organize

5th GeToPhyMa

CIMPA summer school on

Rational Homotopy Theory and its Interactions

celebrating Jim Stasheff and Dennis Sullivan for their respective 80th and 75th anniversary

July 11< 21, 2016
Rabat, Morocco
http://algtop.net/geto16
GeToPhyMa History

GeToPhyMa is a series of summer schools organized since 2011 by the research group Moroccan Area of Algebraic Topology (MAAT). This research group involves 4 institutions: Faculté des Sciences Ain Chock (Casablanca), Faculté des Sciences (Meknes), CRMEF and UIR (Rabat).

This research school is essentially intended for students and young researchers in geometry, topology and mathematical physics. Researchers in other fields can take advantage of introductory courses and are cordially invited to join the school. The main objective is to provide participants with a solid background in algebraic topology, and assimilating them to current research topics such operads, string theory, applied and computational topology, algebraic geometry, ...

The benefits of the event are various:

- **Socio-Economical**: Promote Morocco as a tourist, cultural and scientific destination. Numerous excursions and tours are scheduled.
- **Scientific**:
  - Explore some recent concepts with promising research potential;
  - Promote South-South and South-North scientific cooperation;
  - Help young researchers to communicate their researches.

The first edition was held in the UIR by 2011 as half day of a monthly seminar in geometry organized by the Faculty of Science and Technology (FST) of Marrakech.

GeToPhyMa-2012, was two days of conferences with 40 participants). 60 participants attend GeToPhyMa-2013, it was three days of three courses: TQFT, Operads and Topological Robotics. The 2013-edition was dedicated to the memory of Jean-Louis Loday (1946-2012). The 2014-edition (60 participants, 4 days, three courses: Moduli spaces, configuration spaces, spherical-hyperbolic geometry) was dedicated to the memory of Bill Thurston (1946-2012).

Note that the 2011-edition program was very modest: 4x45mn-conferences and a lunch. However and during the lunch, many ideas has been discussed:

- Form a research group (it was done on 2011 by creating the MAAT. MAAT is now 4 professors, 1 PhD, 7 PhD students and 50 Master students);
- Organize a periodic research school (it was done on 2011 by organizing periodically the GeToPhyMa);
- Open a Master on Algebraic Topology (it was done on 2014 by Faculté des Sciences Ain Chock, Casablanca);
- Create an Association of Moroccan researchers in Algebraic Topology (it was done on recently on May 2016);
- Edit and Publish an international journal (it will be done by 2018);
- Create a regional network of researchers in algebraic topology (the project is now on progress).
Organizers

Founders & Conveners

Administration

M’Feddal Hilali
UIR Rabat, Morocco

Logistic

Mouna Chentoufi
UIR Rabat, Morocco

Scientific

My Ismail Mamouni
CRMEF Rabat, Morocco

2016-Head Organizers

My Ismail Mamouni
CRMEF Rabat, Morocco

Antonio Viruel
Univ. Malaga, Spain
2016-Honored Names

Jim Stasheff (1936- )
James Dillon "Jim" Stasheff (born January 15, 1936 in New York) is an American mathematician, a professor emeritus of mathematics at the University of North Carolina at Chapel Hill. He works in algebraic topology and algebra as well as their applications to physics. Stasheff’s research contributions include the study of associativity in loop spaces and the construction of the associahedron (also called the Stasheff polytope), ideas leading to the theory of operads; homotopy theoretic approaches to Hilbert’s fifth problem on the characterization of Lie groups; and the study of Poisson algebras in mathematical physics. In the 1960s he wrote fundamental papers on higher homotopy theory and homotopy algebras. He introduced $A_\infty$, Stasheff algebras and Stasheff polytopes.
In the 1980s he turned to the application of characteristic classes and other topological and algebraic concepts in mathematical physics, first in the algebraic structure of anomalies in quantum field theory, where he worked with among others, Tom Kephart and Paolo Cotta-Ramusino. He referblue to the research field as cohomological physics.

