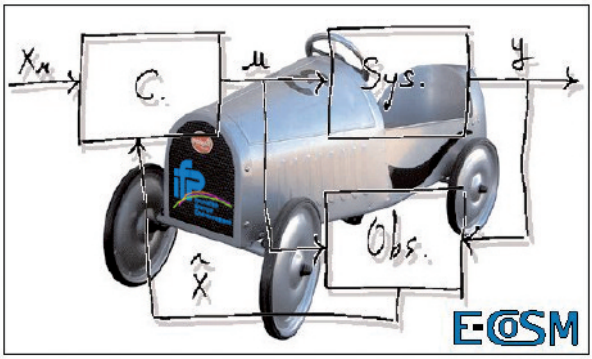
Les Rencontres Scientifiques de l'IFP

IFP, Rueil-Malmaison, France ■ 30 November - 2 December 2009

IFAC Workshop on Engine and Powertrain Control, Simulation and Modeling

Second Announcement and Registration Form



E-COSM'09

Under the auspices of the
International Federation of Automatic Control (IFAC)

Context

The Program and Organizing Committees are pleased to invite you to participate in E-COSM'09, the ***2009 IFAC Workshop on Engine and Powertrain Control, Simulation and Modeling.***

It will be held at IFP, in Rueil-Malmaison (near Paris, France) on **Monday 30 November, Tuesday 1 and Wednesday 2 December 2009**, under the auspices of IFAC, the International Federation of Automatic Control.

E-COSM'09 is the second of a conference series begun in 2006 in Paris. This second edition, organized within the framework of "Les Rencontres Scientifiques de l'IFP" is sponsored by the IFAC Technical Committee on Automotive Control and by four other IFAC Technical Committees.

E-COSM'09 will examine the most recent developments in the fields of engine and powertrain control and modeling, emphasizing the interplay between control design and validation on the one hand, and physical modeling and simulation on the other. As in the first edition, our aim is to offer academic and industrial researchers and practitioners working in the automotive control sector an opportunity to meet one another and exchange views and ideas at a relatively small-scale event.

Papers presented at E-COSM'09 will be hosted and freely available on-line on the IFAC-PapersOnLine.net website and will be citable via an ISSN and a DOI. The best papers will be considered for publication in IFAC journals and IFAC affiliated journals. A further selection of papers will be also considered for publication in OGST (Oil & Gas Science and Technology-Revue de l'IFP), a bi-monthly journal indexed in the major international bibliographical databases.

Scope

In the global quest to move toward cleaner, more fuel-efficient and safer vehicles, control systems play a fundamental role. As a matter of fact, most novel technologies in the field of internal combustion engines, transmissions or alternative propulsion systems could not achieve their full potential without the help of automatic control. In turn, control design and validation definitely need solid support from physical modeling and simulation in order to be effective.

Bearing in mind this strong interplay, this three-day workshop will explore new trends in engine and powertrain control and modeling. The aim is to bring researchers and practitioners from the worlds of industry and academia together, to present and discuss the latest academic research developments relating to these topics, as well as industrial experience in deploying "real-world" applications.

Committees

The International Program Committee (IPC) of E-COSM'09 will be chaired by
- ***Lino Guzzella**, ETH Zurich, Switzerland,*
- ***Lars Eriksson**, Linköping University, Sweden.*
- ***Gilles Corde**, IFP, France, will be the Vice-Chair.*

*The workshop proceedings will be edited by **Antonio Sciarretta** and **Paolino Tona**, IFP, France.*

The International Program Committee (IPC) will include representatives from the IFAC Technical Committees sponsoring the event, along with several other leading researchers in automotive control and related fields.

