WORKSHOP ON SYMPLECTIC TOPOLOGY - RESEARCH TALKS: TITLES AND ABSTRACTS

DIETMAR SALAMON: Moment maps and the Ricci form

Abstract. The talk exhibits the Ricci form as a moment map for the action of the group of exact volume preserving diffeomorphisms on the space of almost complex structures. This observation yields a new approach to the Weil–Petersson symplectic form on the Teichmüller space of isotopy classes of complex structures with real first Chern class zero and nonempty Kahler cone. As a corollary one obtains a proof of the Donaldson–Fujiki–Quillen theorem, which asserts that the scalar curvature is a moment map for the action of the group of Hamiltonian symplectomorphisms on the space of almost complex structures that are compatible with the symplectic form. This is joint work with Oscar Garcia-Prada and Samuel Trautwein.

DIETMAR SALAMON: (colloquium) Uniqueness problems in symplectic topology

Abstract. A fundamental question in symplectic topology is when the space of symplectic forms in a given cohomology class is connected. Little is known about this problem in dimensions greater than two. A longstanding conjecture asserts that the answer to the question is positive for the four-torus. In this lecture I will discuss some known results related to this question and explain Donaldson's geometric flow approach to the uniqueness problem for hyperkähler four manifolds. The Donaldson approach is based on an infinite dimensional hyperkähler moment map.

FABIAN ZILTENER: Classification of Hamiltonian group actions on exact symplectic manifolds with proper momentum maps

Abstract. Symplectic geometry originated from classical mechanics. Hamiltonian Lie group actions correspond to symmetries in mechanics. They can be used to reduce the number of degrees of freedom of a mechanical system.

I will classify Hamiltonian actions of connected compact Lie groups on connected exact symplectic manifolds with proper momentum maps. I will deduce that every Hamiltonian action of a compact Lie group on a contractible symplectic manifold with a proper momentum map is globally linearizable.

This is joint work with Yael Karshon.

FROL ZAPOLSKY: Quasi-morphisms and Grassmannians of 2-planes

Abstract. Quasi-morphisms on groups are real-valued functions for which the failure to be a homomorphism is bounded. They appear in a variety of contexts in algebra,

geometry, and dynamics. Perhaps the best known quasi-morphism is Poincare's rotation number on the universal cover of the group of orientation-preserving diffeomorphisms of the circle. This group is an example of a contactomorphism group (more precisely, its universal cover), and since then quasi-morphisms on these groups have been constructed by Givental, Borman and myself, Granja-Karshon-Pabiniak-Sandon, and Albers-Shelukhin and myself. In this talk, I'll present a construction of such a quasi-morphism for prequantization spaces over a product of a toric manifold and a number of complex Grassmannians of 2-planes, and explore some interesting applications.

ALEKSANDRA MARINKOVIĆ: Displaceability of pre-Lagrangian toric fibers in contact toric manifolds

Abstract. While every compact symplectic toric manifold contains at least one non-displaceable full dimensional orbit (Lagrangian toric fiber) and infinitely many displaceable ones, I will show that this is not the case for compact contact toric manifolds. I will give examples of contact toric manifolds with no displaceable full dimensional orbits (pre-Lagrangian toric fibers) and the examples of contact toric manifolds with all pre-Lagrangian toric fibers being displaceable.

This is a joint work with Milena Pabiniak published in 2016. However, I will use the recent work with Klaus Niederkrger and Samuel Lisi, based on symplectic fillability, to prove some of the non-displaceability results.

JOVANA NIKOLIĆ: Spectral invariants in Lagrangian Floer homology of a conormal set

Abstract. To a given open or closed submanifold X of a smooth manifold M one can associate a conormal set in T^*M. When the submanifold X is closed associated conormal set is its conormal bundle, ν^*X, which is a Lagrangian submanifold of T^*M. Well defined Lagrangian Floer homology of a pair (o_M, ν^*X) is isomorphic to the singular homology of X. When the submanifold X is open associated conormal set is a singular Lagrangian submanifold of T^*M. One can construct Lagrangian Floer homology using appropriate approximations of this singular Lagrangian submanifold. This way defined homology is also isomorphic to the singular homology of X. In this talk, I will discuss Lagrangian Floer-homological spectral invariants that are functions on the singular homology of X. We will also prove some of their properties. This talk is based on a joint work with Jelena Katić and Darko Milinković.

DIMITRIJE CICMILOVIĆ: Symplectic non-squeezing theorem meets Hamiltonian PDE

Abstract. The symplectic non-squeezing theorem of Gromov states that the existence of the symplectic embedding from the ball $B_r(0) \subset \mathbb{C}^n$ into the cylinder $\Sigma_R(0) = \mathbb{D}_R \times \mathbb{C}^{n-1}$ is equivalent to $R \geq r$.

In 2014, Sukhov and Tumanov presented a new proof of Gromov's theorem, which does not rely on pseudoholomorphic theory of Gromov, and which is generalizable

to infinite dimensional Hilbert space. In the talk we present one such generalization and discuss possible applications to Hamiltonian PDE.

DUŠAN JOKSIMOVIĆ: Leafwise fixed points for C^0-small Hamiltonian flows

Abstract. Consider a symplectic manifold (M, ω_0), a closed coisotropic submanifold N_0 of M, and a Hamiltonian diffeomorphism ϕ on M. The set of leafwise fixed points $\mathrm{Fix}(\varphi, N_0, \omega_0)$ is the set of points $x \in N_0$ that under ϕ are mapped to its isotropic leaf. The main result of this talk will be that the set $\mathrm{Fix}(\varphi, N, \omega)$ is non-empty, provided that N is sufficiently C^1-close to N_0, that ω is C^0-close to ω_0 and that φ is the time-1-map of a $\omega-$Hamiltonian flow whose restriction to N stays C^0-close to the inclusion $N_0 \hookrightarrow M$. This result is optimal in the sense that the C^1-condition for coisotropic submanifold N cannot be replaced by the assumption that N stays C^0-close to N_0 and that the C^0--condition for Hamiltonian flow φ cannot be replaced by the assumption that ϕ Hofer-close to the inclusion of N_0. This is joint work with Fabian Ziltener.

VUKAŠIN STOJISAVLJEVIĆ: Persistence modules and symplectic Banach-Mazur distance

Abstract. Let $\mathcal{C}_M$ be the space of all "nice" star-shaped domains inside the cotangent bundle of a smooth manifold M. Following J. Gutt, Y. Ostrover, L. Polterovich and M. Usher, we define a distance on $\mathcal{C}_M$ called symplectic Banach-Mazur distance and study large-scale geometry of the space $(\mathcal{C}_M, d_{SBM})$. Our focus is on unit cotangent bundles of surfaces and we use two main technical ingredients. The first one is a recent theorem about stability of persistence barcodes obtained from filtered symplectic homology and the second one is the fact that symplectic homology of a unit cotangent bundle is isomorphic to the homology of the loop space. The talk is based on a joint work in progress with Jun Zhang.

FILIP ŽIVANOVIĆ: (Non)vanishing of symplectic cohomology for conical symplectic resolutions and quiver varieties

Abstract. By using Viterbo functionality argument, we show the non-vanishing result for symplectic cohomology for conical symplectic resolutions of weight 1. In particular, this holds for Nakajima quiver varieties whose underlying quiver has no edge-loops. On the other hand, we prove the vanishing of symplectic cohomology for quiver varieties when the underlying quiver has edge-loops, using displaceability argument for its boundary.