# Schedule KAWA-NORDAN, CIRM 2014

24.03-29.03.2014

## Monday 24th March 2014

- 9h30-10h30: Welcome + **Beginning of Winterschool**
- Coffee break [10h30-11h]
- 11h-12h: DEMAILLY 1
- Lunch [12h30-14h]
- 14h30-15h30: JONSSON 1
- Coffee break [15h30-16h]
- 16h-17h: ROUSSEAU 1

## Tuesday 25th March 2014

- 9h30-10h30: DEMAILLY 2
- Coffee break [10h30-11h]
- 11h-12h: JONSSON 2
- Lunch [12h30-14h]
- 14h30-15h30: ROUSSEAU 2
- Coffee break [15h30-16h]
- 16h-17h: DEMAILLY 3

## Wednesday 26th March 2014

- 9h30-10h30: ROUSSEAU 3

- Coffee break [10h30-11h]

- 11h-12h: JONSSON 3

- Lunch [12h30-14h]

- Free afternoon

## Thursday 27th March 2014

- 9h30-10h30: DEMAILLY 4

- Coffee break [10h30-11h]

- 11h-12h: JONSSON 4

- Lunch [12h30-14h]

- 14h30-15h30: ROUSSEAU 4

- Coffe break [15h30-16h] and **End of the Winterschool**

- 19h30-: Bouillabaisse

## Friday 28th March 2014: Workshop

- 9h-9h40: BERMAN

- 9h50-10h30: AMERIK

- Coffee break [10h30-11h]

- 11h-11h40: ANGELLA

- 11h50-12h30: DETHLOFF

- Lunch [12h30-14h]

- 14h30-15h10: DESERTI

- 15h20-16h: ARFEUX

- Coffee break [16h-16h30]

- 16h30-17h10: FAGELLA

- 17h20-18h: YAKOVENKO

## Saturday

- 9h-9h40: RUPPENTHAL

- 9h50-10h30: LÄRKÄNG

- Coffee break [10h30-11h]

- 11h-11h40: ADACHI

- 11h50-12h30: FORNAESS-WOLD

- Lunch [12h30-14h]

- **End of Workshop**

# Abstracts

1. **Masanori Adachi** (Nagoya University)

   **On the ampleness of positive CR line bundles over Levi-flat manifolds**

   I would like to report an example of a compact Levi-flat CR 3-manifold with a positive-along-leaves CR line bundle which is not ample with respect to transversely infinitely differentiable CR sections. This shows that we cannot improve the regularity of Kodaira type embedding theorem for compact Levi-flat CR manifolds obtained by Ohsawa and Sibony.

   The example is constructed by restricting a holomorphic line bundle on a flat ruled surface to a Levi-flat real hypersurface. The main point is the existence of a strictly plurisubharmonic exhaustion with logarithmic growth on the complement of the Levi-flat real hypersurface, which enables us to prove a Bochner-Hartogs type extension theorem for sufficiently smooth CR sections.

2. **Ekaterina Amerik** (Higher School of Economics, Moscow)

   **Rational curves on hyperkahler manifolds**

   This is a joint work with Misha Verbitsky. We make some remarks on deformations on rational curves on irreducible hyperkähler manifolds and define what we call the MBM (monodromy birationally minimal) classes on such manifolds: roughly speaking, these are classes generating extremal rays modulo monodromy and birational equivalence. We prove that the property of being MBM is deformation invariant, and draw some consequences for the Kähler cone of an irreducible hyperkähler manifold.

3. **Daniele Angella** (INdAM-Università di Parma)

   **On Bott-Chern cohomology for complex manifolds**

   We study some cohomological properties of complex manifolds, in particular on Bott-Chern cohomology.

4. **Matthieu Arfeux** (Institut de Mathématiques de Toulouse)

**Deligne-Mumford compactification and dynamics on Berkovich spaces.**

I will try to explain how the Deligne-Mumford compactification of stable curves of genus zero can be used to compactify some families of dynamically marked rational maps. We will show how this dynamic can be interpreted as the restriction of the dynamics on Berkovich spaces.

5. **Robert Berman** (Chalmers Techniska Högskola)

**Kähler-Einstein metrics, canonical random point processes and birational geometry**

In this talk will explain a probabilistic (statistical-mechanical) approach to the study of canonical metrics and measures on a complex algebraic variety X. On any such a variety with positive Kodaira dimension one can define canonical random point process - defined in terms of pluricanonical forms - which converges in probability towards a canonical deterministic measure on X, coinciding with the canonical measure of Song-Tian and Tsuji, previously introduced in a different setting. In the case of a variety X of general type one obtains as a corollary that the unique Kähler-Einstien metric on X with negative Ricci curvature is the limit of a canonical sequence of quasi-explicit Bergman type metrics.