Dennis Sullivan (1941- )
Dennis Parnell Sullivan (born February 12, 194) is an American mathematician. He is known for work in topology, both algebraic and geometric, and on dynamical systems. He holds the Albert Einstein Chair at the City University of New York Graduate Center, and is a professor at Stony Brook University. Sullivan is one of the founders of the surgery method of classifying high-dimensional manifolds, along with Browder, Sergei Novikov and C. T. C. Wall. In homotopy theory, Sullivan put forward the radical concept that spaces could directly be localised, a procedure hitherto applied to the algebraic constructs made from them. He founded (along with Daniel Quillen) rational homotopy theory.

Awards and honors
- 1971 : Oswald Veblen Prize in Geometry
- 1981 : Prix Élie Cartan, French Academy of Sciences
- 1994 : King Faisal International Prize for Science
- 2004 : National Medal of Science
- 2006 : Steele Prize for lifetime achievement
- 2010 : Wolf Prize in Mathematics, for "his contributions to algebraic topology and conformal dynamics"
- 2012 : Fellow, American Mathematical Society
- 2014 : Balzan Prize in Mathematics (pure or applied)
4.1 Advisory Board

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- Fblue Cohen, Univ. Rochester, USA;
- M’Feddal Hilali, Univ. Internationale de Rabat, Morocco;
- Mohamed Rachid Hilali, Univ. Casablanca, Morocco;
- Sadok Kallel, Univ. Lille, France and Americain Univ. Sharjah, United Arab Emirates;
- Arnfinn Laudal, Univ. Oslo, Norway;
- John McCleary, Vassar College, USA;
- My Ismail Mamouni, CRMEF Rabat, Morocco;
- Anicieto Murillo, Univ. Malaga, Spain;
- Youssef Rami, Univ. Meknes, Morocco;
- Jim Stasheff, Univ. North Carolina, USA;
- Bruno Vallette, Univ. Nice, France;

4.2 Scientific Committee

Members

- Joana Cirici, Freie Universitât Berlin, Germany
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- Sadok Kallel, Univ. Lille, France and Americaun Univ. Sharjah, United Arab Emirates
- Pascal Lambrechts, Univ. Louvain, Belgium
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- Mohamed Rachid Hilali, Univ. Casablanca, Morocco
- Samuel Bruce Smith, Univ. Saint Joseph, USA
- Bruno Vallette, Univ. Nice, France
- Lucile Vandembroucq, Univ. Braga, Portugal
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- Rim Rahmani, UIR, Rabat, Morocco
- M’Feddal Hilali, UIR, Rabat, Morocco
- Mohamed Rachid Hilali, Univ. Casablanca, Morocco
- My Ismail Mamouni, CRMEF Rabat, Morocco
- Youssef Rami, Univ. Meknes, Morocco
Modèle de Sullivan et de Quillen.
Les actions de groupes de Lie sur les espaces topologiques jouent un rôle très important dans les développements des théories : de feuilletage, des systèmes dynamiques, Dans ce mini cours nous allons nous intéresser à la construction du modèle de Sullivan des actions des groupe de Lie compacts sur les espaces simplement connexes, et plus particulièrement celles du tore ce qui nous permettra de traduire algébriquement des conjectures géométriques.

Mohamed Rachid Hilali
Univ. Casablanca, Morocco

My Ismail Mamouni
CRMEF Rabat, Morocco

Youssef Rami
Univ. Meknes, Morocco

Function and Classifying Spaces in Rational Homotopy Theory.
Self-equivalences and their classifying spaces present a variety of challenging problems in rational homotopy theory. For the function space, the problems include classification of path-components up to rational homotopy type and the computation of invariants such as the rational Whitehead product length. We discuss recent progress on these problems in both settings.

Samuel Bruce Smith
Univ. Saint Joseph, USA

Antonio Viruel
Univ. Malaga, Spain
En-operads, Goodwillie-Weiss calculus for manifolds

An important theorem of Kontsevich and Tamarkin is that this operad is formal over some field of characteristic 0. We will study that operad and explain the ideas behind the proof of its formality, which is based on tools from rational homotopy theory and some Kontsevich integrals over graph complexes. We will also explain the basics of the Goodwillie-Weiss theory.

Paul-Arnaud Songhafouo Tsopméné
Univ. Louvain, Belgium

Rational homotopy theory of non-connected spaces.

We will study rational homotopy theory of non-connected spaces in terms of homotopy theory for L-infinity algebras. For that purpose the Lawrence-Sullivan construction will play an essential role.

Urtzi Buijs
Univ. Malaga, Spain

Topological Robotics.

