Middle-dimensional squeezing and non-squeezing

Alberto Abbondandolo

Bochum

Resumo/Abstract:
We shall discuss a possible middle-dimensional generalization of Gromov's non-squeezing theorem. This talk is based on a joint work with Slava Matveyev.

Dynamical convexity and elliptic orbits for Reeb flows

Miguel Abreu

Lisbon

Resumo/Abstract:
A classical conjecture states that any convex hypersurface in even-dimensional euclidean space carries an elliptic closed orbit of its characteristic flow. Dell'Antonio-D'Onofrio-Ekeland proved it in 1995 for antipodal invariant convex hypersurfaces. In this talk I will present a generalization of this result using contact homology and a notion of dynamical convexity first introduced by Hofer-Wysocki-Zehnder for contact forms on the 3-sphere. Applications include certain geodesic flows, magnetic flows and toric contact manifolds. This is joint work with Leonardo Macarini.

An approach to some questions about Hamiltonian surface maps using pseudo-holomorphic curves

Barney Bramham

Ruhr-Universitt Bochum

Resumo/Abstract:
In this talk we look at some long standing open questions concerning the dynamics of area preserving surface maps and a potential approach using sequences of finite energy foliations that approximate the dynamical system.

On the topology of the monotone Lagrangian submanifolds

Mihai Damian

Strasbourg

Resumo/Abstract:
A well-known theorem of Gromov asserts that there are no simply connected Lagrangian subanifolds in C^n. However the toplogy of Lagrangian submanifolds turns out to be quite flexible. For instance a recent result of Ekholm, Eliashberg, Murphy and Smith asserts that the connected sum with $S^1 \times S^2$ with any orientable 3-manifold admits a Lagrangian embedding into C^3. In this talk we investigate the topology of monotone Lagrangian embeddings and show that it is much more rigid : among the previous examples only the products $S^1 \times \Sigma^2$ can be realized as monotone orientable Lagrangian submanifolds of C^3.

Shadowing Lemmas for Normally Hyperbolic Invariant Manifolds and Applications to the Hamiltonian Instability Problem

Marian Gidea

Illinois

Resumo/Abstract:
We present some shadowing lemmas for normally hyperbolic invariant manifolds (NHIM's). The setting for these lemmas is that there exists a NHIM whose stable and unstable manifolds intersect transversally. There exist two dynamics: an inner dynamics, corresponding to the restriction to the NHIM, and an outer dynamics, corresponding to heteroclinic excursions. We show that for any pseudo-orbit obtained by alternating the inner dynamics and the outer dynamics, there exists a true orbit nearby. We provide some applications to the Hamiltonian instability problem

Multiplicity results for periodic orbits of tight Reeb flows on the three-sphere

Umberto Hryniewicz

UFRJ

Resumo/Abstract:
In this talk I will discuss some recent results on the number of closed orbits of tight Reeb flows on the three-sphere, which were proved using different versions of contact homology. Firstly, I will explain how a non-resonance condition between a pair of closed orbits forming a Hopf link forces the existence of infinitely many periodic orbits; this is a version for flows of the classical Poincar-Birkhoff theorem. Secondly, I will describe how

the existence of a 'very degenerate' closed Reeb orbit implies the existence of infinitely many other periodic orbits; I present two versions of this result. These were obtained in collaboration with Momin and Salomo, and also with Ginzburg, Hein and Macarini.

Beyond the Weinstein conjecture in threee dimensions

Michael Hutchings

University of California at Berkeley

Resumo/Abstract:
We discuss a theorem with Cristofaro-Gardiner and Ramos on the asymptotics of ECH capacities, which implies that every contact form on a closed three-manifold has at least two Reeb orbits. We also discuss a conjecture asserting the existence of a Reeb orbit which is short with respect to the contact volume.

Gopakumar-Vafa conjecture for symplectic manifolds

Eleny Ionel

Stanford

Resumo/Abstract:
The Gopakumar-Vafa conjecture predicts that the Gromov-Witten invariants of a Calabi-Yau 3-fold can be canonically expressed in terms of integer invariants called BPS numbers. In this talk, based on joint work with Tom Parker, we describe the proof of this conjecture, coming from a more general structure theorem for the Gromov-Witten invariants of symplectic 6-manifold.

Local Hofer Geometry

Fracois Lalonde

Montreal

Resumo/Abstract:
We investigate the following conjecture: given a symplectic manifold M and its group Ham(M) of compactly supported Hamiltonian diffeomorphisms, there is a radius r small enough so that the ball of radius r of Ham(M) centred at the identity in Ham(M) in Hofer's metric is contractible in Ham(M). We prove several weaker versions of this, but we have not been able to prove the complete conjecture even in the case of the 2-sphere. Joint work with Yakov Savelyev and Misha Khanevsky.

