PLENARY TALKS ABSTRACTS

- **Christian Bonatti** — *Aperiodic classes of C^1-generic diffeomorphisms.*

  Conley theory splits in a natural way the dynamics of any homeomorphisms of a compact manifold in chain recurrence classes, separated by the regular levels of a Lyapunov function. For C^1-generic diffeomorphisms, a consequence of the Hayashi connecting lemma and its successive generalizations is that any chain recurrence class containing a periodic orbit coincides with the homoclinic class of it. This provides many tools for understanding the dynamics inside the classes containing periodic orbits. The other classes, called "aperiodic classes" are much less understood. Their existence is proved for instance for generic diffeomorphisms in Newhouse regions. However, the classes that we knew, until recently, had a very well understood dynamics: they are all "adding machines" also called "odometers". This specific dynamics was a consequence of our unique way to detect them. In a long work with Katsutoshi Shinohara (4 long papers) we develop another procedure producing aperiodic classes for which we have a control on the dynamics. This leads to a great variety of distinct behavior for (uncountably many) aperiodic classes in the same generic diffeomorphisms. In this talk I will try to motivate this work, and to give some ideas of the tools, of the construction and on the dynamics of the aperiodic classes.

- **Sylvain Crovisier** — *Unicritical Surface Maps and Their Renormalizations.*

  We discuss how the dynamics of dissipative surface maps can be analyzed through successive renormalizations. We focus on two closely related classes of infinitely renormalizable maps of the disc: unicritical diffeomorphisms (characterized by a single non-degenerate critical point) and Hénon-like maps. Under suitable regularity assumptions, we establish and prove a priori bounds for the renormalizations of these maps. These bounds provide uniform control over the small-scale geometric structure of the dynamics and guarantee the precompactness of the renormalization sequence. This is joint work with Mikhail Lyubich, Enrique Pujals and Jonguk Yang.

- **Jonathan DeWitt** — *Expanding on Average Random Dynamics.*

  We consider exponential mixing for volume preserving random dynamical systems on surfaces. Suppose that $(f_1, \dots, f_m)$ is a tuple of volume preserving diffeomorphisms of a closed surface M. We now consider the uniform Bernoulli random dynamical system that this tuple generates on M. We assume that this tuple satisfies a condition called being "expanding on average," which means that there exist $C > 0$ and a natural number N such that for all unit tangent vectors v, $\mathbb{E}[\ln \|Df^N v\|] > C$, where the expectation is taken over all the realizations of the random dynamics. From this assumption we show quenched exponential mixing. (This is joint work with Dmitry Dolgopyat.)

- **Lorenzo J. Díaz** — *Full flexibility of entropies among ergodic measures for partially hyperbolic diffeomorphisms.*

  For a broad class of nonhyperbolic and transitive partially hyperbolic diffeomorphisms having a one-dimensional center, we prove joint flexibility with respect to entropy and center Lyapunov exponent. Flexibility means that for any given value of the center Lyapunov exponent and any value of entropy less than the supremum of entropies of ergodic measures with that exponent, there is an ergodic measure with exactly this entropy and exponent. Our hypotheses involve minimal foliations and blender-horseshoes, they formalize the interplay between two regions of the ambient space, one of center expanding and the other of

center contracting type. A non-exhaustive list of examples our results can apply to includes fibered by circles, flow-type, some Derived from Anosov diffeomorphisms, and some anomalous (non-dynamically coherent) diffeomorphisms. This is a joint work with K. Gelfert, M. Rams, and J. Zhang.

- **Bassam Fayad** —*On the stability and instability of elliptic equilibria and invariant quasi-periodic tori of real analytic Hamiltonians.*

- **Anton Gorodetski** — *On fibered rotation numbers of one-parameter families of cocycles.*
  In the talk we describe the properties of the fibered rotation numbers of one-parameter families of smooth circle cocycles over an ergodic transformation in the base. In the case of projective cocycle we establish an analog of Johnson's Theorem connecting intervals of constancy of the rotation number with uniform hyperbolicity of the cocycle. Also, we show that the rotation numbers must be log-Hölder regular with respect to the parameter. As an immediate application, we get a dynamical proof of 1D version of the Craig-Simon's theorem from spectral theory that claims that the integrated density of states of an ergodic Schrödinger operator must be log-Hölder. Finally, we provide a new explicit formula for the rotation number of a cocycle and discuss its application to spectral theory of ergodic discrete Schrödinger operators. The talk is based on a series of results obtained jointly with Victor Kleptsyn and Pedro Duarte.

- **Adam Kanigowski** — *K and Bernoulli properties in smooth dynamical systems.*
  Both K and Bernoulli properties quantify chaoticity of a system. They are defined for an abstract measure preserving system and it is immediate that Bernoulli implies K. It is also known (although this is much harder) that K does not imply Bernoulli. We will focus on discussing these two properties in the class of smooth (partially hyperbolic) systems. We will recall some classical results, discuss recent developments and state some open questions.