In this course we will study several rational approximations of the topological complexity which have been introduced by M. Farber in the last decade in order to give a topological measure of the complexity of the motion planning problem in robotics. We will discuss some properties of these invariants and give concrete examples of computation.

Yuli Rudyak
Univ. Florida, USA

Lucile Vandembroucq
Univ. Braga, Portugal
RHT and its interactions with complex geometry

In this course we will combine techniques of rational homotopy and Hodge theory to study the topology of complex manifolds and complex projective varieties. We will begin by studying the minimal models of the de Rham and Dolbeault algebras of a complex manifold, focusing on concrete examples that show how the complex structure of a manifold reflects on its homotopy type. We will see that compact Kähler manifolds are formal: their rational homotopy type is entirely determined by the rational cohomology ring. Lastly, we will discuss related results for complex projective varieties, using mixed Hodge theory.

Joana Cirici
Freie Universität Berlin, Germany

Configuration spaces in RHT

We study the rational homotopy type of ordered configuration spaces on manifolds. The Cohen-Taylor spectral sequence computes the cohomology of those spaces, and yields a rational model in special cases. We shall present a constructive approach to the rational homotopy type for a more general class of manifolds.

Paolo Salvatore
Univ. Roma, Italy

RHT extensions.

There are two key workhorse theorems one easy but very useful one not so easy and also useful the rest of the theory becomes smooth once these are conquered. First, the easy one: for any map of CDGAs \( A \to B \) one can make a free extension\(^*\) of \( A \) and the map \( A[y, y', \ldots] \to B \) to obtain a quasi isomorphism denoted \( \text{QI} \) [ie iso on cohomology].

Second, the harder one: select one of the equivalent explicit notions of homotopy of maps of DGAs given a QI map of CDGAs \( A \to B \) and given a CDGA whose underlying algebra is free graded commutative\(^*\) \( F \) with a mapping \( F \to B \) THEN there is a map of \( F \) to \( A \) unique up to homotopy so that the composition to \( B \) is homotopic to the first map of \( F \) to \( B \).

\(^*\) the extension in the first and the \( F \) in the second have differentials satisfying there is an ordering of the generators so that the differential of a generator is an expression in earlier generators\(^*\).

Our main goal to prove and understand these two lemmas in any minicourse note the second one implies the first construction is unique up to a unique homotopy equivalence.
Théories homologiques et cohomologiques généralisées à coefficients

Pour tout spectre de Moore $M$, pour toute théorie homologique $H_*$ et toute théorie cohomologique $H^*$, on définit des foncteurs homologique $H^*_{M}$ et cohomologique $H^*_{M}$ qui sont reliés aux foncteurs $H_*$ et $H^*$ par des suites exactes de coefficients universels de type classique. Cependant la catégorie des spectres de Moore n’est pas la catégorie des $\mathbb{Z}$-modules ; elle s’identifie à une sous-catégorie pleine d’une catégorie abélienne $D$. On associe alors aux foncteurs $H_*$ et $H^*$ des foncteurs $\hat{H}_*$ et $\hat{H}^*$ à valeurs dans $D$ et on donne de nouvelles suites exactes de coefficients universels qui relient ces foncteurs aux foncteurs $H^*_{M}$ et $H^*_{M}$. On montre que ces nouvelles suites exactes sont en général plus précises que les suites exactes de type classique, et ce en utilisant comme exemples l’homotopie stable et la K-théorie réelle.

Highly connected inflexible manifolds

The existence of spaces with a trivial group of self-homotopy equivalences, the so-called homotopically-rigid spaces, was thought to be quite rare [3]. In [1] infinitely many non homotopically rigid spaces were constructed. They all have in common their connectivity as they are based on an example of Arkowitz-Lupton. In this talk we will show how to generalize this example in order to obtain infinitely many rigid spaces that are highly connected. Those spaces are proven to be the rationalization of simply-connected inflexible manifolds. Our main motivation is to develop tools to prove the existence of strongly inflexible manifolds, which is related with a question raised by Gromov [2].


The gauge action, DG Lie algebras and identities for Bernoulli numbers

We prove a family of identities for Bernoulli numbers by translating into homotopical terms the gauge action on the Maurer-Cartan set of a differential graded Lie algebra. We show that Euler and Miki’s identities, well known and apparently non related formulas, are linear combinations of our family and they satisfy a particular symmetry relation.