IPC Members

- **Hisham Abou-Kandil**, ENS Cachan, France
- **El-Kébir Boukas**, École Polytechnique de Montréal, Canada
- **Yann Chamaillard**, Université d'Orléans, France
- **Luigi Del Re,** Johannes Kepler University, Linz, Austria
- **Elena de Santis**, Università dell'Aquila, Italy
- **Mohammed Gabsi**, ENS Cachan, France
- **Luigi Glielmo**, Università del Sannio, Italy
- **Rolf Isermann**, DUT, Germany
- **Rolf Johansson**, Lund University, Sweden
- **Ilya Kolmanovsky**, Ford Research and Innovation Center, USA
- **Oliver Kroecher**, Paul Scherrer Institute, Switzerland
- **Chris Manzie**, University of Melbourne, Australia
- **Isabella Nova**, Politecnico di Milano, Italy
- **James Peyton Jones**, Villanova University, USA
- **Cesare Pianese**, Università di Salerno, Italy
- **Eduard Reithmeier**, Universität Hannover, Germany
- **Gianfranco Rizzo**, Università di Salerno, Italy
- **Pierre Rouchon**, ENSMP, Paris, France
- **Olivier Sename**, INPG, Grenoble, France
- **Anna Stefanopoulou**, University of Michigan, USA
- **Alexander Tarasyev**, IMM, Ekaterinburg, Russian Federation
- **Michiel Van Nieuwstadt**, Ford Motor Co., USA
- **Wan Chul Yoon**, KAIST, Seoul, South Korea

National Organizing Committee Members (NOC)

- **Paolino Tona**, IFP, France (Chair)
- **Janan Zaytoon**, SEE-GdR MACS, France
- **Bettina Caruso**, IFP, France
- **Jonathan Chauvin**, IFP, France
- **Yann Creff**, IFP, France
- **Olivier Grondin**, IFP, France
- **Philippe Moulin**, IFP, France
- **Antonio Sciarretta**, IFP, France
- **Gianluca Zito**, IFP, France

Organization

E-COSM'09 is organized and will be hosted by IFP, a world-class public-sector research and training center, aimed at developing the technologies and materials of the future in the fields of energy, transport and the environment. It is sponsored by the International Federation of Automatic Control (IFAC), the Société de l'Électricité, de l'Électronique et des Technologies de l'Information et de la Communication (SEE - French IFAC NMO), and the Groupement de Recherche en Modélisation, Analyse et Conduite des Systèmes dynamiques (GDR MACS).

The IFAC Technical Committee main sponsor is TC 7.1 Automotive Control.

The co-sponsoring TCs are:

- TC 1.3: Discrete Event and Hybrid Systems
- TC 2.2: Linear Control Systems
- TC 2.4: Optimal Control
- TC 4.5: Human Machine Systems

Scientific contact

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Fax: +33 1 41 34 18 67
clanglois@le-public-systeme.fr

Conference organization

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What is IFP ?

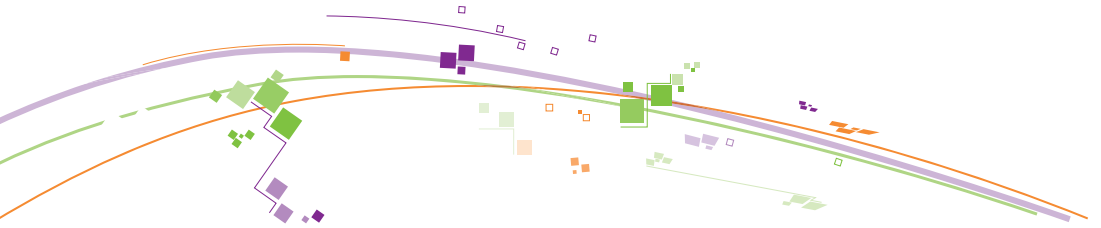
IFP is a world-class public-sector research and training center, aimed at developing the technologies and materials of the future in the fields of energy, transport and the environment. It provides public players and industry with innovative solutions for a smooth transition to the energies and materials of tomorrow – more efficient, more economical, cleaner and sustainable.