6. **Julie Déserti** (Université Paris 7)

**"Big" automorphisms groups with positive entropy on rational surfaces**

We give some geometric and dynamical properties of the embeddings of $SL(2; Z)$ in the Cremona group. In particular we explain how to construct automorphisms groups on rational surfaces isomorphic to $SL(2; Z)$ that preserve an elliptic curve and whose all elements of infinite order have positive entropy.

7. **Gerd Dethloff** (Université de Brest)

   **Value distribution of the Gauss map of complete minimal surfaces**

   In this talk we study the ramification of the Gauss map of complete minimal surfaces in $R^n$ on annular ends. Our results improve results by Jin-Ru (in the general case) and more special ones by Kao (in the case of $R^3$), always in the sense that the restriction of the Gauss map to an annular end of such a complete minimal surface cannot have more branching (and in particular not avoid more values) than on the whole complete minimal surface. The main proof idea is to construct explicit singular negatively curved metrics with ramification on these annular ends and then to adapt techniques similar to those used by Fujimoto, Jin-Ru and Kao to finish the proofs.

8. **Núria Fagella** (Universitat de Barcelona)

   **Newton's method and absorbing domains**

   Newtons method for polynomials or entire maps can be regarded as a dynamical system on the Riemann sphere or, respectively, on the complex plane. Understanding the topology of its Julia set gives results which are interesting both dynamically and numerically. We present here a recent result which states that the Julia set of Newtons methods is always connected or, equivalently, that its stable regions are simply connected. In the talk however, we shall concentrate mostly on the main tool used to prove this theorem, namely the existence of absorbing regions in Baker domains (components on which all iterates tend to infinity).

   Absorbing regions (domains which eventually attract all orbits) are known to exist for each type of Fatou component except, until now, for Baker domains. This result takes a much more general form and it is based on work of Cowen on holomorphic maps from the right half plane to itself with no fixed points.

9. **Richard Lärkäng** (University of Wuppertal)

   **Residue currents with prescribed annihilator ideals on singular varieties**

The duality theorem for Coleff-Herrera products states that the annihilator of the Coleff-Herrera product of a complete intersection $f$ on a complex manifold equals the ideal generated by $f$. The duality theorem was proven independently by Passare and by Dickenstein and Sessa.

Given an arbitrary ideal $J$ on a complex manifold, Andersson and Wulcan constructed a current $R^J$ such that its annihilator equals $J$, generalizing the duality theorem for Coleff-Herrera products. I will describe how one can construct such a current also on a singular variety, mainly by focusing on special cases where this construction can be described concretely.

10. **Erlend Fornaess Wold** (University of Oslo)

   **TBA**

11. **Jean Ruppenthal** (University of Wuppertal)

   **Serre duality and solving $\overline{\partial}$-equations on singular complex spaces**

   We will report on some new results about solvability of the $\overline{\partial}$-equation on complex spaces with arbitrary singularities in different categories of function spaces. Let X be a complex space of pure dimension n. Then the most far-reaching results on regularity of the $\overline{\partial}$-equation on X are about (n,q)-forms. We will show how one can use a topological version of Serre duality for various kinds of $\overline{\partial}$-operators to deduce also local and global solvability results for (0,q)-forms in the $L^2$-category. That covers the maybe most important case of (0,1)-forms where we have also $L^\infty$-results. An example of an application is Hartogs' extension theorem in the most general form for (n-1)-complete spaces. For Gorenstein spaces with canonical singularities we obtain an $L^2$-$\overline{\partial}$-resolution of the structure sheaf

12. **Sergei Yakovenko** (Weizmann Institute of Science)

   **Local dynamics of intersections**

   For a discrete time dynamical system (an invertible self-map $F$ of a manifold $M$) a numeric measure of its mixing properties is

the growth of the number of isolated intersections between $F^n(X)$ and $Y$, where $X$ and $Y$ are two submanifolds of complimentary dimensions in $M$. This number for algebraic maps in general grows exponentially in $n$. On the other hand, for local analytic dynamical systems this number remains bounded, as was discovered in various special cases by Arnold, Shub and Sullivan. We generalize this result in a much more general settings for actions of commutative groups, deriving it from the Noetherianity of quasipolynomial rings. This is a joint work with Anna Seigal (Cambridge U).