Joint work with U. Buijs and A. Murillo.

Joint work with U. Buijs and A. Murillo.
Higher order Whitehead products in Quillen’s models

Higher order Whitehead products of a space are homotopy sets arising from a natural extension problem, and which are fully capture by the rational context by Quillen’s dg Lie algebra models. We will study their role and applications within rational homotopy theory.

José Manuel Moreno Fernández
Univ. Malaga, Spain

Equivariant string products

A product in the homology of the free loop space $LM$ of a manifold was discover by Chas and Sullivan together with other structures. Chataur and Menichi defined among other things a similar product in the homology of the free loop space $L \Sigma G$ of the classifying space of a topological group $G$. We define a product in the homology of the free loop space $L(M_G)$ of the Borel construction of a manifold with a Lie group action. We show it vanishes under a certain degree condition, and in that case, we define a secondary version of the product. This is joint work with Haggai Tene.

Shizuo Kaji
Univ. Yamaguchi, Japan

Relative category and monoidal topological complexity

If a map $f$ has a homotopy retraction, then Doeraene and El Haouari conjectured that the sectional category and the relative category of $f$ are the same. In this talk we discuss this conjecture for some lower bounds of these invariants. In particular, when we consider the diagonal map, we obtain some results supporting Iwase-Sakai’s conjecture which asserts that the topological complexity is the monoidal topological complexity.

Jose Manuel Garcia Calcines
Univ. de La Laguna, Spain

Topological Complexity of groupoids

In this talk I will present work in progress with H. Colman on topological complexity of groupoids and compare it with the existing notions of equivariant topological complexity.

Angel Andres
Univ. Los Andes, Colombia
Critical metric on warped product manifolds

In this paper, we present some properties of generalized warped product manifold. We establish the relationship between the scalar curvature of a generalized warped product $M \times_f N$ of Riemannian manifolds and those ones of $M$ and $N$, and we obtain a necessary condition for a critical Riemannian metrics on $M \times_f N$.

Nour El Houda Djaa
Univ. Relizane, Algeria

Overalgebra for $\text{SL}(n, \mathbb{R})$ and orbits separation

We come back to the question of existence of semi-direct product $g^+ = g \rtimes V$ for a Lie algebra $g$, with a non linear map $\Phi$ from the dual of $g$ into the dual of $g^+$ such that, for generic $\xi$, coadjoint orbits of $\Phi(\xi)$ have distinct closed convex hulls. In the solvable case, there are many examples of such constructions, where $\Phi$ is polynomial, with degree 2. Here we look for semi simple $g$, after generalities, we essentially consider $g = \text{sl}(n, \mathbb{R})$. In this case, we first give such a construction with $\Phi$ polynomial, with degree $n$, then, if $n > 2$, we prove there is no such construction with $\Phi$ polynomial, with degree 2, and, for $\text{sl}(4, \mathbb{R})$, there is no such construction with $\Phi$ polynomial, with degree 3.

Amel Zergane
Univ. Sousse, Tunisia

Formule de gross-Koblitz généralisée

En 1979, B. Gross et N. Koblitz ont énoncé une identité qui relie la fonction gamma $p$-adique de Morita à des sommes de Gauss définies sur un corps fini $F_q$. Dans cet exposé, on étudie la possibilité de généraliser cette formule à des sommes de Gauss définies sur un anneau de Witt $W_q(F_q)$.

Siham Mokhfi
Univ. Blida, Algeria
ON THE GENERALIZED OF HARMONIC AND BI-HARMONIC

In this note, we extend the definition of harmonic and biharmonic maps between two Riemannian manifolds, and we present some properties for f-harmonic maps and f-biharmonic maps.

Kaddour Zegga
Univ. Mascara, Algeria

Harmonic vector field on twisted Sasaki metric

In this paper, we introduce the twisted Sasaki metric on the tangent bundle TM, as a new natural metric on TM. We establish necessary and sufficient conditions under which a vector field is harmonic with respect to the twisted Sasaki metric. We also construct some examples of harmonic vector fields.

