First Joint Meeting Brazil Italy of Mathematics
Special Session:
Dynamical Systems and Ergodic Theory

Rio de Janeiro, August 29 - September 02, 2016

Title: The geodesic flow of meromorphic connections on compact Riemann surfaces

Authors: Marco Abate, Università di Pisa, Italy

Abstract: A geodesic for a meromorphic connection on a Riemann surface can locally be seen as a real solution of a geodesic equation with meromorphic coefficients, or as a geodesic for a conformal family of flat metrics. Using both these characterizations we shall be able to discuss the asymptotic behavior of the geodesic flow, proving in particular a theorem extending to this setting the classical theorem of Poincaré-Bendixson. Finally, we shall show why this theory is related to the study of the local dynamics of holomorphic germs tangent to the identity in several complex variables. (Joint work with F. Tovena and F. Bianchi).

Title: Partially hyperbolic attractors: fine statistical properties and linear response formula

Authors: Armando Castro

Abstract: We prove the existence and uniqueness of pressure maximizing measures associated to low variation potentials in the context of partially hyperbolic attractors with prevalence of expansion in the central bundle. For such measures we prove fine properties (Exponential decay of correlations, CLT, statistical stability, Large Deviations results, etc.) and Linear response formula. Joint work with C. Liverani.

Title: Supersymmetric Quantum Mechanics and Homogeneous Dynamics

Authors: Francesco Cellarosi

Abstract: SUSY quantum mechanics is concerned with the study of quantum evolution of two so-called "partner Hamiltonians". I will describe a limit theorem for autocorrelation functions for a class of SUSY quantum systems (Pöschl-Teller potentials) at random times. The result is based on the equidistribution of closed horocycles under the action of the geodesic flow in a suitably defined homogeneous space and Ratner theory.

Title: Parabolic dynamics and Anisotropic Banach spaces

Authors: Paolo Giulietti

Abstract: In a simple model I will explain a relation between the distributions appearing in the study of ergodic averages of parabolic flows (e.g. in the work of Forni) and the distributions appearing in the study of the statistical properties of hyperbolic dynamical systems (i.e. the eigendistributions of the transfer operator). This is joint work with C.Liverani.

Title: Invariant pseudo-foliations for minimal torus homeomorphisms

Authors: Alejandro Kocsard

Abstract: We shall discuss some recent rigidity results about minimal 2-torus homeomorphisms which are isotopic to the identity.

Minimal rotations are archetypal examples of such systems. However, it is well-known that there exist minimal diffeomorphisms on $\mathbb{T}^2$ exhibiting a very rich and complicate dynamics which are very faw away from those of rigid rotations. In fact, it has been recently shown that there exist minimal diffeomorphisms which do not even have a well-defined rotation vector.

In this talk, we shall show that such systems are not as "wild" as it was originally thought and in fact, they exhibit certain form of rigidity.

Title: Satellite copies of the Mandelbrot set

Authors: Luna Lomonaco

Abstract: Douady and Hubbard proved the existence of homeomorphic copies of the Mandelbrot set M inside of M. These copies can be primitive (roughly speaking the ones with a cusp) or satellite (without a cusp). Lyubich proved that the primitive copies of M are quasiconformally homeomorphic to M, and that the satellite ones are quasiconformally homeomorphic to M outside any small neighbourhood of the root. The satellite copies are not quasiconformally homeomorphic to M, but are they mutually quasiconformally homeomorphic? In a joint work with C. Petersen we prove that this question has in general a negative answer.

Title: Young towers and SRB measures for nonuniformly hyperbolic surface diffeomorphisms

Authors: Stefano Luzzatto

Abstract: We prove that surface diffeorphisms with non-zero Lyapunov exponents satisfying some natural recurrence condition admit a Young Tower and therefore an SRB measure. This essentially proves, in the two-dimensional setting, Viana's conjecture. This is joint work with V. Climenhaga and Y. Pesin.

Title: Rigorous Approximation of stationary Measures and Convergence to Equilbrium for Iterated Function Systems.

Authors: Maurizio Monge

Abstract: We study the problem of the rigorous computation of the stationary measure and of the rate of convergence to equilibrium of an Iterated Function System described by a stochastic mixture of two or more dynamical systems that are either all uniformly expanding on the interval, either all contracting. In the expanding case, the associated transfer operators satisfy a Lasota-Yorke inequality, we show how to compute a rigorous approximations of the stationary measure in the L1 norm and an estimate for the rate of convergence. The rigorous computation requires a computer-aided proof of the contraction of the transfer operators for the maps, and we show that this property propagates to the transfer operators of the IFS. In the contracting case we perform a rigorous approximation of the stationary measure in the Wasserstein-Kantorovich distance and rate of convergence, using the same functional analytic approach. We show that a finite computation can produce a realistic computation of all contraction rates for the whole parameter space. We conclude with a description of the implementation and numerical experiments. Joint work with S. Galatolo and I. Nisoli.

Title: Lagrange and Markov dynamical spectra of Lorenz-like attractors

Authors: Maria José Pacifico

Abstract: In a joint work with S. Roma no and C. G. Moreira, we prove that the Hausdorff dimension of a geometric Lorenz attractor is strictally greater than 2. From this, we conclude that the interior of the Lagrange dynamical spectra as well the interior of the Markov dynamical spectra of a geometric Lorenz attractor is non empty.

Title: Lorenz maps with abundance of invariant ergodic probabilities having $+\infty$ as Lyapunov exponent.

Authors: Vilton Pinheiro

Abstract: We give sufficient conditions for a Lorenz map to present an uncountable set of ergodic invariant probabilities having full support, positive entropy, fast recurrence to the singularity and infinite Lyapunov exponent. We also discuss the Thermodynamic Formalism for these maps (this is a joint work with Renaud Leplaideur).

Title: Zero entropy homeomorphisms of the sphere

Authors: Fabio Tal

Abstract: We use a newly developed theory of forcing for surface homeomorphisms to obtain a Poincar-Bendixson like result for orientation preserving - homeomorphisms of the 2-sphere with zero topological entropy. If f is such a map and is not a pseudo-rotation, we show that for every x, there exists a power of f such that the omega limit of x must be either:

1) A cycle made of the union of unlinked fixed points and points heteroclinic to them.

2) A set rotating with irrational speed around a fixed point and possibly this fixed point.

3) An "infinitely renormalizable" set where the restriction of the dynamics is semi-conjugate to the odometer.

In particular, we show that, if a transitive invariant set contains a non-fixed periodic point, it is a periodic orbit. Joint work with P. Le Calvez