Workshop on "Complex Geometry, Dynamics and Probability"

July 08th-09th, Lille

The talks will take place in the Salle de réunion in the building M2 (Metro station : Cité scientifique - Professeur Gabillard on line 1, direction : Quatre Cantons - Stade Pierre-Mauroy). Coffee breaks will take place in Salle de Kampé de Fériet close by the Salle de réunion.

MONDAY, JULY 08TH

09 :00–09 :30   **Welcome**.

9 :30–10 :15   **George MARINESCU (Universität zu Köln)**.

Tian's approximation theorem for Moishezon spaces.

Tian's approximation theorem for compact Kähler manifold endowed with a positive prequantum line bundle asserts that the sequence of Fubini-Study forms induced by the Kodaira embeddings converge, together with all their derivatives, to the curvature of the prequantum line bundle. In this talk we will present generalizations of this statement to the case of Moishezon manifolds and big line bundles. This is a joint work with Dan Coman and Xiaonan Ma.

10 :15–10 :40   **Group picture and Coffee Break**

10 :40–11 :25   **Dan COMAN (Syracuse University)**.

Zeros of random holomorphic sections of big line bundles with continuous metrics.

Let X be a compact normal complex space, L be a big holomorphic line bundle on X and h be a continuous Hermitian metric on L. We consider the spaces of holomorphic sections $H^0(X, L^{\otimes p})$ endowed with the inner product induced by $h^{\otimes p}$ and a volume form on X, and prove that the corresponding sequence of normalized Fubini-Study currents converge weakly to the curvature current $c_1(L, h_{\mathrm{eq}})$ of the equilibrium metric h_{eq} associated to h. We also show that the normalized currents of integration along the zero divisors of random sequences of holomorphic sections converge almost surely to $c_1(L, h_{\mathrm{eq}})$, for very general classes of probability measures on $H^0(X, L^{\otimes p})$. This is joint work with Turgay Bayraktar, George Marinescu, and Viêt-Anh Nguyên.

11 :30–12 :15 **Romain DUJARDIN (Sorbonne Université)**.

On the dynamical Manin-Mumford conjecture for plane polynomial maps.

The dynamical Manin-Mumford conjecture is a dynamical question inspired by classical results from arithmetic geometry. The question is whether, for an algebraic dynamical system, a subvariety containing 'unusually many' preperiodic points must be itself preperiodic. In a recent work in collaboration with Charles Favre and Matteo Ruggiero, we establish this conjecture for a wide class of plane polynomial maps.

12 :15–14 :30 **Lunch Break**

14 :30–15 :30 **HDR defense of Fabrizio BIANCHI (Université de Lille & Università di Pisa)**.

Thermodynamics and bifurcations in several complex variables (Thermodynamique et bifurcations ‡ plusieurs variables complexes).

Abstract. This habilitation thesis covers a large part of the research I have carried out since the end of my PhD. The main topic is the study of dynamical systems in several complex variables, mostly by means of pluripotential theory techniques. In the first part I describe my works related to the characterization of stability and bifurcation in families of endomorphisms of $\mathbb{P}^k(\mathbb{C})$. In the second part, I describe the results related to the statistical study of endomorphisms of $\mathbb{P}^k(\mathbb{C})$ and HÈnon maps. In the last part, I collect the results which are not directly related to these two main directions, or that, on the opposite, rely on both.

Résumé. Cette thèse d'habilitation couvre une grande partie des mes travaux depuis la fin de ma thèse de doctorat. Le sujet principal est l'étude des systÈmes dynamiques à plusieurs variables complexes, principalement au moyen de techniques de la théorie du pluripotentiel. Dans la première partie je décris mes travaux liés à la caractérisation de la stabilité et de la bifurcation dans les familles d'endomorphismes de $\mathbb{P}^k(\mathbb{C})$. Dans la deuxième partie, je présente les résultats liés à l'étude statistique des endomorphismes de $\mathbb{P}^k(\mathbb{C})$ ainsi que des applications de Hénon. Dans la dernière partie, je rassemble les résultats qui ne sont pas directement liés à ces deux directions principales, ou qui, au contraire, s'appuient sur les deux.

15 :30–16 :30 **Jury deliberations**

14 :00–16 :30 **Coffee and Tea available**.

17 :00 **Pot de thèse (drinks party)**.

9 :00–9 :30   **Coffee and Tea available**.

9 :30–10 :15   **Tien-Cuong DINH (National University of Singapore & Sorbonne Université)**.

Siu's theorem for positive pluriharmonic currents

After reviewing some results, I will discuss Siu's theorem on the level sets of Lelong numbers of a positive pluriharmonic current. The talk is based on an ongoing project with Viet-Anh Nguyen.

10 :15–10 :40   **Coffee Break**.

10 :40–11 :25   **Guokuan SHAO (Sun Yat-Sen University)**.
Recent progress on holomorphic Morse inequalities

In this talk, we present recent progress on holomorphic Morse inequalities. We first review the history and motivation. Then we introduce recent results on CR manifolds. Finally we give a uniform proof of weak holomorhpic Morse inequalities in various settings.

11 :30–12 :15   **Mihai-Marius TIBAR (Université de Lille)**.

Enumerative Geometry of the Gradient

The polar degree and the Euclidean distance degree are two notions in algebraic geometry which involve counting of the zeroes of the gradient. We discuss some recent results, some applications, and the relation to enumerating Morse points in linear Morsifications.

12 :15–14 :00   **Lunch Break**.

14 :00–16 :30   **Coffee break and open discussions**.