

3DD 2025

EDIÇÃO COMEMORATIVA

21, 22 e 23 de outubro

CADERNO DE

RESUMOS

Apoio:



INSTITUTO DE MATEMÁTICA
Universidade Federal do Rio de Janeiro



FAPERJ

Fundação Carlos Chagas Filho de Amparo
à Pesquisa do Estado do Rio de Janeiro



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Commemorative Edition

October 21-23, 2025

BOOK OF

ABSTRACTS

SUPPORT:



INSTITUTO DE MATEMÁTICA
Universidade Federal do Rio de Janeiro



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Apresentação

Em 2025, celebramos duas décadas de uma iniciativa que contribuiu com a formação, a pesquisa e o diálogo matemático no Instituto de matemática da Universidade Federal do Rio de Janeiro (UFRJ): o Seminário de Sistemas Dinâmicos. Mais que uma sequência de encontros, esse seminário hospedou o nascimento e desenvolvimento de diversas idéias, parcerias entre matemáticos em geral, artigos de matemática e um clima agradável para a discussão de uma gama de artigo. Em geral, regadas a café no final das apresentações.

Realizado ininterruptamente desde 2005, com dois encontros semanais com duas horas de duração, e temas não só em sistemas dinâmicos, teoria ergódica, mas passeando por geometria, análise e probabilidade, o seminário se destaca pela constância, diversidade e profundidade. E agora é hora de celebrar parte dessa trajetória.

Este congresso além de caráter comemorativo é um reencontro entre gerações. Teremos palestras de matemáticos que fizeram parte dessa história, sobre temas recentes e que darão um vislumbre sobre o futuro da área. Mais do que relembrar, queremos seguir criando — porque a dinâmica, afinal, continua.

Sejam bem-vindos.

De volta à sala B106A — ou aonde quer que a matemática nos leve.

Introduction

In 2025, we celebrated two decades of an initiative that contributed to the formation, research and mathematical dialogue at the Institute of Mathematics of the Federal University of Rio de Janeiro (UFRJ): the Seminar on Dynamic Systems.

More than a series of meetings, this seminar hosted the birth and development of various ideas, partnerships among mathematicians in general, mathematical articles and a pleasant atmosphere for the discussion of a range of articles.

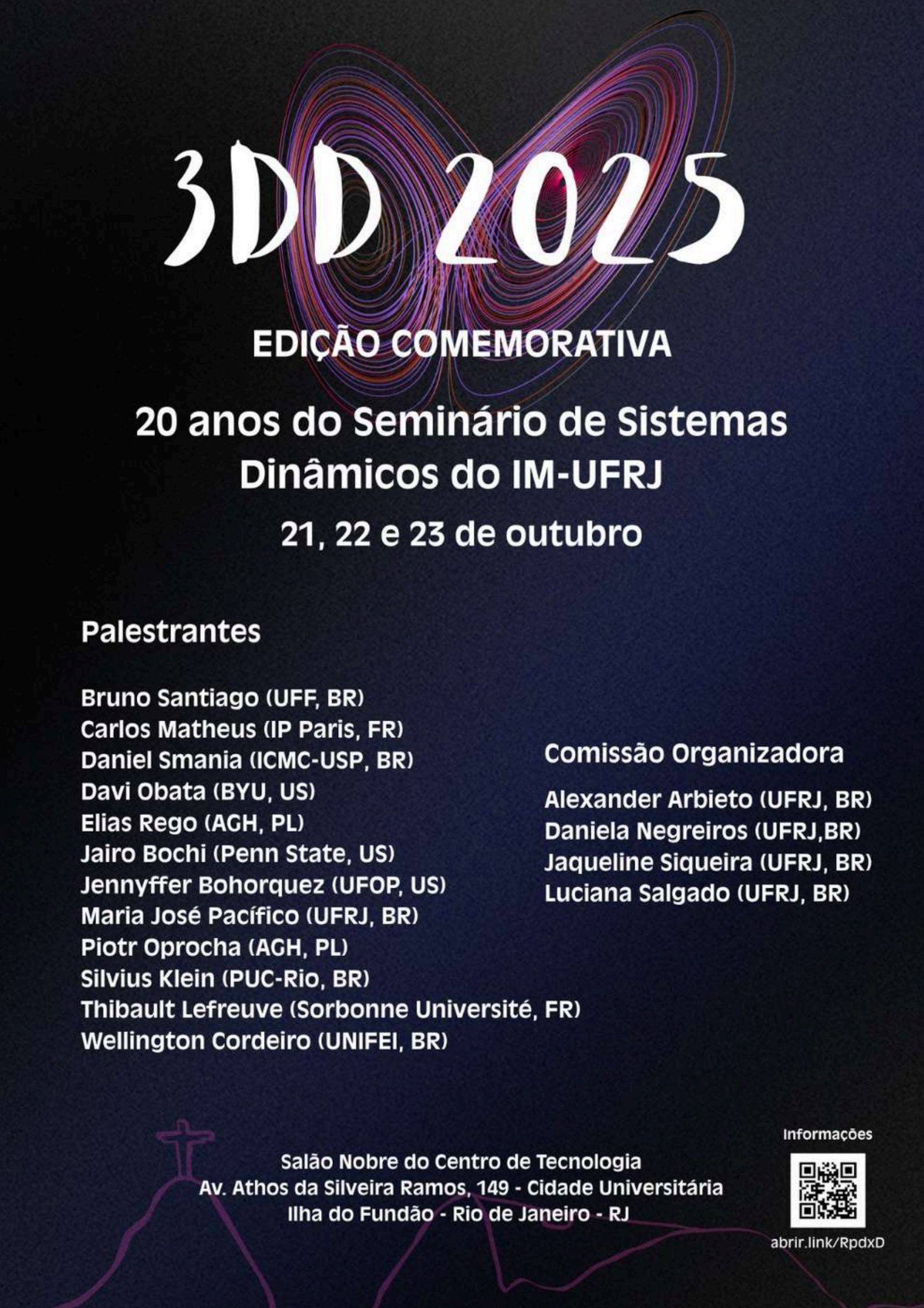
In general, sprinkled with coffee at the end of presentations. Held continuously since 2005, with two weekly meetings of two hours duration, and topics not only in dynamic systems, ergodic theory, but strolling through geometry, analysis and probability, the seminar stands out for constancy, diversity and depth. And now it's time to celebrate part of this trajectory.

