Workshop on Symplectic Geometry and Related Topics

Graduate School of Sciences, The University of Osaka (Toyonaka Campus)
Toyonaka, Osaka, Japan
March 18–20, 2026

Places: Day 1: Room E301/303 (3rd floor in the Building E)
Day 2–3: Room E404/406/408 (4th floor in the Building E)

Timetable

Time	Mar. 18 (Wed)	Mar. 19 (Thu)	Mar. 20 (Fri)
09:30–10:30	Okamoto	Hayakawa	Yamaguchi
11:00–12:00	Husin	Avdek (2)	del Pino (2)
12:00–14:00	Lunch Break		
14:00–15:00	Avdek (1)	del Pino (1)	Kawasaki
15:30–16:30	Kasuya	Ogawa	

Program

Mar. 18 (Wed) @ Room E301/303

09:30–10:30 **Yukihiro Okamoto** (*Tokyo Metropolitan University*)
Non-contractible loops of Legendrian tori from families of knots

11:00–12:00 **Axel Husin** (*RIMS, Kyoto University*)
Local systems and vanishing Maslov class

14:00–15:00 **Russell Avdek** (*Sorbonne University*)
Numerical invariants of codim = 2 contact submanifolds

15:30–16:30 **Naohiko Kasuya** (*Hokkaido University*)
Lefschetz fibrations on the Milnor fibers of cusp and simple elliptic singularities

Mar. 19 (Thu) @ Room E404/406/408

09:30–10:30 **Tomoya Hayakawa** (*The University of Tokyo*)
On fillability of contact manifolds associated with fat SO(3)*-bundles*

11:00–12:00 **Russell Avdek** (*Sorbonne University*)
Exotic codim = 2 contact submanifolds in high dimensions

14:00–15:00 **Álvaro del Pino** (*Universiteit Utrecht*)
Rigidity for prelegendrian submanifolds of fat distributions (1)

15:30–16:30 **Noboru Ogawa** (*Tokai University*)
Contact contractions and Liouville dynamics

Mar. 20 (Fri) @ Room E404/406/408

09:30–10:30 **Kentaro Yamaguchi** (*RIMS, Kyoto University*)
Moment polytopes of subtorus orbit closures in symplectic toric manifolds

11:00–12:00 **Álvaro del Pino** (*Universiteit Utrecht*)
Rigidity for prelegendrian submanifolds of fat distributions (2)

14:00–15:00 **Morimichi Kawasaki** (*Hokkaido University*)
Non-extendability of Shelukhin's quasi-morphism from Hamiltonian to symplectic

Talk Abstracts

Yukihiro Okamoto (*Tokyo Metropolitan University*)
Non-contractible loops of Legendrian tori from families of knots

In the unit cotangent bundle of $\mathbb{R}^3$, we consider loops of Legendrian tori arising as families of the unit conormal bundles of smooth knots in $\mathbb{R}^3$. In this talk, I will explain a topological method to compute the monodromy on the Legendrian contact homology in degree 0 induced by those loops. As an application, we obtain non-contractible loops of Legendrian tori. This is joint work with Marián Poppr.

Axel Husin (*RIMS, Kyoto University*)
Local systems and vanishing Maslov class

We present a new Floer theoretic proof of the well known fact that the Maslov class vanishes for closed exact Lagrangians in cotangent bundles. Our argument uses Floer theory enriched with chains on Moore path spaces, building on work by Abouzaid and Barraud–Cornea. This is joint work with Thomas Kragh and is available at arXiv:2410.01586.

Russell Avdek (*Sorbonne University*)
Numerical invariants of codim $= 2$ *contact submanifolds*

I'll introduce an integer invariant of codim $= 2$ contact submanifolds which generalizes the self-linking number of transverse knots. Extending the observation that self-linking numbers of transverse knots are always 1 mod 2, modular properties of the new invariant are related to the divisibilities of certain Chern numbers. Using these properties and related invariants, we can easily distinguish contact structures on many Milnor links.

Exotic codim $= 2$ *contact submanifolds in high dimensions*

For $n > 1$, I'll describe a standard contact $\dim = 2n - 1$ sphere sitting inside of the standard contact $\dim = 2n + 1$ sphere which is smoothly unknotted but "contact-topologically knotted". The first half of the talk will concern classical geometric topology (Milnor links, Morse theory, double branched covers) focused on a high-dimensional generalization of the famous Montesinos trick. The second half will employ modern contact topology (overtwistedness, Legendrian stabilization).

