WORKSHOP ON SYMPLECTIC TOPOLOGY: ABSTRACTS

Miguel Abreu: On the number of periodic orbits of non-degenerate lacunary contact forms on prequantizations

Abstract. A non-degenerate contact form is lacunary if the indices of its contractible periodic Reeb orbits have the same parity. As far as I know, every known contact form with finitely many periodic orbits is non-degenerate and lacunary. In this talk I will present joint work with L. Macarini (IMPA), where we show that the number of contractible periodic Reeb orbits of every non-degenerate lacunary contact form on suitable prequantizations is precisely given by the rank of the rational homology of the base. Examples of such prequantizations include the standard contact sphere and the unit cosphere bundle of a compact rank one symmetric space (CROSS). We can also consider some prequantizations of orbifolds, like lens spaces and their unit cosphere bundles, and obtain a similar multiplicity result.

Filip Broćić: Bordism classes of loops and relative Gromov width

Abstract. In the talk, I will give bounds for the relative Gromov width of star-shaped domains in cotangent bundles, for certain classes of base manifolds. I will also provide examples where our bound is sharp. The method of the proof uses a moduli space associated with the bordism class in the free loop space of the base. Another consequence of analyzing such a moduli space is the existence of a periodic orbit for a large class of Hamiltonians. This is based on the joint work with Dylan Cant. Time permitting, I will talk about our related work in progress, where we bound the relative Gromov width for a different class of manifolds.

Urs Frauenfelder: Spectral Jumps in Tate Rabinowitz Floer homology

Abstract. This is joint work with Kai Cieliebak. We are looking for n interacting particle. For these we are introducing the delayed Rabinowitz action functional which is invariant under the action on an n-dimensional torus, which appears by reparametrizing the time of each particle individually. The corresponding Tate chain complex admits a double filtration. This leads to the phenomenon of spectral jumps. We are relating these to semiclassics and EBK quantization.

Yaniv Ganor: A relative capacity from relative symplectic homology, and Gromov width

Abstract. In this talk, we investigate a relative capacity derived from relative symplectic homology, which is an invariant associated with compact subsets of a symplectic manifold. This homology is a module over the Novikov ring and from its torsion part, a capacity can be extracted. Umut Varolgunes proposed this relative

capacity in his thesis and conjectured its nondegeneracy. Our main result establishes that this is indeed a relative capacity, and in particular, is non-degenerate, by providing a lower bound with Gromov width. This is achieved through an energy estimate on Floer solutions, utilizing an adapted neck stretching procedure for holomorphic curves with a Hamiltonian term. This is a work in progress, joint with Adi Dickstein, Leonid Polterovich and Frol Zapolsky.

Rémi Leclercq: Weinstein exactness of nearby Lagrangians and C^0 symplectic geometry

Abstract. The central point of this talk is to present a strategy for proving that Lagrangians which are displaceable by a Hamiltonian diffeomorphism admit a "Weinstein neighborhood of non-displacement." By this, I mean a neighborhood W of the given Lagrangian L such that if the image of L by a Hamiltonian diffeomorphism is included in W, it must intersect L.

When the inclusion of L into M induces the 0-map at the level of first homology groups with real coefficients, this non-displacement property also holds for any Lagrangian included in W, which is the image of L by a (non necessarily Hamiltonian) symplectomorphism.

In both cases, non-displacement follows directly from "Weinstein exactness" of nearby Lagrangians, i.e. the fact that any Lagrangian in the Hamiltonian or symplectic orbit of L, included in W, is exact in W seen as a subset of T^*L.

I will give several natural examples for which such a neighborhood exists. I will then discuss applications of this line of ideas in terms of the topology of the space of Lagrangians Hamiltonianly isotopic to L, and in terms of C^0 symplectic geometry. This is joint work in progress with Jean-Philippe Chassé.

Vladimir Marković: Unramified correspondence and virtual homology of mapping class groups

Abstract. I shall discuss my work showing that the Bogomolov-Tschinkel universality conjecture holds if and only if the mapping class groups of a punctured surface is large (which is essentially the negation of the Ivanov conjecture about the mapping class groups). In addition I shall discuss the recent result showing that the closely related Putman-Wieland conjecture holds for a random cover.

Alexander Ritter: Equivariant Floer theory for symplectic $\mathbb{C}^*$-manifolds

Abstract. I will talk about recent progress in a series of joint papers with Filip Živanović, about a large class of non-compact symplectic manifolds, which includes semiprojective toric varieties, quiver varieties, and conical symplectic resolutions of singularities. These manifolds admit a Hamiltonian circle action which is part of a pseudo-holomorphic action of a complex torus. The symplectic form on these spaces is highly non-exact, yet we can make sense of Hamiltonian Floer cohomology for functions of the moment map of the circle action. We showed that Floer theory induces a filtration by ideals on quantum cohomology. I will explain recent progress on equivariant Floer cohomology for these spaces, in which case we obtain a filtration on equivariant quantum cohomology. If time permits, I will also

mention a presentation of symplectic cohomology and quantum cohomology for semiprojective toric varities.