This congress is a reunion between generations. We will have lectures by mathematicians who were part of this history, on recent topics and that will give a glimpse about the future of the area.

More than remembering, we want to continue creating - because the dynamic, after all, continues.

Welcome.

Back to room B106A - or wherever the math takes us.



3DD 2025

EDIÇÃO COMEMORATIVA

**20 anos do Seminário de Sistemas
Dinâmicos do IM-UFRJ**

21, 22 e 23 de outubro

Palestrantes

Bruno Santiago (UFF, BR)
Carlos Matheus (IP Paris, FR)
Daniel Smania (ICMC-USP, BR)
Davi Obata (BYU, US)
Elias Rego (AGH, PL)
Jairo Bochi (Penn State, US)
Jennyffer Bohorquez (UFOP, US)
Maria José Pacífico (UFRJ, BR)
Piotr Oprocha (AGH, PL)
Silvius Klein (PUC-Rio, BR)
Thibault Lefreuve (Sorbonne Université, FR)
Wellington Cordeiro (UNIFEI, BR)

Comissão Organizadora

Alexander Arbieto (UFRJ, BR)
Daniela Negreiros (UFRJ, BR)
Jaqueline Siqueira (UFRJ, BR)
Luciana Salgado (UFRJ, BR)



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Ilha do Fundão - Rio de Janeiro - RJ

Informações



abrir.link/RpdxD

ORGANIZADOR(AS)/ORGANIZERS

**Alexander Arbieto
Daniela Negreiros
Jaqueline Siqueira
Luciana Salgado**

Sumário/Summary

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Programação

1

	Ter 21	Qua 22	Qui 23
11:00-11:50	Carlos Matheus	Thibault Lefreuve	Maria José Pacífico
12:00-12:50	Almoço (Lunch)	Almoço (Lunch)	Almoço (Lunch)
13:00-13:50	Piotr Oprocha	Silvius Klein	Jennyffer Bohorquez
14:00-14:50	Bruno Santiago	Daniel Smania	Wellington Cordeiro
15:00-15:40	Coffee Break	Coffee Break	Coffee Break
16:00-16:50	Davi Obata	Elias Rego	Jairo Bochi
16:55-17:00			Encerramento (Closure)

Schedule

2

	Tue 21	Wed 22	Thu 23
11:00-11:50	Carlos Matheus	Thibault Lefreuve	Maria José Pacífico
12:00-12:50	Almoço (Lunch)	Almoço (Lunch)	Almoço (Lunch)
13:00-13:50	Piotr Oprocha	Silvius Klein	Jennyffer Bohorquez
14:00-14:50	Bruno Santiago	Daniel Smania	Welington Cordeiro
15:00-15:40	Coffee Break	Coffee Break	Coffee Break
16:00-16:50	Davi Obata	Elias Rego	Jairo Bochi
16:55-17:00			Encerramento (Closure)