On Isometry-Invariant Geodesic in Product Manifolds

Marco Mazzucchelli

Montreal

Resumo/Abstract:
In this talk we present a new result on the multiplicity of geodesics invariant by a given isometry of a Riemannian manifold. More specifically, we prove that on any closed Riemannian manifold homeomorphic to a product $(M_1 \times M_2, g)$, where M_1 is at least two-dimensional and M_2 has non-zero first Betti number, every isometry homotopic to the identity admits infinitely many invariant geodesics.

Orderability, contact non-squeezing, and Rabinowitz Floer homology

Will Merry

ETH-Zurich

Resumo/Abstract:
This is joint work with Peter Albers and Urs Fuchs. In 2000 Eliashberg-Polterovich introduced the natural notion of orderability of contact manifolds. As discovered by Eliashberg-Kim-Polterovich, this notion is closely related to non-squeezing in contact geometry. I will explain how one can study orderability questions using product structures on Rabinowitz Floer homology. In particular, how non-vanishing of Rabinowitz Floer homology implies orderability and gives new non-squeezing results, and why hypertight contact structures (contact structures that can be defined by a contact form whose associated Reeb vector field has no contractible orbits) are always orderable.

A dynamical characterization of Lens spaces

Pedro Salomão

USP

Resumo/Abstract:
We prove that a contact manifold (M, ξ) is the Lens space $L(p, q)$ with its standard contact structure if there exists a defining contact form so that its Reeb flow admits a p-unknotted periodic orbit P with rotation number > 1, self-linking number -p, monodromy -q and all contractible periodic orbits having rotation number 1 are not contractible in $M \setminus P$. Related applications to geodesic flows on S^2 and the planar circular restricted 3-body problem are discussed. This is joint work with U. Hryniewicz (UFRJ) and J. Licata (Australian Nat. Univ).

Intersection and embedding controls for punctured pseudoholomorphic curves

Richard Siefring

Max Planck

Resumo/Abstract:
Positivity of intersections for closed pseudoholomorphic curves in dimension 4 (Gromov; McDuff; Micallef and White) has the following important consequences: 1) Two curves having no common components are disjoint if and only if their intersection number is zero. 2) Whether a simple curve is an embedding is determined entirely by topological data. In this talk we will discuss how a precise description of the asymptotic behavior of punctured pseudoholomorphic curves allows similar results to be shown for these curves even though the intersection number of a pair of such curves need not be topologically invariant.

Lagrangian submanifolds of complex projective space.

Michael Usher

Georgia

Resumo/Abstract:
First, I will discuss a proof that a Lagrangian torus in CP^2 arising from a semitoric system described by Weiwei Wu coincides with the image in CP^2 of Chekanov's exotic Lagrangian torus in R^4. I will then turn to what can be regarded as higher-dimensional versions of Wu's torus, which include a monotone Lagrangian torus in CP^3 which is not isotopic either to the Clifford torus or to any of Chekanov and Schlenk's twist tori, as well as monotone Lagrangian submanifolds of CP^n for n at least 4 which (unusually for monotone Lagrangians) are Hamiltonianly displaceable. This is joint work with Joel Oakley.

When is a Stein structure merely symplectic?

Chris Wendl

London

Resumo/Abstract:
The study of Stein manifolds and their symplectic geometry has increasingly been dominated by the question of "rigid vs. flexible", e.g. subcritical Stein manifolds satisfy an h-principle, so their Stein homotopy type is determined by the homotopy class of the almost complex structure. I will show that in dimension 4, there is a much larger class

of Stein domains that exist somewhere between rigid and flexible: while the h-principle does not hold in a strict sense, their Stein deformation type is completely determined by their symplectic deformation type. This result depends on some joint work with Sam Lisi and Jeremy Van Horn-Morris involving the relationship between Stein structures and Lefschetz fibrations, which can sometimes be realised as foliations by J-holomorphic curves.

Coisotropic Submanifolds of Symplectic Manifolds, Leafwise Fixed Points, and a Discontinuous Capacity (partly joint with Jan Swoboda and Kai Zehmisch)

Fabian Ziltener

Munich

Resumo/Abstract:
Consider a symplectic manifold (M, ω), a coisotropic submanifold N of M, and a selfmap ϕ of M. A leafwise fixed point of ϕ is a point on N that is mapped to its isotropic leaf under ϕ. As an example let $H : M \to R$ be a smooth function, N the pre-image of a regular value under H, and ϕ the Hamiltonian time-one flow of a time-dependent perturbation of H. Then a leafwise fixed point of ϕ is a point on the energy level set N whose trajectory is changed only by a phase shift, under the perturbation.

I will discuss lower bounds on the number of leafwise fixed points of ϕ. As an application one obtains a symplectic capacity by considering the minimal actions of regular closed coisotropic submanifolds of a given symplectic manifold. A variant of this capacity is discontinuous. This answers a question by K. Cieliebak, H. Hofer, J. Latschev, and F. Schlenk.