WORKSHOP ON SYMPLECTIC TOPOLOGY 2019: TITLES AND ABSTRACTS

DIETMAR SALAMON: Moment maps in symplectic and Kähler geometry

PAUL BIRAN: Lagrangian Cobordisms - Metric Measurements and Fukaya Categories

Abstract. We will survery recent developments in the theory of Lagrangian cobordism and its relations to Fukaya categories as well as metric structures on the space of Lagrangian submanifolds. Based on joint works with Octav Cornea and with Egor Shelukhin.

FABIAN ZILTENER: Coisotropic submanifolds of symplectic manifolds, leafwise fixed points, and spherical nonsqueezing

Abstract. My talk is partly about joint work with Dusan Joksimović, and with Jan Swoboda.

Consider a symplectic manifold (M, ω), a closed coisotropic submanifold N of M, and a Hamiltonian diffeomorphism ϕ on M. A leafwise fixed point for ϕ is a point $x \in N$ that under ϕ is mapped to its isotropic leaf. These points generalize fixed points and Lagrangian intersection points. In classical mechanics leafwise fixed points correspond to trajectories that are changed only by a time-shift, when an autonomous mechanical system is perturbed in a time-dependent way.

J. Moser posed the following problem: Find conditions under which leafwise fixed points exist. A special case of this problem is V.I. Arnold's conjecture about fixed points of Hamiltonian diffeomorphisms.

The main result presented in this talk is that leafwise fixed points exist if the Hamiltonian diffeomorphism is the time-1-map of a Hamiltonian flow whose restriction to N stays C^0-close to the inclusion $N \to M$. I will also mention a version of this result that is locally uniform in the symplectic form and the coisotropic submanifold.

As an application of a related result, no neighbourhood of the unit sphere symplectically embeds into the unit symplectic cylinder.

FROL ZAPOLSKY: Floer homology for prequantization bundles and applications

Abstract. I will describe a Floer homology group defined for a contact manifold which is a prequantization space over a monotone symplectic manifold. It is an associative unital algebra, in a sense analogous to the quantum homology algebra of a symplectic manifold. I will describe various applications based of this group and natural persistence modules associated to it. Based on joint work in progress with Peter Albers and Egor Shelukhin.

KLAUS NIEDERKRÜGER: Hamiltonian circle actions on symplectic 4-manifolds with boundary (work in progress, joint with Aleksandra Marinković)

Abstract. In her thesis Y. Karshon classified closed symplectic 4-manifolds that have a Hamiltonian circle action. For this she studied the Morse theoretic properties of the Hamiltonian function. We extend her work to 4-manifolds with contact boundary. I'll give a sketch of Karshon's work, and then explain why her results do not completely break down by the existence of a boundary.

DIMITRIJE CICMILOVIĆ: Symplectic non-squeezing and nonlinear Schrödinger equation

Abstract. In this talk we will present a generalization of Gromov's result on the symplectic non-squeezing and discuss one of the applications to Hamiltonian PDEs. More specifically, we shall present how does mass-subcritical nonlinear Schrdinger equation falls into the generalized Gromov framework. Joint work with Herbert Koch.

VUKAŠIN STOJISAVLJEVIĆ: Persistence barcodes in symplectic topology

Abstract. Persistence modules and their corresponding barcodes provide an abstract framework for studying filtered chain complexes. They originated in topological data analysis, however in recent years they found many applications in symplectic topology, starting with works of Polterovich-Shelukhin and Usher-Zhang. A key feature of a barcode is it's stability with respect to perturbations of the chain complex. This stability allows one to extract numerical invariants from the barcode which will automatically be continuous with respect to certain distances, such as C^0-distance between Morse functions or Hofer's distance between Hamiltonian diffeomorphisms. I will survey some of the applications of barcodes in symplectic topology, focusing mainly on a recently discovered stability of barcodes coming from filtered symplectic homology with respect to a newly defined distance called symplectic Banach-Mazur distance. The talk is based on joint works with Leonid Polterovich, Egor Shelukhin and Jun Zhang.

FILIP ŽIVANOVIĆ: $\mathbb{C}^*$-symplectic cohomology in hyperkähler manifolds

Abstract. In the presence of $\mathbb{C}^*$-holomorphic action on an open Kähler manifold, whose $\mathbb{S}^1$-part are isometries, one can often get a structure that is suitable for defining symplectic cohomology (i.e. convex at infinity), where the value of moment map of the $\mathbb{S}^1-$part of this action becomes the radial coordinate. Moreover, there is a Morse-Bott spectral sequence that converges to the symplectic cohomology, and, in particular, when the symplectic cohomology vanishes one gets a filtration on the singular cohomology of the manifold.

We try to establish the analogous story in the hyperkähler setup of conical symplectic resolutions, where in general one does not get convex at infinity structure,

but the non-compactness issues can be still ruled out due to the conical property of $\mathbb{C}^*$-action. This is a work in progress.