Mustapha Djaa
Univ. Relizane, Algeria

Numerical Simulation of Natural Convection of Nanofluid in a Square Cavity Including a Square Heater Using Finite Volume Method

This paper reports a numerical study of natural convection of nanofluid (Cu–water) in a square cavity with a centrally-placed heated block. The transport equations were solved using the finite volume discretization method with SIMPLE algorithm. The method used is validated against previous works. Results were presented in terms of streamlines, isotherms, and Nusselt number for different sizes of the heater. The other parameters governing the problem are the Rayleigh number.

Zoubair Boulalahia
Univ. Casablanca, Morocco

ORTHOGONAL POLYNOMIALS ATTACHED TO COHERENT STATES FOR THE SYMMETRIC POSCHL-TELLER OSCILLATOR

We consider a one-parameter family of nonlinear coherent states by replacing the factorial in coefficients $z^n/\sqrt{n!}$ of the canonical coherent states by a specific generalized factorial $x^n_{\gamma}!$, $\gamma \geq 0$. These states are superposition of eigenstates of the Hamiltonian with a symmetric Pöschl-Teller potential depending on a parameter $\gamma > 1$. The associated Bargmann-type transform is defined for $\gamma = \nu$. Some results on the infinite square well potential are also derived. For some different values of $\gamma$, we discuss two sets of orthogonal polynomials that are naturally attached to these coherent states.

Patrick Kayupe
Univ. Kenitra, Morocco
The Onset of Electroconvection in a Dielectric Nanofluid Saturated a Rotating Porous Medium

Abderahim Wakif
Univ. Casablanca
Morocco

The simultaneous effect of rotation and a vertical electric field on the onset of electroconvection in a horizontal dielectric nanofluid layer saturated a porous medium is investigated. The boundaries of the nanofluid dielectric layer are considered isothermal where the vertical nanoparticle flux is zero. The results show that an increase either in the electric Rayleigh number, the Lewis number, the nanoparticle Rayleigh number or in the modified diffusivity ratio allows to hasten the onset of electroconvection in dielectric nanofluids, while the Taylor number and the porosity of the porous medium allow to delay it. In this investigation, we consider an infinite horizontal layer of incompressible dielectric nanofluid saturated a rotating porous medium with a uniform angular velocity, this layer is confined between two parallel impermeable boundaries and heated from below where the temperatures at the lower and upper boundaries are taken to be and respectively and the vertical nanoparticle flux is zero on the boundaries. The nanofluid layer is subjected to the gravitational field and also to a uniform vertical electric field applied across the layer, such that the lower surface is grounded and the upper surface is kept at an alternating potential whose root mean square is . The thermo-physical properties of nanofluid (viscosity, thermal conductivity, specific heat) are assumed constant in the vicinity of the reference temperature except for both the dielectric constant and the density in the Maxwell equations and the momentum equation respectively which are based on the Oberbeck-Boussinesq approximation.

String Topological Robotics

My Ismail Mamouni
CRMEF Rabat
Morocco

We claim to link two well known theories; namely the string topology (founded by M. Chas and D. Sullivan in 1999) and the topological robotics (founded by M. Farber some few years later, in 2003). For our purpose, we consider G a compact Lie group acting on a path-connected n-manifold X. On the set $\mathcal{M}_{LP}(X)$ of the so-called loop motion planners (LMP for short), we define and discuss a string homology product. Firstly, we define transversely an intersection LMP-product at level of chains of $\mathcal{M}_{LP}(X)$. Secondly, we define a boundary operator on the chains of $\mathcal{M}_{LP}(X)$ and extend the intersection LMP-product, at level of homology of $\mathcal{M}_{LP}(X)$, to a string LMP-product. Finally, we show that it induces on the shifted string LMP-homology $\mathbb{H}_*(\mathcal{M}_{LP}(X)) := \mathbb{H}_{*+2n}(\mathcal{M}_{LP}(X))$ a structure of an associative and commutative graded algebra (acga). By the end, following Chas-Sullivan approach, we ask how one may extend this acga-structure to a structure of Gerstenhaber algebra or that of a Batalin-Vilkovisky algebra. Some ideas will be suggested.

