FRG Workshop on Symplectic Isotopy and Packing

Schedule	
May 18,	
8:30-9:30	Registration and breakfast, in front of EH 4096.
9:00-10:00	Weiyi Zhang,
10:30-11:30	Francesco Lin,
Lunch time,	
1:00-2:00	Cheukyu Mak,
2:30-3:30	Richard Hind,
4:00-5:00	Weiwei Wu,
5:30pm	Dinner at 2nd-floor atrium.
7:30-8:30	casual soccer game at Burns park.
May 19,	
9:00-10:00	Dan Cristofaro-Gardiner,
10:30-11:30	Olguta Buse,
Lunch time,	
1:00-2:00	Gabriel Kerr,
2:10-3:10	Daniel Irvine.
All talks will be in East Hall 4096.	

<div align="center">**Title and Abstract**</div>

Olguta Buse,

Title: Negative inflation and symplectomorphism groups of non-rational ruled surfaces

Abstract: We describe a symplectic inflation method along embedded or nodal J-holomorphic curves that preserve the tameness of the symplectic form by the given J. We overview existing literature results on the stability of the symplectomorphism group of minimal ruled surfaces, that appear as consequences of the mentioned inflation. Then we present work in progress with Jun Li regarding the extension of these results to blowups of non-rational ruled surfaces.

Dan Cristofaro-Gardiner,

Title: Symplectic embeddings in dimension greater than 4

Abstract: I will describe joint work exploring the higher dimensional ellipsoid embedding problem. For embeddings of four-dimensional ellipsoids, McDuff showed that embedded contact homology gives sharp obstructions; in higher dimensions, however, much less is known and new techniques are needed. We develop a stabilization procedure for building new obstructions from four-dimensional ones, and we show that in many cases the obstructions we get are optimal.

Richard Hind,

Title: Packing and squeezing Lagrangian tori.

Abstract: Given a Lagrangian torus in the standard symplectic Euclidean space, we ask how far it can be squeezed, that is, we look for the minimal capacity of a ball into which the torus can be embedded under a Hamiltonian diffeomorphism. As a packing question, we fix a ball and ask how many copies of the torus can be embedded with disjoint images.
We obtain optimal embeddings for Lagrangian tori in dimension 4, but natural packings turn out not to be maximal. This is joint work with Ely Kerman and Emmanuel Opshtein.

Daniel Irvine,

Title: Stabilized Polydiscs

Abstract: A stabilized polydisc is a product a product symplectic manifold $D(a) \times D(b) \times C$, where D(r) denotes the 2-disc of area r. I will examine the problem of embedding one stabilized polydisc into another, giving necessary and sufficient conditions for such an embedding to exist. Then I will relate this result to other known embedding problems.

Gabriel Kerr,

Title: Relations in symplectic mapping class groups arising from mirror symmetry.

Abstract: I will discuss results obtained by myself and collaborators L. Katzarkov and C. Diemer on symplectic mapping class group Symp(H) of a toric hypersurface H. Utilizing tropical geometry and triangulations of a circuit, one may define a set of generators and relations of a finite groupoid G whose objects correspond to vertices of a secondary polytope. There is a surjective homomorphism from groupoid G to the subgroup of Symp(H) generated by spherical twists (and, in certain cases, other more exotic symplectomorphisms). I will describe how this picture arose from mirror symmetry and some of its connections to birational geometry.

Francesco Lin,

Title: Hyperbolic four-manifolds with vanishing Seiberg-Witten invariants

Abstract: We show the existence of hyperbolic 4-manifolds with vanishing Seiberg-Witten invariants, addressing a conjecture of Claude LeBrun. This is achieved by showing, using results in geometric and arithmetic group theory, that certain hyperbolic 4-manifolds contain L-spaces as hypersurfaces. This is joint work with Ian Agol.

Cheukyu Mak,

Title: Category O and Fukaya-Seidel categories of nilpotent slices

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 in progress with Ivan Smith.

Weiwei Wu,

Title: Semi-toric spherical systems and symplectomorphism groups

Abstract: We will explain a generalization of semi-toric systems. In dimension four, such systems can be easily obtained by generalizing the notion of "toric blow-up". As it turns out, this construction gains new understandings of the symplectic mapping class groups. We will explain its relation to a long-standing question between Lagrangian Dehn twists and symplectic mapping class groups of rational manifolds, and potential construction of exotic finite group actions. This is a combination of several on-going joint works with Liat Kessler, Jun Li and Tian-Jun Li.

Weiyi Zhang,

Title: From smooth to almost complex

Abstract: An almost complex manifold is a smooth manifold equipped with a smooth linear complex structure on each tangent space. We will discuss differential topology of almost complex manifolds, explain how to use transversality statements for smooth manifolds to formulate and prove corresponding results for an arbitrary almost complex manifold. The examples include intersection of almost complex manifolds, structure of pseudoholomorphic maps and zero locus of certain harmonic forms. One of the main technical tools is Taubes' notion of "positive cohomology assignment", which plays the role of local intersection number.
Our results would lead to a notion of birational morphism between almost complex manifolds. Various birational invariants, including Kodaira dimension, for almost complex manifolds will be introduced and discussed (this part is joint with Haojie Chen).