- **Tamara Kucherenko** — *Thermodynamic formalism for coded shifts.*
  In the classical theory of uniformly hyperbolic systems, the dynamics is studied by way of an associated shift of finite type derived from a Markov partition. However, in the absence of uniform hyperbolicity a smooth system cannot generally be modeled by shifts of finite type and instead shifts on countable alphabets have been used. There is some evidence (e.g. for certain model classes of bifurcating heterodimensional cycles) showing that coded shifts, which are limits of increasing families of irreducible subshifts of finite type, could be a potential tool for studying non-uniformly hyperbolic systems. The advantage here is that, in contrast to countable shifts, the coded shifts are compact. I will discuss thermodynamic formalism for coded shifts and present results concerning the uniqueness of measures of maximal entropy and equilibrium states for Hölder potentials, as well as their properties.

- **Homin Lee** — *Positive entropy actions by higher rank lattices.*
  In this talk, we will discuss smooth higher rank lattice actions on manifolds with positive entropy. For instance, when a lattice in $\mathrm{SL}(n,\mathbb{R})$ acts on an n-dimensional manifold with positive entropy with $n \geq 3$, we will see that the lattice is commensurable with $\mathrm{SL}(n,\mathbb{Z})$. Furthermore, we can obtain topological information about the manifold. This is a joint work with Aaron Brown.

- **Karina Marin** — *Lyapunov spectrum of volume-preserving partially hyperbolic maps.*
  The Lyapunov spectrum of a map is said to be simple if every Lyapunov exponent has multiplicity one. That is, if the Oseledets decomposition is given by one dimensional subspaces. This problem has been extensively studied in the context of linear cocycles. In this talk, we discuss the simplicity of the Lyapunov spectrum for partially hyperbolic

volume-preserving diffeomorphisms with two dimensional center bundle. This is a joint work with D. Obata and M. Poletti.

- **Matilde Martínez** — *Solenoidal surfaces of finite type and their horocycle flows.*
  Hyperbolic surfaces of finite type are classical objects, and their horocycle flows are well understood both from the topological and the ergodic-theoretical viewpoints. Solenoidal surfaces are foliated spaces very similar to surfaces. We will consider non-compact solenoidal surfaces "of finite type" with a hyperbolic structure, and give a complete topological description of their horocyclic orbits. This is joint work with Fernando Alcalde, Álvaro Carballido and Alberto Verjovsky.

- **Meysam Nassiri** — *Blenders and Ergodicity.*
  We introduce a local and robust mechanism that ensures the ergodicity of smooth actions. This approach aims to reveal intrinsic ergodic properties of certain hyperbolic sets, including the classical blenders of Bonatti and Díaz. In particular, it yields new examples of stably ergodic, partially hyperbolic, volume-preserving diffeomorphisms, as well as alternative proofs of some recent results in the field. The main result uses ideas developed in collaboration with Abbas Fakhari and Mojtaba Zareh Bidaki. This is joint work with Hesam Rajabzadeh.

- **Davi Obata** — *Absolute continuity of stationary measures.*
  We study random dynamical systems generated by smooth surface diffeomorphisms. Brown and Rodriguez Hertz showed that hyperbolic stationary measures typically have the SRB property—meaning absolute continuity along unstable manifolds—except in the presence of specific obstructions. We aim to identify conditions under which SRB stationary measures are absolutely continuous with respect to Lebesgue measure on the ambient space. This is a joint work with Aaron Brown, Homin Lee, and Yuping Ruan.

- **Yi Pan** — *Hyperbolicity of renormalization of quasi-periodic cocycles.*
  Hyperbolicity of renormalization has been studied in several different settings. We will talk about a first result concerning quasi-periodic cocycles. As an application, we will show a global reducibility result of quasi-periodic symplectic cocycles: given one parameter family of such cocycles, for almost every parameter, either the maximal Lyapunov exponent is positive, or the cocycle is almost conjugate to some precise linear model. The techniques also include Kotani theory and KAM theory. This is a joint work with Artur Avila and Raphaël Krikorian.

- **Cagri Sert** — *Projections of self-affine fractals.*
  I will discuss the extension of Falconer's landmark 1988 result – on the Hausdorff dimension of typical self-affine fractals – to linear projections of these fractals. The result uncovers an algebraic structure on the exceptional sets of projections in the sense of Marstrand projection theorem. Furthermore, the results comes with various examples of new phenomena that I will mention. These include: existence of equilibrium states having non-exact dimensional linear projections (equilibrium states themselves are exact dimensional by Feng); existence of self-affine fractals in dimensions at least 4, whose set of exceptional projections contains higher degree algebraic varieties in Grassmannians (such constructions are not possible even in Borel category in dimension 3 by the solution of a conjecture of Fässler-Orponen by Gan et al., nor in any dimension if the linear parts of affinities act strongly irreducibly on all exterior powers, by Rapaport); existence of self-affine fractals whose sumsets have lower than expected dimension without satisfying an arithmetic resonance (impossible in dimension 1 by Hochman, Shmerkin, Peres and in dimension 2 by Pyörälä). Joint work with Ian D. Morris.

- **Amie Wilkinson** — *Minimality of strong foliations of Anosov diffeomorphisms.*

  I will discuss work with Avila and Crovisier (and related work with Eskin, Potrie and Zhang as well) on the following problem and where it has led us: Let f be an Anosov diffeomorphism in dimension 3. Assume the unstable bundle is 2 dimensional and admits a dominated splitting into weak and strong unstable bundles. Under what hypotheses is the strong unstable foliation minimal?

- **Alberto Verjovsky** — *Adelic loop spaces.*

- **Masato Tsujii** — *An extension of Katok non-stationary normal coordinate along one dimensional invariant manifold.*