To fulfill its mission, IFP has five complementary strategic priorities:

- capturing and storing CO_2 to combat the greenhouse effect,
- diversifying fuel sources,
- developing clean, fuel-efficient vehicles,
- converting as much raw material as possible into transport energy,
- pushing back the boundaries in oil and gas exploration and production.

An integral part of IFP, its graduate engineering school prepares future generations to take up these challenges.

For more information, **http://www.ifp.com**



Information about the program

Keynote lectures

A set of keynote lectures will illustrate the central themes of the workshop:

- Model structure and performance of predictive control in automotive applications, **L. Del Re**, Johannes Kepler University Linz, Austria
- Look-ahead vehicle control, **Lars Nielsen**, Linköping University, Sweden
- Real-time in-cycle engine simulation, **Andy Noble**, Ricardo Consulting Engineers, UK
- Dynamic simulation strategies for PCCI combustion control design, **Norbert Peters**, Aachen University, Germany
- Control of urea SCR systems for diesel applications, **Michiel Van Nieuwstadt**, Ford Motor Company, USA

45 minutes allotted for keynote speakers, including 5 minutes discussion.

Regular sessions

More than thirty papers will be presented in the following sessions:

- Applications of optimal and predictive control
- Engine air path
- Engine calibration, actuators and sensors
- Engine emissions and after-treatment
- Engine fuel path and combustion
- Hybrid vehicles, electric components and energy management

25 minutes allotted for oral presentations, including 5 minutes discussion.

The throttle control benchmark session

This session will illustrate the results obtained by the participants in a benchmark to evaluate throttle control systems, designed and calibrated following different approaches, in frameworks of increasing complexity.

A Hardware-in-the-Loop (HiL) demonstration, which includes a real throttle, will present real-time control results interactively.

The control design approaches followed by participants in the benchmark will be illustrated by a set of posters displayed around the HiL demonstration.

Official language

English will be the official language. Simultaneous interpretation will not be provided.

The conference at a glance

Monday 30 November 2009

8.30 Registration

9.15 Beginning of the program - Welcome address

10.15 Session 1 - Engine fuel path and combustion

12.25 to 13.55 *Lunch*

15.30 Session 2 - Engine air path

18.40 End of the presentations

18.45 Cocktail

20.30 Bus departure to the meeting point in Paris

Tuesday 1 December 2009

9.00 Beginning of the progam

9.45 Session 3 - Hybrid vehicles, electric components and energy management

12.45 to 14.15 *Lunch*

15.00 Session 4 - Applications of optimal and predictive control

18.00 End of the presentations

18.30 Bus departure to the meeting point in Paris

Wednesday 2 December 2009

9.00 Beginning of the progam

10.00 Session 5 - Engine emissions and after-treatment

13.00 to 14.30 *Lunch*

14.30 Session 6 - Engine calibration, actuators and sensors

16.10 Closing address

16.30 Bus departure to Rueil-Malmaison RER station (connections to the airports and the railway stations) and to the meeting point in Paris

Program

Monday 30 November

8.30 Registration

9.15 Welcome address: P. Ungerer, Scientific Director (IFP, France)

9.30 Keynote address 1: **Dynamic simulation strategies for PCCI combustion control design**
N. Peters (Aachen University, Germany)

Session 1 – Engine fuel path and combustion

Chairpersons: A. Stefanopoulou (University of Michigan, USA) and N. Peters (Aachen University, Germany)

10.15 **Estimation of diesel engine combustion phasing from crankshaft torque data**
M. Thor, I. Andersson, T. Mc Kelvey (Chalmers University of Technology, Sweden)

10.40 **Bayesian inference for combustion phasing estimation in diesel engine**
E. Nguyen, O. Grondin, F. Guillemin (IFP, France)

11.05 Coffee break, visit of demonstration stands

11.35 **A fast-acting stochastic approach to knock control**
J. Peyton Jones, J. Frey, K. R. Muske (Villanova University, USA)

