Abstracts of lectures

Jean Gutt (Institut National Universitaire Champollion and Institut de Mathématiques de Toulouse)
TALK ONE
Titile: Knotted symplectic embeddings
Abstract: I shall discuss a joint result with Mike Usher, showing that many toric domains X in the 4-dimensional euclidean space admit symplectic embeddings f into dilates of themselves which are knotted in the strong sense that there is no symplectomorphism of the target that takes f(X) to X.

TALK TWO
Title: Symplectic homology is a Morse theory
Abstract: In the context of star-shaped domains in $\mathbb{R}^{2n}$, Abbondandolo and Majer have defined a Morse theory for the action functional. I shall build a chain complex isomorphism from this Morse complex to the Floer complex which commutes with continuations. This is joint work with Vinicius Ramos.

Cheuk Yu Mak (University of Cambridge)
TALK ONE
Title: Non-displaceable Lagrangian links in four-manifolds
Abstract: One of the earliest fundamental applications of Lagrangian Floer theory is detecting the non-displaceablity of a Lagrangian submanifold. Many progress and generalisations have been made since then but little is known when the Lagrangian submanifold is disconnected. In this talk, we describe a new idea to address this problem. Subsequently, we explain how to use Fukaya-Oh-Ohta-Ono and Cho-Poddar theory to show that for every $S^2 \times S^2$ with a non-monotone product symplectic form, there is a continuum of disconnected, non-displaceable Lagrangian submanifolds such that each connected component is displaceable. This is a joint work with Ivan Smith.

TALK TWO
Title: Fukaya-Seidel categories of nilpotent slices and category O
Abstract: We study Fukaya-Seidel categories of nilpotent slices in which symplectic Khovanov homology is defined. To make computations accessible, we introduce a cylindrical

version of the Fukaya-Seidel category for complex surfaces in analogy to Lipshitz's reformulation of Heegaard Floer homology. Combining with the recent work of Abouzaid-Smith, we show that the Fukaya-Seidel category is quasi-equivalent to the corresponding parabolic category O arising from the representation theoretic point of view towards Khovanov homology. Some interesting features of this cylindrical version will be discussed along the way. This is a joint work with Ivan Smith.

Zachary Sylvan (Columbia University)
TALK ONE
Title: Sectorial Viterbo transfer
Abstract: I'll discuss the Viterbo transfer functor from the (partially) wrapped Fukaya category of a Liouville domain to that of a subdomain. There are currently three constructions of this functor at varying levels of generality, and I will describe a general approach to comparing them.

TALK TWO
Title: Viterbo transfer as localization
Abstract: The Viterbo transfer functor is a localization when everything in sight is Weinstein, and I'll explain how much of that survives if we drop the assumption that the cobordism is Weinstein. The result allows us to turn natural questions about exact Lagrangians into interesting questions in homotopical algebra.

Jun Zhang (CRM, Université de Montréal)
TALK ONE
Title: Symplectic Banach-Mazur distance and Riemannian metrics
Abstract: In this talk, we will introduce a quantitative approach to compare two star-shaped domains via symplectic embeddings, and its applications in Riemannian geometry. Explicitly, we define a pseudo-metric called the symplectic Banach-Mazur distance in the space of star-shaped domains of a Liouville manifold. This can be viewed as a non-linear version of the Banach-Mazur distance from convex geometry. The main result is that when the Liouville manifold is the cotangent bundle of a surface with positive genus, the symplectic Banach-Mazur distance admits a large-scale geometric property. The proof of this property depends on the persistence module theory (based on symplectic homology). We give a brief introduction of this machinery as well as the sketch of the proof of the property. Finally, we will demonstrate several applications on the closed geodesics in Riemannian geometry. This talk is based on joint work with Vukasin Stojisavljevic.