BRUNO SANTIAGO

Rigidity of unstable entropy in dimension three

The notion of unstable entropy has its roots in the seminal work of Ledrappier and Young. It is a concept of particular interest in partially hyperbolic dynamics, as it captures the dynamical complexity of the system along the strong unstable foliation. A recent result shows that the unstable topological entropy also satisfies a variational principle: it is the supremum of the unstable metric entropies over all invariant measures. Measures attaining the supremum are not expected to be highly regular along the unstable direction. In this work, we investigate this idea further and conclude that, in some cases, it leads to strong rigidity. More precisely, we show that whenever a partially hyperbolic Anosov diffeomorphism of the three-dimensional torus with expanding center admits a u -Gibbs state which is a measure of maximal unstable entropy, then the unstable periodic data are constant. As a corollary, when the system is jointly integrable, we deduce smooth conjugacy along center-unstable leaves. This is joint work with Vitor Ferreira.

CARLOS MATHEUS

Os espectros de Lyapunov em dinâmica de Teichmueller são tão simples quanto possível

Os trabalhos fundadores de H. Masur e W. Veech em 1982 sobre dinâmicas parabólicas em baixa dimensão (como intercâmbios de intervalos, bilhares e fluxos de translação) deram início à chamada dinâmica de Teichmueller: em poucas palavras, a ideia de base é tratar uma classe de sistemas parabólicos através das propriedades hiperbólicas de uma renormalização definida num espaço de módulos adequado.

Desde então, uma temática importante em muitas aplicações da dinâmica de Teichmueller tem sido as características do espectro de Lyapunov do cociclo de Kontsevich-Zorich com relação às probabilidades $SL(2, \mathbb{R})$ -invariantes (as quais possuem excelentes propriedades graças aos trabalhos de Eskin, Mirzakhani, Mohammadi e Filip). Nessa direção, o famoso teorema de Avila e Viana diz que os espectros de Lyapunov das medidas de Masur-Veech são simples, mas os espectros de Lyapunov de outras probabilidades $SL(2, \mathbb{R})$ -invariantes possuem padrões mais ricos (como em exemplos construídos por Forni, Filip, Yoccoz, Avila e eu).

Nessa palestra, vamos discutir um trabalho em andamento (em conjunto com F. Arana-Herrera, J. De Witt, A. Eskin, V. Gadre, R. Gutierrez-Romo, Y. Lima, K. Rafi, S. Schleimer) mostrando que o espectro de Lyapunov do cociclo de Kontsevich-Zorich de uma probabilidade $SL(2, \mathbb{R})$ -invariante é tão simples quanto permitido pela monodromia do grupo fundamental.

DANIEL SMANIA

Anisotropic spaces for the bilateral shift

We describe the work of the Ph. D. student Mateus Marra (ICMC-USP-Brazil), under my supervision (Preprint available at <https://arxiv.org/abs/2411.15050>). Given two Hölder potentials ϕ_+ and ψ_- for the unilateral shift, we define anisotropic Banach spaces of distributions on the bilateral shift space with a finite alphabet. On these spaces, the transfer operator for the bilateral shift is quasi compact with a spectral gap, and the unique Gibbs state associated with ϕ_+ spans its 1-eigenspace. This result allows us to establish exponential decay of correlations for Hölder observables and a wide range of measures on the bilateral shift space.

DAVI OBATA

Centralizers and Nonuniform Hyperbolicity

In this talk, we explore the centralizer problem for certain classes of dynamical systems exhibiting nonuniformly hyperbolic behavior. We present a criterion for virtual triviality of the centralizer. As an application, we show that the analytic centralizer of the Taylor–Chirikov standard map is virtually trivial. Further applications include some partially hyperbolic skew products. This is an ongoing joint work with Boris Hasselblatt.

ELIAS REGO

The Shadowing Property for Flows with Singularities

The shadowing property is one of the most celebrated concepts in dynamical systems, with deep connections to applied sciences. Determining whether a given dynamical system exhibits some form of shadowing can shed light not only on its stability and chaotic behavior but also on the reliability of computer simulations. Shadowing theory has been highly successful in the study of maps and nonsingular flows. However, the presence of singularities introduces significant obstructions when dealing with flows. In this talk, I will present recent advances in the shadowing theory for singular flows. These results arise from some recent collaborative works.