12.00 **Supervisory multiple-model approach to multivariable lambda and torque control of SI engines**
P. Majecki, H. Javaherian, M. Grimble (Industrial Systems and Control Ltd, UK - General Motors R&D Center, USA - University of Strathclyde, UK)

12.25 Lunch

13.55 **A phenomenological approach to model diesel engine combustion and in-cylinder pollutant emissions adapted to control strategy**
R. Lebas, G. Mauviot, F. Le Berr, A. Albrecht (IFP, France)

14.20 **Modeling and simulation of gasoline auto ignition engines**
K. G. Stapf, D. Seebach, S. Pischinger, P. Adomeit, J. Ewald (Aachen University, Germany – FEV Motorentechnik GmbH, Germany)

14.45 Keynote address 2: **Real-time in-cycle engine simulation**
A. Noble (Ricardo, UK)

Session 2 – Engine air path

Chairpersons: L. Eriksson (Linköping University, Sweden) and O. Grondin (IFP, France)

15.30 **Compression ignition engine model supporting powertrain development**
J.-C. Schmitt, M. Fremovici, O. Grondin, F. Le Berr (IFP, France)

15.55 **System properties and control of turbocharged diesel engines with high and low-pressure EGR**
M. Mrosek, R. Isermann (Darmstadt University, Germany)

16.20 Coffee break, visit of demonstration stands

16.50 **Control oriented model of a variable geometry turbocharger in an engine with two EGR loops**
J. Chauvin, P. Moulin, O. Grondin (IFP, France)

17.15 **Nonlinear EGR and VGT control with integral action for diesel engines**
J. Wahlström, L. Eriksson (Linköping University, Sweden)

17.40 **Control of a turbo charged NVO HCCI engine using a model based approach**
H. Aulin, P. Tunestal, B. Johansson (GM Powertrain Sweden, Sweden – Lund University, Sweden)

18.05 **Wastegate actuator modeling and model-based boost pressure control**
A. Thomasson, L. Eriksson, O. Leufven, P. Andersson (Linköping University, Sweden - GM Powertrain Sweden, Sweden)

18.45 Cocktail

20.30 Bus departure to the meeting point in Paris

Tuesday 1 December

8.30 Registration

9.00 Keynote address 3: **Look-ahead vehicle control**
L. Nielsen (Linköping University, Sweden)

Session 3 – Hybrid vehicles, electric components and energy management

Chairpersons: L. Guzzella (ETH Zurich, Switzerland) and A. Sciarretta (IFP, France)

9.45 **Rapid start for hybrid pneumatic vehicles**
I. Vasile, C. Doenitz, C. Voser, J. A. Vetterli, C. H. Onder, L. Guzzella (ETH Zurich, Switzerland)

10.10 **Analysis of rule-based control strategies for on-board energy management of hybrid solar vehicles**
M. Sorrentino, G. Rizzo, I. Arsie (University of Salerno, Italy)

10.35 **Supervisory control of hybrid powertrains: an experimental benchmark of offline optimization and online energy management**
A. Chasse, G. Hafidi, P. Pognant-Gros, A. Sciarretta (IFP, France)

11.00 Coffee break, visit of demonstration stands

11.30 **Modeling magnetic saturation and saliency effects via Euler-Lagrange models with complex currents for three-phase permanent magnet machines**
D. Basic, F. Malrait, P. Rouchon (Schneider Electric, France - Mines ParisTech, France)

11.55 **Ni-MH battery ageing: from comprehensive study to electrochemical modeling for state-of-charge and state-of-health estimation**
E. Prada, J. Bernard, V. Sauvant-Moynot (IFP, France)

12.20 **Optimum for CO_2 transcritical power Rankine cycle using exhaust gas from fishing boat diesel engines**
E. Autier, A. Kouadri (Avel Vor Technologies, France – INSA of Rennes, France)