TALK TWO
Title: Shape invariant and coarse Banach-Mazur distance
Abstract: In this talk, we will discuss a pseudo-metric on the space of star-shaped domains

of a Liouville manifold which is similar to the symplectic Banach-Mazur distance introduced in my first talk, but without the unknottedness condition. This pseudo-metric is called coarse Banach-Mazur distance. The right machinery to study this pseudo-metric is the shape invariant first introduced by Sikorav and enhanced by Eliashberg later. I will briefly introduce this machinery, which is based on Lagrangian embeddings. The main result is that when the Liouville manifold is either a product of a torus (of dimension at least 2) with any closed symplectic manifold or the 4-dimensional Euclidean space, the coarse Banach-Mazur distance admits a large-scale geometric property. Finally, we will give the sketch of the proof of this property. This talk is based on a joint work in progress with Richard Hind.

Masahiro Futaki (Chiba University)
Title: On Sebastian-Thom type theorem for Fukaya-Seidel categories
Abstract: Sebastiani-Thom type theorem holds for the Fukaya-Seidel category of the potential of type$f + x^n$. I will explain how Ganatra-Pardon-Shende's framework applies to this situation.

Jongmyeong Kim (IBS-CGP)
Titlle: Categorical systolic inequality for the Fukaya category of Milnor fiber of ADE singularity
Abstract: In 2018, Y.-W. Fan introduced the notion of the categorical systole using Bridgeland stability condition and proved that analogues of classical systolic inequalities hold for the derived categories of elliptic curves and K3 surfaces of Picard rank 1. In this talk, I will talk about the categorical systolic inequality for the Fukaya category of 4-dimensional Milnor fiber of ADE singularity.

Sangjin Lee (IBS-CGP)
Title : A higher-dimensional generalization of pseudo-Anosov surface automorphisms
Abstract : In 80's, Thurston classified the mapping class group of orientable surfaces. A generic element of the mapping class group is of the pseudo-Anosov type. In 2014, from pseudo-Anosov surface automorphisms, Dimitrov, Haiden, Katzarkov and Kontsevich constructed Bridgeland stability conditions on the Fukaya category of the surface. They also gave a question asking the existence of higher-dimensional generalization of pseudo-Anosov automorphisms on symplectic manifolds. To answer their question, we found a construction of symplectomorphisms which preserve a stable Lagrangian lamination. In this talk, we will discuss the construction and some applications if time allows.

Toru Yoshiyasu (Kyoto University)
Title: Liouville manifolds of Weinstein type
Abstract: A topological characterization of Weinstein manifolds was given by Cieliebak

and Eliashberg. The first example of a Liouville manifold which does not satisfy the characterization was constructed by McDuff. Although this difference was essentially known in the 90's, the following problem is completely open. Is a Liouville manifold satisfying the characterization symplectomorphic to a Weinstein manifold? In this talk, I will give the first example of such a Liouville manifold being symplectomorphic to a Weinstein manifold. This is a joint work with Yakov Eliashberg and Noboru Ogawa.

Jae-Young Choi (POSTECH)
Title: Wrapped Fukaya category of Riemann surface of infinite type
Abstract: First, I will talk about end structure of noncompact symplectic Riemann surfaces of infinite type and their classification. Using that, I will try to define Wrapped Fukaya categories of those surfaces and explain about their generators.

Weonmo Lee (POSTECH)
Title: Asymptotic behavior of Vianna's exotic Lagrangian tori $T_{a,b,c}$ in $\mathbb{C}P^2$.
Abstract: Vianna constructed infinitely many non-Hamiltonian isotopic monotone Lagrangian tori $T_{a,b,c}$ in $\mathbb{C}P^2$. After briefly reviewing his construction, we prove that the Gromov capacity of the complement of $T_{a,b,c}$is greater than or equal to $1/3$ of the area of the complex line, independent of the choice of torus. We also prove that these tori do not form a dense family in $\mathbb{C}P^2$ and that any of these tori can be embedded into monotone $\mathbb{C}P^2\#\overline{k\mathbb{C}P^2}$ for $k \leq 5$. This is a joint work with Yong-Geun Oh and Renato Vianna.