JAIRO BOCHI

Old and new examples in ergodic optimization

Ergodic optimization seeks to identify orbits or invariant measures that maximize some type of performance. In this talk, we will look at some classes of examples and uncover relationships between them. I will present an optimization problem with a simple geometric formulation: we want to maximize the displacement achieved by compositions of isometries of the Euclidean plane. We reformulate the problem in terms of commutative ergodic optimization over a partially hyperbolic map. This novel class of examples presents a number of features not seen in classical ones: periodic maximization becomes atypical, and Diophantine properties play a role. Joint work with Pablo Lessa (Universidad de la República, Uruguay).

JENNYFFER BOHORQUEZ

Star vector fields on three-manifolds are multisingular hyperbolic

The coexistence of singularities and regular orbits in chain transitive sets has been a major obstacle in understanding the hyperbolic/partial hyperbolic nature of robust dynamics. Notably, the vector fields with all periodic orbits robustly hyperbolic (star flows), are hyperbolic in absence of singularities. Morales, Pacifico and Pujals proposed a partial hyperbolicity called "singular hyperbolicity" that characterizes an open and dense subset of three dimensional star flows. In higher dimensions, Bonatti and da Luz characterize an open and dense set of star vector fields by multi-singular hyperbolicity. In this article, we prove that a vector field exhibiting all periodic orbits robustly of the same index is multi-singular hyperbolic, generalizing the previous results. As a corollary, we obtained that all three-dimensional star flows are multi-singular hyperbolic. Moreover, if all singularities in the same class exhibit the same index, the star flow is singular hyperbolic. Additionally, star flows with robust chain recurrence classes in any dimension are multisingular hyperbolic.

MARIA JOSÉ PACIFICO

40 anos de Sistemas Dinâmicos no IM-UFRJ

Celebrating the 40th anniversary of the Dynamical Systems at IM-UFRJ

PIOTR OPROCHA

On inverse limits and planar attractors

A very useful technique called BBM(Brown-Barge-Martin), incorporates inverse limits and natural extensions of the underlying bonding maps to embed attractors in manifolds. The original idea goes back to the paper of Barge and Martin, where the authors constructed strange attractors from a wide class of inverse limits. One of the crucial steps for this technique to work is the usage of Brown's approximation theorem. Recently, this technique was extended to produce a parameterized family of strange attractors. In this talk we will present a few possible applications of BBM technique in construction of concrete examples. This is joint work with Jernej Cinc.

SILVIUS KLEIN

Random compositions of linear cocycles

Beginning with the celebrated work of Furstenberg on non commuting random products (of matrices), the study of the statistical and the regularity properties of the asymptotic quantities associated with such processes has become an important topic in probabilities and dynamics, with important applications elsewhere, e.g. in mathematical physics.

With different motivations, various researchers have more recently (independently) considered related problems for more general random multiplicative processes.

In this talk I will review some developments regarding the study of random compositions of (quasiperiodic) linear cocycles.

[Based on joint works with Ao Cai, Pedro Duarte, Marcelo Durães, Aline Melo ... the list is expanding.]

THIBAUT LEFEUVRE

The spectrum of Anosov representations

I will report on an ongoing project in collaboration with Yannick Guedes Bonthonneau and Tobias Weich.

The goal of this work is to define a natural spectrum associated with Anosov representations, consisting of complex hypersurfaces in the complexified dual Cartan subalgebra. The leading hypersurface corresponds to a well-known object in the literature—the so-called critical hypersurface of the representation. To some extent, this spectrum generalizes a similar notion in the rank-one case, known as the set of Pollicott–Ruelle resonances (and the leading resonance), which is known to encode the exponential decay of correlations, among other properties. I will describe the main consequences of this spectral approach, namely the meromorphic extension (to the full complexified dual Cartan subalgebra) of dynamical zeta functions and Poincaré series associated with the representation. If time permits, I will discuss specific values of these functions, the sharp quantitative decay of correlations for the Weyl chamber flow, and the perspectives for future work.

Wellington Cordeiro

Continuum-Wise Hyperbolicity

In this talk, we will introduce the concept of continuum-wise hyperbolicity, a generalization of hyperbolicity grounded in continuum theory. We will explore the similarities and differences between uniform hyperbolicity and continuum-wise hyperbolicity. Specifically, we will present a shadowing lemma for continuum-wise hyperbolic homeomorphisms and a spectral decomposition theorem within this framework. Additionally, we will showcase some non-trivial examples of such systems, highlighting their properties.