Joint work with Younes Derfoufi (Univ. Meknes, Morocco).
Algèbre de Lie de Lorentz semi-symétrique de dimension inférieure ou égale à 4

Soit G une algèbre de Lie munie d’une métrique de Lorentz invariante à gauche q, de courbure K et d’opérateur de Ricci Ric, G est semi-symétrique si $K.K=0$. Dans le cas où la dimension de G est inférieure ou égale à 4, nous allons définir la courbure à partir de Ricci, et une caractérisation simple de G.

Abderrazzak Benroummane
Univ. Marrakech, Morocco

Un critère cohomologico-geometric d’affinité en géométrie algébrique

Les schémas affines jouent un rôle très important en géométrie algébrique d’où l’intérêt de leur caractérisation. J.P. Serre a introduit les techniques de faisceau et de cohomologie en géométrie algébrique, et découvert son célèbre critère cohomologique d’affinité : Un schéma Noethérien X est affine si et seulement si pour tout faisceau quasi-cohérent F, pour tout $\ell > 0 \ H^\ell(X,F) = 0$. Dans ce travail nous allons donner un critère cohomologico-geometric d’affinité en géométrie algébrique.

Mohamed Aqalmoun
Univ. Meknes, Morocco

On construction of certain Chevalley groups of $E_6(q)$

The purpose of this poster is to give a transparent and elementary construction of certain Chevalley groups $Fi_{22}$ and stabilizers of a base vector of a 27-dimensional vector space over of $F_2$.

Mashhour Bani Ata
PAAET Kuwait, Kuwait

Abdullah Alazemi
Univ. Kuwait, Kuwait
Sur la représentation intégrale dans un espace de balayage

Dans ce travail, on va établir la représentation intégrale des fonctions surharmoniques positives et celle des fonctions dites invariantes sur un espace de balayage \((X,W)\). On suppose que l’espace \(X\) admet un noyau de Green \(G\). On montre que, si les potentiels de même support ponctuel sont proportionnels alors tout potentiel sur \(X\) est représentable par la fonction \(G\) et réciproquement.

Abderrahim Aslimani
Univ. Rabat, Morocco
Excursions

Wednesday, July 13 : Rabat monuments

14h : Departure from UIR ;
15h-17h : Chellah free visit ;
17h-18h30 : Walking along Royal Palace walls and Hassan Tower visit ;
18h30-21h : Free walking along Bouregreg river marina and Kasbah des Oudayas visit ;
21h : Return to UIR.

Sunday-Saturday, July 16-17 : Middle Atlas

Sunday, July 16 :
7h : Departure to Meknes from Rabat City Center and UIR
9h-11h : Visit to Meknes (Gates, Medresa, Mausoleums, ...)
11h : Departure to Azrou from Meknes
12h-13h : Free Cedres Forest hiking : Cedre Gouraud (1855), barbary macaques, ...
13h30 : Departure to Oum Rabia River Sources (Lunch at Afennourir Lake)
16h-18h : Oum Rabia River Sources Free hiking
18h : Departure to the hotel at Khenifra
20h-21h30 : Panel on the MAAT project to edit a Topology-Geometry Journal
22h : Folk Gala Dinner : Folk dances, roast mutton à la Marocaine, ...

Saturday, July 17 :
8h : Departure From Khenifra hotel to Ifrane (free 1h hiking at Vittel Sources)
11h30 : Departure to Fes
13h : Lunch (Imouzzer)
15h-18h : Guided tour to Fes Medina
18h : Departure to Rabat

Wednesday, July 20 : Mehedia Beach

14h : Departure to Kenitra from UIR
15h30 : Sidi Boughaba Lake (free 1h hiking)
17h-20h : Mehedia plage (free program : swimming, walking, coffees, ...)
20h : Departure to Rabat.
Participants