12.45 Lunch

14.15 Keynote address 4: **Model structure and performance of predictive control in automotive applications**
L. Del Re (Johannes Kepler University Linz, Austria)

Session 4 – Applications of optimal and predictive control

Chairpersons: L. Del Re (Johannes Kepler University Linz, Austria) and P. Templin (Volvo Powertrain Corporation, Sweden)

15.00 **A design framework for nonlinear predictive engine control**
X. Wang, P. Ortner, L. Del Re (Johannes Kepler University Linz, Austria)

15.25 **Non-linear model-based predictive control with constraints for controlled auto ignition**
K. Hoffmann, D. Abel (Aachen University, Germany)

15.50 **Experimental validation of a parameterized NMPC for a diesel engine**
A. Murilo, M. Alamir, P. Ortner (University of Grenoble, France - Johannes Kepler University Linz, Austria)

16.15 Coffee break, visit of demonstration stands

16.45 **Controlled injection of compressed air in marine diesel engine intake for improved load acceptance**
G. Papalambrou, N. P. Kyrtatos (National Technical University of Athens, Greece)

17.10 **Experimental results for a powertrain LQR-torque compensator with backlash handling**
P. Templin, B. S. Egardt (Volvo Powertrain Corporation, Sweden – Chalmers University of Technology, Sweden)

17.35 **A comparison between LTV-MPC and LQR yaw rate-side slip controller**
D. Meola, G. Gambino, G. Palmieri, L. Glielmo (University of Benevento, Italy)

18.30 Bus departure to the meeting point in Paris

Wednesday 2 December

8.30 Registration

9.00 Keynote address 5: **Control of urea SCR systems for US diesel applications**
M. van Nieuwstaadt (Ford Motor Company, USA)

Session 5 – Engine emissions and after-treatment

Chairpersons: M. van Nieuwstaadt (Ford Motor Company, USA) and J. Peyton Jones (Villanova University, USA)

10.00 **Kinetic study of the NO/NO_2-NH_3 SCR reactions over a V_2O_5–WO_3/TiO_2 commercial catalyst for the after treatment of Diesel engines exhausts**
I. Nova, E. Tronconi (Politecnico di Milano, Italy)

10.25 **The effect of grid resolution and oxygen storage in a one-dimensional monolithic three-way catalyst model**
D. Andrianov, R. J. Dingli, M. Brear, C. Manzie (University of Melbourne, Australia)

10.50 **Persistent memory effects and pre-conditioning for repeatable investigations into three-way catalyst dynamics**
R. Schallock, J. Peyton Jones, K. R. Muske (Villanova University, USA)

11.15 Coffee break, visit of demonstration stands

11.45 **Practical achievable performance in diesel oxidation catalyst temperature control**
O. Lepreux, Y. Creff, N. Petit (IFP, France – Mines ParisTech, France)

12.10 **A fast control oriented physical NOx model for embedded use**
C. Wilhelmsson, P. Tunestal, A. Widd, R. Johansson (Lund University, Sweden)

12.35 **A control-oriented model for cold start operation of spark ignition engines**
C. Manzie, F. Keynejad, D. Andrianov, R. J. Dingli, G. Voice (University of Melbourne, Australia - Ford Motor Company of Australia, Australia)

13.00 Lunch

Session 6 – Engine calibration, actuators and sensors

Chairpersons: Z. Filipi (University of Michigan, USA) and P. Tunestal (Lund University, Sweden)

14.30 **An optimal calibration of high DOF engines considering fuel economy and combustion stability**
T.-K. Lee , Z. Filipi (University of Michigan, USA - Chrysler LLC, USA)

14.55 **Dynamic modeling of a piezo-electric actuated fuel injector**
C. Satkoski, G. M. Shaver, R. More, P. H. Meckl, D. Memering (Purdue University, USA - Cummins Fuel Systems, USA)

15.20 **Model based TDC offset estimation from motored cylinder pressure data**
P. Tunestal (Lund University, Sweden)

15.45 **A dynamically identified algebraic NARX air-to-fuel ratio estimato**
P. B. Dickinson, N. Rivara, A. T. Shenton (University of Liverpool, UK)

16.10 Closing address: P. Tona (NOC Chair IFP, France)

16.30 Bus departure to Rueil-Malmaison RER station (connections to the airports and the railway stations) and to the meeting point in Paris

Registration

Conference fees (VAT incl.)

