Monday 25 March

9.30 am: Denis Auroux - Fukaya categories of trivalent configurations of rational curves

The mirror of a genus $g$ Riemann surface can be viewed as a trivalent configuration of $3g-3$ rational curves meeting in $2g-2$ triple points; more precisely, this singular configuration arises as the critical locus of the superpotential in a 3-dimensional Landau-Ginzburg mirror. In joint work in progress with Alexander Efimov and Ludmil Katzarkov, we attempt to introduce a notion of Fukaya category for such a configuration of rational curves, where objects are embedded graphs with trivalent vertices at the triple points, and morphisms are linear combinations of intersection points as in usual Floer theory. We will describe the proposed construction of the structure maps of these Fukaya categories, attempt to provide some motivation, and outline examples of calculations that can be carried out to verify homological mirror symmetry in this setting.

11.00 am: Jack Smith - Disc potentials and Hochschild cohomology of monotone tori

Associated to a monotone Lagrangian torus are a geometric disc potential, defined by counting index 2 discs, and an algebraic disc potential, defined on the space of Maurer-Cartan solutions. I will explain the relationship between them, extract a map out of the Hochschild cohomology of the torus's Floer algebra, and discuss applications.

2.00pm: Saraswathi Venkatesh - Symplectic cohomology of subdomains

Mirror symmetry predicts the existence of Floer invariants that yield “local” information. Guided by this, we construct a quantitative symplectic cohomology theory that detects Floer-essential Lagrangians within subdomains. We illustrate the quantitative behavior of this theory by examining negative line bundles over toric symplectic manifolds.
3.30pm: Tobias Ekholm - Augmentations, annuli, and Alexander polynomials

Let $K$ be a knot in 3-space. The knot contact homology algebra of $K$ is the Chekanov-Eliashberg algebra of the Legendrian conormal of $K$. It is an algebra over the group algebra of the second relative homology of the Legendrian conormal, which we think of as a polynomial algebra in variables $e^x, e^p, e^t$, where $x$ corresponds to the longitude, $p$ to the meridian, and $t$ to the class of the fiber sphere in the unit cotangent bundle. The augmentation polynomial $\text{Aug}_K(e^x, e^p, e^t)$ is the polynomial that determines the locus where the knot contact homology algebra of $K$ admits a unital chain map to the complex numbers. Let $\text{Alex}_K(e^p)$ denote the Alexander polynomial of $K$. We show $\text{Alex}_K$ can be expressed as follows

$$\text{Alex}(e^p) = (1-e^p) \exp\left( \int \frac{d}{dt} \text{Aug}_K(0,e^p,0) \bigg/ \frac{d}{dx} \text{Aug}_K(0,e^p,0) \right) dp.$$

The formula is proved by counting holomorphic disks and annuli on the Lagrangian filling of the Legendrian conormal that has the topology of the knot complement.

Tuesday 26 March

9.30 am: Chris Woodward - Invariance of immersed Floer cohomology under surgery

(Joint with J. Palmer) Given an immersed Lagrangian brane of dimension at least two and a weakly bounding cochain with vanishing quantum valuation at a self-intersection point, the immersed Floer cohomology is isomorphic to the Floer cohomology on the surgered brane for some weakly bounding cochain on the surgery. This is a generalization of works of Seidel, Fukaya-Oh-Ohta-Ono, Pascaleff-Tonkonog, Mak-Wu and gives a sort of "versal deformation" for a Lagrangian brane similar to that of its mirror coherent sheaf. Our intended application is the invariance of the Floer cohomology of an immersed Lagrangian under mean curvature flow beyond the time at which the weakly bounding cochain hits a "wall" of the Maurer-Cartan space, which was a conjecture of Joyce.

11.00 am: Cheuk-Yu Mak - Category O and Fukaya-Seidel categories of nilpotent slices

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 in progress with Ivan Smith.

2.00pm Paul Seidel - Formal groups and quantum cohomology

The simplest kind of Gromov-Witten theory (genus zero, on a Fano manifold) can be axiomatized as a chain level Cohomological Field Theory. One can apply some basic topological ideas to the situation (going back to the early days of cohomology operations). The motivation for revisiting these classical topics comes from arithmetic aspects of mirror symmetry, and more specifically, the Picard groups of Fukaya categories.
3.30pm: Emmy Murphy - Inductively collapsing Fukaya categories and flexibility

A Weinstein manifold $X$ is an exact symplectic manifold which admits a Lagrangian skeleton. This skeleton is not canonical, but a chosen skeleton gives a natural presentation of the wrapped Fukaya category of $X$. We define an algebraic property of an $A_\infty$ category with a given presentation: “inductively collapsing”. Any inductively collapsing category is equivalent to the trivial category, but it furthermore becomes trivial in a controlled way with respect to the presentation. During the talk we will define this notion and discuss the following theorem: If $X$ is a contractible Weinstein 6-manifold which has an arboreal Lagrangian skeleton, presenting the wrapped Fukaya category as inductively collapsing, then $X$ is symplectomorphic to $\mathbb{C}^3$. We also discuss the ingredients of the proof, generalizations, and conjectures.

