ARTUR AVILA
CNRS, Universite Paris 6

Localization and reducibiblity

We discuss the dynamics of Schrödinger cocycles over Diophantine rotations of the circle in the case of non-perturbatively small analytic potential. In such systems, the dynamics is conjugate to a constant for typical energies in the spectrum, but often one finds also a generic set of energies for which the behavior is more erratic. Something remains however in the form of a (possibly divergent) Fourier series of a "would be conjugacy". We show how a careful analysis of such Fourier series leads to detailed description of the dynamics. This allows us to obtain sharp estimates on some characteristics of the related operators. Co-author: Svetlana Jitomirskaya

ANDR DE CARVALHO
IME-USP

Pruning and renormalization of Hnon maps

The Pruning Front Conjecture (PFC) states, roughly, that every Henon map can be described as a horseshoe from which some orbits have been destroyed or pruned away. I'll explain pruning and the PFC and a program to prove it for infinitely renormalizable Henon maps. Coauthors: M. Lyubich and M. Martens

RAFAEL DE LA LLAVE
University of Texas

Renormalization of weak noise at the accumulation of period doubling

We study the effect of weak noise on the accumulation of period doubling. We show that if we take a sequence of weak noises but observe the system at longer times, the distribution of the noise converges to a Gaussian in some sense that will me made precise. Joint work with O. Diaz

L. H. ELIASSON
University of Paris 7

KAM for the non-linear Schrodinger equation.

GIOVANNI FORNI
University of Toronto

Algebraic renormalization, cohomological equations and deviation of ergodic averages

We present a unified approach to the study of the asymptotic behavior of ergodic averages (speed of ergodicity, deviation of ergodic averages) for a few basic examples of parabolic flows (suspensions of interval exchange transformations, horocycle flows and some nilflows). The method is based on the study of a renormalization cocycle on a bundle of distributions (or currents) invariant under the dynamics and on estimates on solutions of cohomological equations. The plan of the lectures is the following: We formulate a notion of algebraic renormalization, which is sufficiently general to cover all known examples of "algebraic" renormalizable flows (linear toral flows, horocycle flows on surfaces of constant curvature, suspensions of interval exchange transformation) and to suggest a new example (Heisenberg nilflows). We briefly discuss the limitations of this notion and possible generalizations. We then outline the basic features of cohomological equations in the parabolic uniquely ergodic examples under consideration (versus the elliptic and the hyperbolic case), in particular the presence of distributional obstructions to the existence of solutions and describe the renormalization cocycle (over the renormalization dynamics) relevant to the deviation of ergodic averages. Finally, we explained our method at work in the case of suspensions of interval exchange transformations and of Heisenberg nilflows (with applications to number theory). Coauthor: Livio Flaminio (Univ. Lille, France)

JUN HU
CUNY, Brooklyn College and Graduate Center

From Earthquake Measure to Quasisymmetric Conjugacy

In this talk, I will first give a brief introduction to Thurston earthquake theory and describe a new result on the equivalence between Thurston norms of earthquake measures and cross-ratio distortion norms of circle homeomorphisms. The second part of the talk concerns the earthquake measure induced by the topological conjugacy in Denjoy's theorem on circle diffeomorphisms. I will show that the Denjoy inequality immediately implies that the Thurston norm of the induced earthquake measure is finite if the rotation number is of bounded type, which then implies that the topological conjugacy is quasisymmetric.

HANS KOCH
The University of Texas at Austin

Renormalization and invariant tori

THE FIELDS INSTITUTE
FOR RESEARCH IN MATHEMATICAL SCIENCES

ABSTRACTS 1.2

JOAO LOPES DIAS
Universidade Tecnica de Lisboa

Renormalization of Siegel disks

MARCO MARTENS
University of Groningen

Henon Renormalization

A renormalization operator will be introduced to study Henon maps. The geometry of the Cantor attractor of an infinitely renormalizable Henon map and the global topological properties of such maps will be discussed. There are universal properties. However, the average Jacobian controls two-dimensional phenomena responsable for non-rigidity. Finally, it is shown that hyperbolicity is dense in the zero entropy part of a neighborhood of any infinitely renormalizable map. Moreover, there are countable many hyperbolic components accumulating at such a map.

CARLOS GUSTAVO TAMM DE ARAUJO MOREIRA
IMPA, Rio de Janeiro, Brasil

Statistical properties of unimodal maps: a survey

I will describe a series of results obtained in the last years in collaboration with Artur Avila on statistical properties of unimodal maps: for most parameters in typical analytic families of unimodal maps the corresponding map is either regular or Collet-Eckmann with slow recurrence of the critical orbit. In both cases there is a unique SRB measure for this map. We show that typically the critical orbit belongs to the basin of this measure. Moreover we prove a combinatorial formula for the eigenvalues of periodic orbits of typical non-regular analytic unimodal map. We also estimate fractal dimensions of some exceptional sets of parameters associated to such families. Co-author: Artur Avila.

MITSUHIRO SHISHIKURA
Kyoto University and Fields Institute

An invariant space of maps for parabolic and near-parabolic renormalization

Let $f_0(z) = z + z^2 + \dots$ be a holomorphic function of one variable, which has the origin as a parabolic fixed point. Then for any $\alpha \in \mathbb{R} \setminus \{0\}$ sufficiently close to 0, $f(z) = f_\alpha(z) = e^{2\pi i\alpha} f_0(z)$ has another fixed point σ near 0, and one can find a "fundamental domain" S bounded by an arc ℓ and its image $f(\ell)$, where ℓ is an arc joining 0 and σ. If we glue the boundary curves *ell* and $f(\ell)$ by f, we obtain a bi-infinite cylinder isomorphic to $\mathbb{C}/\mathbb{Z}$,

then by the exponential map $z \mapsto e^{2\pi iz}$ the space is identified with $\mathbb{C}^* = \mathbb{C} \setminus \{0\}$. The first return map to $\overline{S}$ defines a near- parabolic renormalization or cylindrical renormalization $\mathcal{R}f$ which is defined on the neighborhood of the origin with multiplier $e^{-2\pi i\frac{1}{\alpha}}$. We will define a space of functions for which the action of this renormalization is hyperbolic (joint with Hiroyuki Inou). They key to the proof is to consider the limiting situation where "parabolic renormalization" is defined for maps with a parabolic fixed point and to construct an invariant space for it. The invariant space will be characterized by the partial covering properties of the maps. As an application, Buff and Chéritat have obtained a result which says there exists a quadratic polynomial whose Julia set has positive Lebesgue measure.

DANIEL SMANIA
ICMC-USP-Brazil

Measure-theoretical rigidity for unimodal maps

We show that in some topological classes of unimodal maps the measure- theoretical dynamical behaviour, as the existence of wild attractors or the rate of the convergence of a typical point to the measure-theoretical attractor, depends only on the order of the critical point. For infinitely renormalizable maps with bounded combinatorics, as Feigenbaum maps, we prove that the conjugacy between two maps in the same topological class and same critical order is always absolutely continuous. Co-author: C. G. Moreira (IMPA).

SEBASTIAN VAN STRIEN
University of Warwick

Some consequences of density of hyperbolicity

After giving a survey on results related to density of hyperbolicity, we shall describe some its consequences: monotonicity of entropy for multicritical maps, and prevalence of maps with SRB measures. Coauthors: W. Shen, O. Kozlovski and H. Bruin.