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**Conference on**  
**GEOMETRY, TOPOLOGY & DYNAMICAL SYSTEMS**

**Casablanca, October 26 to 28, 2011**

<http://www.ggtm.uh2c.ma/>

**Organizers** : H. ABCHIR, M. BOUCETTA, H. HAMRAOUI & R. HILALI

**Scientific Committee** : M. BELKHELFA, A. EL KACIMI & N. GAMARA

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The **GGTM** (Groupement pour le développement de la Géométrie et la Topologie au Maghreb), the University Hassan II of Casablanca and **CIMPA** plan to organize in Casablanca, October 26 to 28, 2011, a conference on *Geometry, Topology and Dynamical Systems*. This event is a part of the scientific activities of the RIAMI-GGTM:

<http://www.cimpa-icpam.org/spip.php?rubrique88>

1. Three courses in three sessions each. These courses have general content and will be of interest to a wide audience. Next is a presentation of these courses.

- Abdelhak ABOUQATEB (Professor, Cadi Ayyad University, Marrakech, Morocco)

**Introduction to de Rham cohomology.** The purpose of this course is to introduce the de Rham cohomology as a powerful tool in differential topology. The first course will be devoted to the definition of cohomology groups associated to an open set in the Euclidean space and to a smooth manifold and some immediate properties of these spaces. In the second course we will develop the main techniques useful to compute this cohomology, namely, Mayer-Vietoris theorem, Poincaré Lemma and Künneth theorem. The last course will consist of computation of the de Rham cohomology groups in some particular cases, for instance, the spheres, the complex projective spaces and compact Lie groups.

- Mohamed BOUCETTA (Professor, Cadi Ayyad University, Marrakech, Morocco)

**Introduction to symplectic topology.** This course is an introduction to symplectic topology via the surprising non-squeezing theorem of Gromov. This theorem asserts that, if there is a symplectic diffeomorphism of  $\mathbb{R}^{2n}$  which maps the ball  $B^{2n}(0, r)$  into the cylinder  $B^2(0, R) \times \mathbb{R}^{2(n-1)}$ , then  $r \leq R$ . The first course will be devoted to the introduction of some elementary properties of symplectic vector spaces and the proof of the affine non-squeezing theorem. The second course will be an introduction to symplectic manifolds and some of their immediate properties; the proof of Darboux's theorem will be given. In the last course, we will

prove that the non-squeezing theorem is equivalent to the existence of symplectic capacities and we will define the Conley-Zehnder capacity and then prove Gromov's theorem.

- Aziz EL KACIMI (Professor, University of Valenciennes, France)

**Deformation theory in geometry.** Deformation theory is a central theme on which many mathematicians are working currently. It brings a variety of problems many of which are still open. After giving the basic definitions, we will focus our attention on two important situations: the deformations of actions of discrete groups (but just actions of  $\mathbb{Z}$ ) and those of lattices in Lie groups. We will also compute explicitly the cohomology groups which describe the infinitesimal aspect of these deformations. A list of some elementary open questions on the topic will be given (it may interest students).

2. Plenary lectures in tune with current mathematical research. The invited speakers are:

- Ali BAKLOUTI (Professor, University of Sfax, Tunisia)

**On the geometry of discontinuous subgroups acting on homogeneous spaces.**

- Abdelkader BOUYAKOUB (Professor, University of Oran Es-Sénia, Algeria)

**On a problem of B.Y. Chen on minimal submanifolds.**

- Rachid HILALI (Professor, University Hassan II of Casablanca, Morocco)

**Actions of  $\mathbb{R}^2$  on  $\mathbb{S}^3$ .**

- Hassan SAIDI (Professor, University of Rabat & Academy of Sciences, Morocco)

**Topological Index Theorem in Lattice QFTs.**

3. Three communications per day by doctoral students who will report on their thesis work. The communicating students are from the three Maghreb countries (Algeria, Morocco and Tunisia).

The number of expected participants is estimated at forty with a dozen doctoral students who will come from Maghreb, of course, but we hope also from France and other African countries.

This activity will be funded mainly by the CIMPA in the RIAMI-GGTM Program. But a request for additional support will be made to University Hassan II which is hosting the conference. We expect positive return.

This conference replaces the biennial Symposium of the GGTM whose fifth edition was programmed in Hammamet from 25 to 28 April 2011 but, unfortunately, was canceled because of the recent events in Tunisia. It will allow the GGTM to continue its scientific activities and play its role as a RIAMI recognized by the CIMPA and the CNRS.