1. Urtzi Buijs, Univ. Louvain, Belgium
2. Joana Cirici, Freie Universität Berlin, Germany
3. Cameron Crow, Stony Brook University (SUNY), USA
4. Bora Ferlengez, Hunter College (CUNY), USA
5. Mohamed Rachid Hilali, Univ. Casablanca, Morocco
6. My Ismail Mamouni, CRMEF Rabat, Morocco
7. Youssef Rami, Univ. Meknes, Morocco
8. Yuli Rudyak, Univ. Florida, USA
9. Samuel Bruce Smith, Univ. Saint Joseph, USA
10. Paolo Salvatore, Univ. Roma, Italy
11. Paul-Arnaud Songhafouo Tsopméné, Univ. Louvain, Belgium
12. Lucile Vandembroucq, Univ. Braga, Portugal
13. Antonio Viruel, Univ. Malaga, Spain
14. Sadok Kallel, Univ. Lille (France) & Americain Univ. Sharjah (United Arab Emirates)
15. Claude Cibilis, CIMPA, France
16. Marc Aubry, CIMPA, France
17. Mouna Chentoufi, UIR Rabat, Morocco
18. Rim Rhmani, UIR Rabat, Morocco
19. M’Feddal Hilali, UIR Rabat, Morocco
20. Nadir Maaroufi, UIR Rabat, Morocco
22. Hassan Aaya, Univ. Casablanca, Morocco
23. Zakia El Khazraoui, Univ. Casablanca, Morocco
24. Seddik Abdelalim, Univ. Casablanca, Morocco
25. Yassine Aderab, Univ. Casablanca, Morocco
26. Omar El Fourchi, CRMEF Rabat
27. Karmouni Mohamed, Univ. Fes, Morocco
28. Bekri Zouaoui, Univ. El Bayadh, Algeria
29. Abderrazzak Benroummane, Univ. Marrakech, Morocco
30. Mohamed El Amine Bahayou, Univ. Sidi-Bel-Abbes, Algeria
31. Djordje Baralic, Univ. Belgrade, Serbia
32. Mikel Lluvia, Univ. Barcelona, Spain
33. Said Bouhmane, Univ. Meknes, Morocco
34. Abderrahim Wakif, Univ. Casablanca, Morocco
35. Ali Hafidi, Univ. Meknes, Morocco
36. Mohammed Srati, Univ. Marrakech, Morocco
37. Ines Saihi, Univ. Tunis, Tunisia
38. Azzeddine Boudjaj, Univ. Meknes, Morocco
39. Omar Dwimi, Univ. Rabat, Morocco
40. Sanaa Madad, Univ. Casablanca, Morocco
41. Hicham Yamoul, Univ. Casablanca, Morocco
42. Kheira Mekhlafi, Univ. Ain Temouchant, Algeria
43. Kaddour Zegga, Univ. Mascara, Algeria
44. Mustapha Djaa, Univ. Relizane, Algeria
45. Nour El Houda Djaa, Univ. Relizane, Algeria
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Lhousain Mouatadid, Univ. Meknes, Morocco
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José Manuel Moreno Fernández, Univ. Malaga, Spain
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Mohamed Sabak, Univ. Casablanca, Morocco
El Mehdi Adani, Univ. Casablanca, USA
Maroua Gamanda, Univ. Sfax, Tunisia
Moez Bouzouita, Univ. Monastir, Tunisia

Abi Sahli, Univ. Casablanca, Morocco

Hamza Foudali, Univ. Casablanca, Morocco

Yassine Amri, Univ. Casablanca, Morocco

Naima El Asery, Univ. Casablanca, Morocco

Hind Otmani, Univ. Casablanca, Morocco

Abderahim El Attar, Univ. Fes, Morocco

Saloua Chouingou, Univ. Casablanca, Morocco

Siham Mokhfi, Univ. Blida, Algeria

Yassir Rachdi, Univ. Casablanca, Morocco

Fatima Ezzahra Teffah, UIR Rabat, Morocco

Naaem Al Koumi, Univ. Birzeite, Palestine

Walid Taamallah, Univ. Tunis, Tunisia

José Carrasquel, Univ. Louvain, Belgium

Mashhour Bani Ata, PAAET Kuwait, Kuwait

Abdullah Alazemi, Univ. Kuwait, Kuwait

Mohamed Aqalmoun, Univ. Meknes, Morocco

Cheikh Khoule, Univ. Dakar, Senegal

Angel Andres, Univ. Los Andes, Colombia

Patrick Kayupe Kikodie, Univ. Kenitra, Morocco

Mohammed Abdellaoui, Univ. Fes, Morocco

Rajae Bentahar, Univ. Fes, Morocco
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<th>Monday, July 11</th>
<th>Tuesday, July 12</th>
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<th>Friday, July 15</th>
<th>Sun-Sat, July 16-17</th>
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<tr>
<td>9h-9h30</td>
<td>Registration</td>
<td>Course 1</td>
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<td>Interview</td>
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