Felix Schlenk: Symplectic almost squeezings

Abstract. Around 2000, Biran introduced the notion of polarization of a symplectic manifold, and showed that the associated Lagrangian skeleta exhibit remarkable rigidity properties. He proved in particular that their complements may have small Gromov width. In this work, we introduce a version of polarization on affine symplectic manifolds. These polarizations are more flexible than those of closed symplectic manifolds, which provides a wider range of applications. For instance, given an affine symplectic manifold V and any closed symplectic 4-manifold M of larger volume, there exists an isotropic CW complex in V such that its complement symplectically embeds into M. Specifically, after removing from a 4-ball of any radius finitely Lagrangian planes, one finds an embedding into the standard cylinder, extending a result by Sackel-Song-Varolgunes-Zhu and Brendel.

This is work joint with Emmanuel Opshtein.

Baptiste Seraille: The sharp C^0-fragmentation property for Hamiltonian diffeomorphisms and homeomorphisms on surfaces

Abstract. Fragmentation properties have been used by Banyaga, Fathi and Thurston in order to study the algebraic structure of groups of diffeomorphisms, volume preserving diffeomorphisms/homeomorphisms and Hamiltonian diffeomorphisms. This property has been improved on surfaces by Entov, Polterovich and Py and later by Seyfaddini in order to give better control on the "fragments". Still on surfaces, I will present a sharper version of those results

Egor Shelukhin: A dichotomy for Hofer's geometry of autonomous flows on S^2

Abstract. The growth of an autonomous Hamiltonian flow in Hofer's metric is not yet well understood in general. A result of Polterovich and Rosen shows that generically this growth is asymptotically linear, and in all known cases whenever it is not, it appears to be bounded. Such a dichotomy is indeed known for open connected surfaces of infinite area by a result of Polterovich and Siburg from 2000. I will discuss a new approach to this question that establishes a strong version of such a dichotomy for the two-sphere and potentially extends to other closed surfaces. This talk is based on a joint work in progress with Lev Buhovsky, Ben Feuerstein, and Leonid Polterovich.

Laura Starkston: Concave contact boundaries and contact toric manifolds

Abstract. We study contact manifolds at the overlap of two sources: (1) concave boundaries of a symplectic plumbing of disk bundles over symplectic surfaces and (2) contact toric manifolds. Our goal is to investigate properties of the contact structures, such as overtwistedness, tightness, fillability, and algebraic torsion measurements. We will discuss our current results, and hopes for generalizations. This

talk is based on joint work in progress with Aleksandra Marinković, Jo Nelson, Ana Rechtman, Shira Tanny, and Luya Wang.

Vukašin Stojisavljević: On certain C^0-aspects of contactomorphism groups

Abstract. We will explore certain C^0-rigidity phenomena in the study of contact transformations. In particular, we will show how dichotomy between contact squeezing and non-squeezing is reflected in the group of contact homeomorphisms and discuss different conjugation-invariant norms on this group. The main technical ingredient is a result stating that Sandon's spectral norm is C^0-locally bounded. The talk is based on a joint work in progress with Baptiste Serraille.

Maksim Stokić: C^0 flexibility of Legendrian discs

Abstract. Let $\Lambda \subset (Y, \xi)$ be a Legendrian submanifold, and let $\phi : Y \to Y$ be a contact homeomorphism such that $\phi(\Lambda)$ is a smooth submanifold of Y. The question I will discuss in my talk is: must $\phi(\Lambda)$ be Legendrian? I will provide a negative answer when Λ is a Legendrian disc. Specifically, I will construct a compactly supported contact homeomorphism of $\mathbb{R}^5$ with the standard contact structure, which maps a Legendrian disc to a smooth, nowhere Legendrian disc.

Frol Zapolsky: Symplectic quasi-states and symplectic embeddings

Abstract. Symplectic quasi-states are certain functionals on the space of continuous functions of a closed symplectic manifold. They were introduced by Entov-Polterovich circa 2006, who also constructed the first nonlinear examples, using Floer homology. Today Floer homology remains the only route to such a construction, in dimensions at least four. Symplectic quasi-states are a special subclass of the more general topological quasi-states, introduced by Aarnes in the nineties. He also provided a construction of such objects on very general spaces equipped with a Borel probability measure. In the talk I'll show that on a symplectic manifold of dimension at least four, the Aarnes construction yields a symplectic quasi-state only if it is already linear. To do so necessitates embedding a polydisk with image covering a large portion of the given probability measure, which is another result I'll discuss. Joint work with Adi Dickstein.

Fabian Ziltener: Infinitesimal Hamiltonian displacement and symplectic squeezing for a set with vanishing critical Hausdorff measure

Abstract. This is joint work with Yann Guggisberg. We show that an n-rectifiable compact subset of R^{2n} with vanishing n-dimensional Hausdorff measure can be displaced from itself by a Hamiltonian diffeomorphism arbitrarily close to the identity. As a consequence, such a set can be symplectically embedded into an arbitrarily small neighborhood of the origin in R^{2n}.

Filip Živanović: Exact Lagrangians in hyperkähler manifolds

Abstract. In this talk, we will discuss some results and ideas towards the classification of exact Lagrangian submanifolds inside hyperkähler manifolds which admit contracting $\mathbb{C}^*$-actions. We will mention particular examples of A_n-resolutions and their generalisations, hypertoric varieties.