Before 5 November 2009

- 500€
- 250€ for students (*).

After 5 November 2009

- 600€
- 350€ for students (*).

(*) Reduced conference fees will be allowed to students in order to facilitate their participation to this conference upon presentation of the student card and a letter of approval from the laboratory manager.

The conference fees cover attendance at the conference, conference proceedings, lunches, breaks, cocktail reception and shuttle service.
They do not cover accommodation.

Authors of accepted technical papers - French or citizens of a developing country - whose age will be less than 30 years during the Workshop are eligible for the Young Authors' Support Program of the IFAC Foundation , thanks to a donation of the French IFAC NMO. For further information, please refer to the conference website www.ecosm09.org.

Cocktail reception

A cocktail reception is organized for the conference participants on Monday 30 November at IFP, Rueil-Malmaison. after the end of the conference.
Participants wishing to attend have to register (the cocktail is included in the conference fees).

Registration

You can choose to register on line

- at the following address: http://www.ecosm09.org
- or through IFP web site: http://events.ifp.com

or to complete the enclosed registration form and send it, with your payment, to the administrative secretariat *Le Public Système*. (see page 5 for the address).

Upon receipt of the registration and the relevant payment, the administrative secretariat will send each participant a letter of acknowledgment.

Payment

All fees are payable in Euros only:

■ by check sent to
Ms. Claire Langlois
Le Public Système
40 rue Anatole France,
92594 Levallois Perret Cedex
France

■ by wire transfer to
the bank CIC
Agency:
CIC SUD SAINT AUGUSTIN GCE
LPS / IFP ECOSM 09
Account
n° 30066 10947000100268 34 55
IBAN: FR76 3006 6109 4700 0100
2683 455
BIC/SWIFT: CMCIFRPP
Please mention the reference
CCEA 9121 C
on the wire transfer order.

■ by credit card
(Visa, Eurocard, Mastercard)
Due to bank charges, commission
fees will be applied to credit card
payments.

Cancellation conditions

All cancellations must be notified in writing to *Le Public Système*.

Before 5 November 2009
40€ penalty will be applied

After 5 November 2009
50% of the total will be held

After 15 November 2009
no refund

Visa

You may need a visa to enter France from some countries outside the European Union.
Please contact the French Embassy or Consulate in your country, or your travel agency, to check whether or not you will need a visa.
You can ask for the appropriate invitation letter to *Le Public Système*.

Accommodation

Accommodation is not included in the conference registration fees. Participants are required to make their own reservations by contacting the following hotels where block booking at preferential rate has been made by the organizers for 3 nights **(Sunday 29, Monday 30 November and Tuesday 1 December).**

The hotels are located in Rueil-Malmaison, near IFP, and in Paris in the area of the place Charles de Gaulles-Etoile. As Paris area is very crowded at this time of the year, we strongly encourage you to make your reservation as soon as possible. The deadlines are the responsibility of each hotel, after these dates room availability is not guaranteed.
To make your reservation and to benefit from the prices indicated below please send an email to the hotel listed below with the reference : "Room Reservation - IFP Ecosm 2009".

