for transportation and drop-off, right at the Les Houches School.

Click here for shuttle reservations!

As previously indicated, please plan to arrive at the school **after 15:00**.

By car:

On the main road **Le Fayet/Chamonix**, get off at the **exit "Le Prarion/Les Chavants"**. In front of the Bellevue cable car, turn right, **direction "Les Chavants"** and continue for 3 km. Follow the indications at the various crossings.
Compulsory Parking on the upper lot indicated on the map.

Note: special winter equipment required.

By train:

From the train station Saint-Gervais Les Bains/Le Fayet: take the train in the direction of Chamonix and get off at the **Les Houches Station**.

Note: there is no taxi station at the train station. It is essential to **reserve a taxi in advance** (station more than 3 km from the School).

By taxi:

Participants from abroad can contact the secretariat, who will reserve a taxi for them. In this case, send an email to the secretariat **no later than Wednesday afternoon prior to your arrival,** indicating the date and time of your arrival at the station.
Beyond this date, your request cannot be processed! Click here to email the secretariat!

- Cham Taxi : +33/0 6.07.26.36.62
- Taxi Plus : +33/0 6.12.35.30.72



ARRIVAL

NOTE: **The School opens at 15:00 on the arrival day**; It is important not to arrive on the site any earlier, as the buildings are closed before this time.

The School is located far away from the village, in an isolated location. There is no service nearby (shops and restaurants are more than 3 km away).

BUILDING CÉCILE DEWITT

(ex Jacassière)

The **Cécile DeWitt building** is the main building, where you will find:

- **The accommodation plan**: this indicates the name of the chalet and the room number that you have been assigned. **Note**: the chalets' access codes sent by email must be saved in order to access the buildings/bedrooms (saved on a mobile phone but not printed out)
- **Nominative pigeonhole**, in the entrance hall: this contains information and a badge.

Attached is a "Practical information" sheet that summarizes the essential information on the campus. From the opening of the school, all buildings are accessible 24/24 and secured by access codes.

LODGINGS

Rooms are individual, with ensuite, and distributed among eight buildings located on the school campus.

A safe is available in the closet of each bedroom.

Provided: bedsheets, towels, shower gel, shampoo, and hair-dryer.

On the last day of the session, the bedrooms must be vacated by 10:00 am at the latest. **It is not possible to extend your stay before or after the dates and time indicated.**

CATERING

On the day of arrival, the first meal is dinner. On departure (Friday), the last meal is lunch, after the last lecture.

Any diet requirement must be indicated to the organizers.

Meal times:

- Breakfast from 7:45 to 8:45
- Lunch at 12:30
- Dinner at 19:30

We ask you to be on time.

It is useful to have some cash in euros on you to pay for your purchases at the bar located on the ground floor of the restaurant.

A telephone will be available in the restaurant hall, to receive calls (only) during meal times. Number: +33/0 4 57 04 10 49.

WI-FI

Wi-Fi is available in all buildings and accessible via EDUROAM, which is strongly recommended to use. Also, an individual Wi-Fi access code is provided, but this does not allow you to connect with multiple devices at the same time.

OTHER INFORMATION

- A headlamp or flashlight is useful for walking around the site in the evening and at night
- The School has only collective insurance
- Electricity: 220v alternating current
- Local time: GMT +2
- Animals are not admitted on the site.

ÉCOLE DE PHYSIQUE DES HOUCHES

Ecole de Physique des Houches

Multiscale Dynamics in Molecular Systems

August 25th to August 30th 2019

	Sunday 25	Monday 26	Tuesday 27	Wednesday 28	Thursday 29	Friday 30
08:00		Breakfast	Breakfast	Breakfast	Breakfast	Breakfast
09:00		Introduction Fernando Martin	Federica Agostini	Benjamin Lasorne	Manuel Joffre	Yann Mairesse
10:00						
11:00		Pascal Parneix	Johanna Brazard	Alexander Kuleff	Cyril Falvo	Françoise Remacle
12:00						
13:00		Lunch	Lunch	Lunch	Lunch	Lunch
14:00						departure
15:00	Registration					
16:00		Patrick Rousseau	workshops		Aurélien de la Lande	
17:00						
18:00		Sophie Carles			Satchin Soorkia	
19:00		Welcome reception				
20:00	Dinner	Dinner	Dinner	Dinner	Dinner	
21:00		Posters	Posters			
22:00						