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# 88º EDAí 13 de Março de 2020

## Em homenagem aos 80 anos de Jacob Palis

## DMAT-PUC-Rio, Auditório del Castillo RDC, PUC-Rio

10h00 – 10h50

### A survey of results on ergodic Billiards

**Roberto Markarian (IMERL, Montevideu, Uruguai)**

We will present a survey of results and methods on the mathematical theory of billiards. We will focus on ergodic and statistical properties of classical billiard systems in the plane.
The invariant measure for these systems was studied by Birkhoff in the twenties and the ergodic theory was developed by the soviet school in the sixties - seventies, specially by the seminal works of Jacob Sinai.
Relations with the ergodic hypothesis of Boltzmann and properties of the geodesic flow were well understood from the very beginning.
The survey will include references to my own work on ergodic and statistical properties and to recent results on decay of correlations and Poisson processes using methods by for example, Liverani, Demers, Baladi, Dolgopyat, Vaienti, Collet, Zhang, Melbourne.

11h00 – 11h50

### Linear response formula for the topological entropy at the time one map of a geodesic flow on a manifold of negative curvature

**Carlos Vásquez (PUCV, Valparaiso, Chile)**

Let $f$ be the time one map of a geodesic flow on a manifold of constant negative curvature with $\mu$ its Liouville measure. Consider $f_t$, a $C^3$ family of diffeomorphisms with $f_0 = f$. In this talk we discuss about the differentiability of the map $t \mapsto h_{\text{top}}(f_t)$ at $t = 0$, and we provide an explicit formula for its derivative. More precisely,

$$\frac{\partial}{\partial t} h_{\text{top}}(f_t)\Big|_{t=0} = -\int_M \omega_{E^{cs}}(\mathcal{L}_X V_{E^u}) d\mu.$$

In the formula above $\omega_{E^{cs}}$ is a continuous nonzero $k$-form on $M$, $k = \dim E^u$, such that $\ker \omega_{E^{cs}} = E^{cs} \wedge TM^{\wedge(k-1)}$, and it is acting on the Lie derivative of the multi-vector field $V_{E^u}$ in $(E^u)^{\wedge k}$ along $X$, the vector field tangent to the perturbation $h_t = f_t \circ f_0^{-1}$ at $t = 0$.
This is a joint work with Pancho Valenzuela-Henríquez and Radu Saghin from PUCV.

Almoço 12h00-14h00

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14h00 – 14h50

## Strongly Dissipative Diffeomorphisms in the n-Ring

**Fernando Lenarduzzi (IMPA, Brasil)**

In this lecture we will talk about the concept of Strongly Dissipative Diffeomorphisms,a class of maps that were introduced by Pujals and Crovisier. These diffeos contract volume and has intermediate dynamics between a one-dimensional dynamic and a general surface diffeomorphism.
We will give a brief introduction of its basic concepts in the disc and in the n-ring, presenting the idea behind the graph construction that describes the dynamics, exploring a bit about how conjugacy on graphs imply a correlation in the original dynamics.

15h00 – 15h50

## Equilibrium states for a class of non-uniformly hyperbolic maps

**Jaqueline Siqueira (UFRJ, Brasil)**

We consider a wide family of non-uniformly hyperbolic maps and hyperbolic potentials and prove that the unique equilibrium state associated to each element of the family is given by the eigenmeasure and the eigenfunction of the transfer operator (both having the spectral radius as an eigenvalue). We prove that the transfer operator has the spectral gap property in the space of Hölder continuous observables. From this we derive that the unique equilibrium state satisfies a central limit theorem and that it has exponential decay of correlations. Moreover, we prove joint continuity and analyticity with respect to the potential. (Based on various joint works with S. Afonso, J. Alves, V. Ramos.)

Intervalo para café 16h00-16h30

16h30 – 17h30

## Untangling homoclinic tangles

**Isabel Rios (UFF, Brasil)**

In this talk I will discuss some recent results inspired in the works of Palis-Takens and Palis-Yoccoz, about the unfolding of homoclinic bifurcations. In a joint work with A. de Carvalho, L. J. Diaz and K. Diaz-Ordaz, we study the variation of the topological entropy for a family of horseshoes bifurcating an internal homoclinic tangency. We prove that, restricted to a set of parameters with total density at the breaking-contact bifurcation, the topological entropy is a non-increasing function. This result formalizes the idea that the loss of transversal homoclinic intersections implies the decreasing of the amount of dynamics.

Confraternização: Bar Hipódromo, 18h00 – $\infty$

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