Hotels in Rueil-Malmaison

Hotels	Address	Rate per night (including breakfast)	Deadline
IBIS**	16 boulevard de l'Hôpital Stell 92500 Rueil-Malmaison Tel: +33 1 47 32 96 96 - H1407@accor.com	123€	30 September
LA CHAUMIERE***	20 avenue Albert 1er 92500 Rueil-Malmaison Tel : +33 1 47 32 20 92 hotel-chaumiere@wanadoo.fr	122€	30 October
LES ARTS***	3 rue du Maréchal Joffre 92500 Rueil-Malmaison Tel: +33 1 47 52 15 00 - hotelarts@hotmail.com	99€	30 October

Hotels in Paris

Hotels	Address	Rate per night (including breakfast)	Deadline
MERCURE PARIS WAGRAM ARC DE TRIOMPHE ***	3 rue Brey - 75017 Paris Tel: +33 1 56 68 00 01 - H2053@accor.com	205€	30 October
BEST WESTERN HOTEL ELYSÉES ***	1 rue Brey - 75017 Paris Tel: +33 1 53 81 82 90 elyseesparis@wanadoo.fr	160€	30 October
HOTEL MAGELLAN ***	17-19 rue Jean-Baptiste Dumas - 75017 Paris Tel: +33 1 45 72 44 51 paris@hotelmagellan.com	136€	30 October
HOTEL PRINCESSE CAROLINE ***	1 bis rue Troyon - 75017 Paris Tel: +33 1 58 05 30 00 contact@hotelprincessecaroline.fr	140€	30 October
HOTEL CECILIA ***	11 avenue Mac Mahon - 75017 Paris Tel: +33 1 43 80 32 10 hotel.cecilia@wanadoo.fr	138€	15 October

Access to IFP

By road

From Paris, exit Porte Maillot, RN 13, Direction La Défense/ Saint-Germain-en-Laye.

Using public transport

RER (Réseau Express Régional), Line A direction Saint Germain-en-Laye.

Two possibilities (see map page 18):

- Get off at Rueil-Malmaison station, exit "Victor Hugo – Autobus". Then bus 244, get off at "Geneviève Couturier"

- Get off at Grande Arche de la Défense station, then take the bus 258 (La Défense/ Saint-Germain-en-Laye) and get off at "Bois-Préau"

Shuttle

A free shuttle service will be organized between Paris (meeting point near the hotels) and IFP for the three days of the conference.

Meeting point in Paris:
Place Charles de Gaulle-Étoile, at the corner of Avenue Mac Mahon.

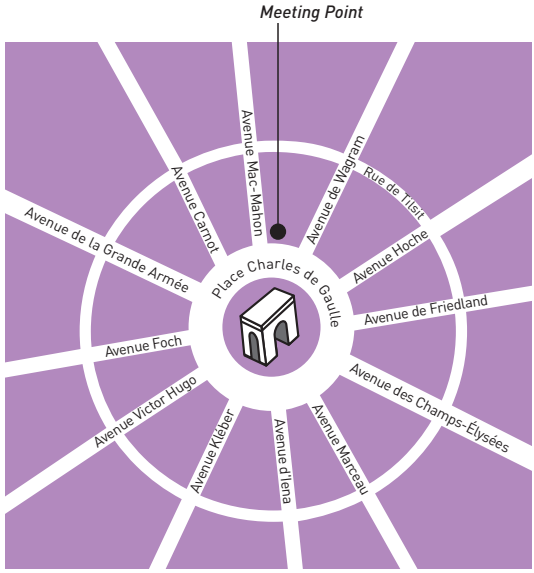
Please register on line or with the form here enclosed if you wish to use this service.