Naohiko Kasuya (*Hokkaido University*)
Lefschetz fibrations on the Milnor fibers of cusp and simple elliptic singularities

The complex hypersurface singularity defined by the equation $x^p + y^q + z^r + xyz = 0$ is called a simple elliptic singularity if $\frac{1}{p} + \frac{1}{q} + \frac{1}{r} = 1$, and a cusp singularity if $\frac{1}{p} + \frac{1}{q} + \frac{1}{r} < 1$. In this talk, we show that the total space of the Milnor fibration of a simple elliptic or a cusp singularity admits an S^1-family of genus-one Lefschetz fibrations. We constructed a map that realizes these Lefschetz fibrations as Lagrangian torus fibrations. This is achieved by applying the moment map of $\mathbb{C}^3$ and explicitly deforming the Milnor fibers as convex symplectic submanifolds within this space. As an application, we prove that the Lawson codimension-one foliation on S^5, associated with a simple elliptic or cusp singularity, can be regarded as the pullback of the Reeb foliation on S^3. This enables us to give an alternative proof of Mitsumatsu's theorem that the Lawson foliation admits a leafwise symplectic structure. Moreover, we show that the closed 4-manifold obtained by the smooth gluing of the Milnor fibers of a pair of dual cusp singularities (in the sense of Nakamura) is diffeomorphic to the K3 surface. This is a joint work with Hiroki Kodama (Hiroshima University/ RIKEN iTHEMS), Yoshihiko Mitsumatsu (Chuo University) and Atsuhide Mori (Osaka Dental University).

Tomoya Hayakawa (*The University of Tokyo*)
On fillability of contact manifolds associated with fat SO(3)*-bundles*

We discuss contact manifolds which arise from principal SO(3)-bundles within the framework of Weinstein's fat bundle theory, which generalizes the classical Boothby–Wang construction for principal U(1)-bundles. We see that these associated contact manifolds admit strong symplectic fillings and examine the relationship between the Stein fillability and the first Pontryagin class.

Álvaro del Pino (*Universiteit Utrecht*)
Rigidity for prelegendrian submanifolds of fat distributions

Given integers $1 < k < n$, one can attempt to study the maximally non-integrable distributions of rank k on n-dimensional manifolds. Among these, the case $n = 2m + 1$, $k = 2m$, the study of contact structures, is rather exceptional. Contact structures are locally stable (i.e. they have a local model) and even globally stable on closed manifolds (homotopic contact structures are isotopic). They also have a large automorphism group. These facts lead to a rich global/topological theory, that displays both flexible aspects (i.e. certain phenomena are purely algebraic topological in nature) and rigid aspects (other phenomena are governed by invariants that are truly "contact" and not algebraic topological).

For other choices of n and k, the theory of maximally non-integrable distributions is very different. Local stability happens solely for $k = n-1$ and in the exceptional case $n = 4, k = 2$ (Engel structures). This means that the theory has a more local flavour, generally. Moreover, global stability is particular to the contact case; this is closely related to the fact that automorphism groups of other distributions tend to be small.

Despite a historical focus on the local aspects of the theory, we have seen many developments regarding global/topological features in the last few years. However, most of these have been on the side of flexibility. That is: we now know that certain classes of maximally non-integrable distributions abide by the h-principle (fully in some cases, partially in others). The same is true for tangent/transverse submanifolds under various assumptions.

The aim of this talk is to present what appears to be the first example of topological rigidity for such distributions, outside of contact topology. Concretely: I will explain what fat distributions are. Loosely speaking, these are the most non-integrable among all maximally non-integrable distributions; they are particular to certain dimensions and ranks. The crucial property they exhibit is a close connection to contact structures, which allows us to associate contact invariants to them. This will allow us to introduce a certain family of submanifolds, called prelegendrians, that we will study via legendrian contact homology (LCH). Our main result states that we can construct an infinite family of prelegendrians, all of which have the same algebraic topological invariants, but are distinguished by LCH. My aim is to spend as much time as possible discussing how one can "draw" such prelegendrians via their "front projection"; it turns out that this is closely related to the theory of totally real submanifolds of almost complex manifolds.

This is joint work with Eduardo Fernández and Wei Zhou.

Noboru Ogawa (*Tokai University*)
Contact contractions and Liouville dynamics

A Liouville domain is a fundamental object in symplectic and contact geometry; typical examples include cotangent bundles and Stein domains. Recently, Huang introduced a construction of Liouville domains via contact contractions and exhibited examples whose cores form solenoidal laminations. These examples are interesting in that it is not immediately clear whether they can be deformed into Weinstein (Stein) domains. Motivated by Huang's work, we investigate which contact manifolds admit contact contractions and what kinds of Liouville domains and cores arise from this construction. In this talk, we describe the contact-topological properties of these manifolds and discuss applications to Liouville dynamics. This work is based on joint work with Toru Yoshiyasu.

Kentaro Yamaguchi (*RIMS, Kyoto University*)
Moment polytopes of subtorus orbit closures in symplectic toric manifolds

Delzant showed that there is a one-to-one correspondence between compact symplectic toric manifolds and certain convex polytopes called Delzant polytopes. In this talk, we study subtorus orbit closures in symplectic toric manifolds from the viewpoint of the Delzant correspondence. In particular, we discuss the moment polytopes of subtorus orbit closures.

Morimichi Kawasaki (*Hokkaido University*)
Non-extendability of Shelukhin's quasi-morphism from Hamiltonian to symplectic

Shelukhin constructed a quasi-morphism on the universal cover of the group of Hamiltonian diffeomorphisms. We prove that this quasi-morphism cannot be extended to the universal cover of the group of symplectomorphisms for certain symplectic manifolds. We also discuss applications of this non-extendability.

Organizers:
Jiro Adachi (Hokkaido University),
Tomohiro Asano (Kyoto University),
Takahiro Oba (The University of Osaka)