Wednesday 27 March

9.30 am - Laura Starkston - Symplectic versus algebraic curves in the complex projective plane

We will discuss the existence and classifications of various types of symplectic surfaces, with singularities modeled on those of complex curves. We will see similarities and differences between the symplectic and algebraic categories, reflecting the rigidity of pseudoholomorphic curves, the complexity of 4-dimensional topology, and the flexibility of the open symplectic condition for submanifolds. We will particularly report on results on rational cuspidal curves in the symplectic category. This is joint work with Marco Golla.

11.00 am: Mohammed Abouzaid - A sheaf-theoretic model for SL(2,C) Floer homology

I will describe joint work with Ciprian Manolescu on constructing an analogue of instanton Floer homology replacing the group $SU(2)$ by $SL(2,C)$. Having failed to do so using the standard Floer theoretic tools of gauge theory and symplectic topology, we turned to sheaf theory to produce an invariant. After describing our approach, I will discuss some features of this theory that are expected to be visible from a Floer-theoretic point of view, but that we cannot currently access.

Free afternoon

Thursday 28 March

9.30 am: Kenji Fukaya –Symplectic sum, symplectic cut and Lagrangian Floer theory

I would like to explain a project in progress to describe how Lagrangian Floer theory and $A_\infty$ category behave for symplectic sum and symplectic cut.

11.00 am: Jake Rasmussen – Heegaard Floer homology of manifolds with torus boundary.

Following Auroux and Lekili-Perutz, the bordered Floer homology of a 3-manifold whose boundary is a surface of genus $g$ can be interpreted as an object in a Fukaya category $C_g$ associated to the $g$th symmetric product of the surface. In the case $g=1$, a structure theorem due to Haiden, Kontsevich and Katzarkov shows that any object of $C_1$ is a direct sum of
objects associated to immersed curves. This has interesting consequences for the Floer homology of 3-manifolds.

I'll discuss a graphical calculus for converting a compactly supported object of $C_1$ to an explicit collection of curves in the punctured torus, thus giving an alternate approach to structure theorem in this case. This is joint work with Jonathan Hanselman and Liam Watson.

2.00pm: Netanel Blaier – Twisted MMM-classes and Characteristic Classes in Gromov-Witten theory

We extend the theory of twisted Morita-Miller-Mumford classes defined by Kawazumi-Morita for surfaces to the setting of more general symplectic manifolds $(M,\omega)$. These are defined in terms of parametrized Gromov-Witten invariants of certain distinguished lifts of cohomology classes in $H^*(M,Q)$ to the equivariant cohomology $H^*_G(M,Q)$ with respect to $SG=\text{Symp}(M,\omega)$. We compute the value of these classes for a number of smooth Fano varieties, and produce explicit Kähler fibrations $SE \rightarrow B$ over $Si$-dimensional bases which map to distinct classes in the rational homology of the classifying space $BS\text{Symp}(M,\omega)$, thus obtaining a non-trivial lower bound on the rank.

3.30pm: Roger Casals - Contact Submanifolds in Higher-Dimensions

In this talk, I will discuss progress in our understanding of contact submanifolds in higher-dimensions. I will present, in any dimension, the construction of contactomorphic smoothly isotopic contact submanifolds which are not contact isotopic. This resolves one of the main questions we had in the higher-dimension, providing rigidity for contact submanifolds. In the end, I will introduce other works in progress and lines of future development. This talk is partially based on my work with J. Etnyre.

Friday 29 March

9.30 am: YankI Lekili - Homological mirror symmetry for higher dimensional pants

We prove that the partially wrapped Fukaya category of the complement of $(n+2)$-generic hyperplanes in $\mathbb{CP}^n$ (n-dimensional pants) with respect to certain stops is equivalent to a certain categorical resolution of the derived category of the singular affine variety $x_1x_2...x_{n+1}=0$. By localizing, we deduce that the (fully) wrapped Fukaya category of n-dimensional pants is equivalent to the derived category of $x_1x_2...x_n=0$. This is joint work with A. Polishchuk.

11.00 am: Kristen Hendricks: A simplicial construction of $G$-equivariant Floer homology

For $G$ a Lie group acting on a symplectic manifold and preserving a pair of Lagrangians, we use techniques from infinity category theory to construct a $G$-equivariant Floer homology of $L_0$ and $L_1$ without equivariant transversality. We give a sample application to symplectic Khovanov homology. This is joint work with R. Lipshitz and S. Sarkar.

2.00pm: John Pardon - Structural results in wrapped Floer theory

I will discuss results relating different partially wrapped Fukaya categories. These include a Kônneth formula, a `stop removal' result relating partially wrapped Fukaya categories relative to different stops, and a gluing formula for wrapped Fukaya categories. The techniques also lead to generation results for Weinstein manifolds and for Lefschetz fibrations. The methods are mainly geometric, and
the key underlying Floer theoretic fact is an exact triangle in the Fukaya category associated to
Lagrangian surgery along a short Reeb chord at infinity. This is joint work with Sheel Ganatra and
Vivek Shende.

3.30pm: David Nadler - What kind of an invariant are microlocal sheaves?

I will give an introduction to sheaves and microlocal sheaves, as pioneered by Kashiwara-Schapira.
The goal will be to explain recent work with Shende establishing that microlocal sheaves on a
Weinstein manifold are a symplectic invariant.