Shuttle schedule:

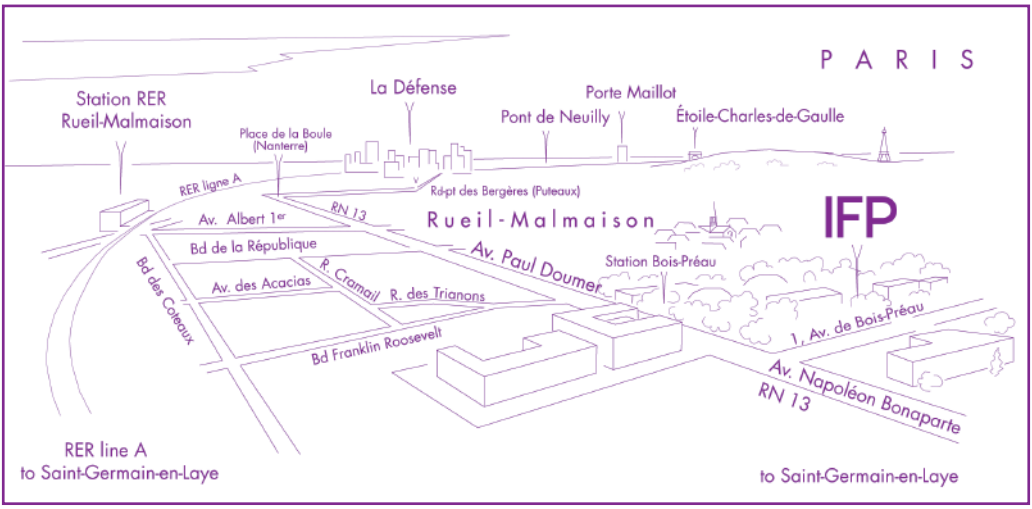
Monday 30 November
7.45: Departure from the meeting point to IFP
20.30: Departure from IFP to the meeting point

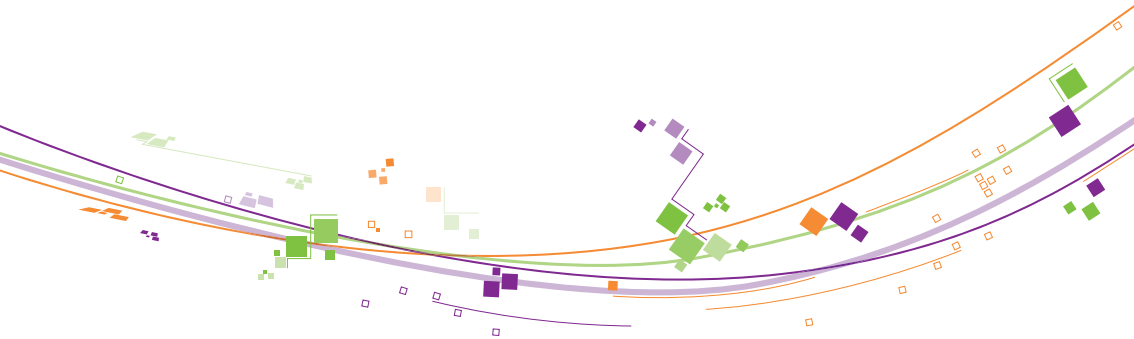
Tuesday 1 December
8.00: Departure from the meeting point to IFP
18.30: Departure from IFP to the meeting point

Wednesday 2 December
8.00: Departure from the meeting point to IFP
16.30: Departure from IFP to the RER station of Rueil-Malmaison and to the meeting point in Paris



Overview of the place Charles de Gaulle-Étoile


PARIS
Station RER
Rueil-Malmaison
La Défense
Porte Maillot
Pont de Neuilly
Étoile-Charles-de-Gaulle
Place de la Boule
(Nanterre)
RER ligne A
Rd-pt des Bergères (Puteaux)
Av. Albert 1er
RN 13
Rueil-Malmaison
IFP
Bd de la République
Av. Paul Doumer
Station Bois-Préau
Av. des Acacias
R. Cramail
R. des Trianons
Bd des Coteaux
1, Av. de Bois-Préau
Bd Franklin Roosevelt
Av. Napoléon Bonaparte
RN 13
RER line A
to Saint-Germain-en-Laye
to Saint-Germain-en-Laye



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