

RISM5 – Program:

M. Abouzaid (Columbia University)

Title: Family Floer homology and mirror symmetry

Abstract: : I will consider the toy model of mirror symmetry for symplectic manifolds equipped with non-singular Lagrangian torus fibrations. In the first lecture, I will explain how to assign to such a manifold a rigid analytic space over the Novikov field, obtained by gluing affinoid domains, and equipped with a gerbe inducing a "twist" of the category of analytic sheaves. In the second talk, I will explain how to prove that the Fukaya category embeds fully faithfully in the mirror category. The main new idea is an enlargement of the Fukaya category, with topologised infinite rank local systems, which admits new objects, corresponding to the "structure sheaves" of the affinoid domains appearing in the cover of the mirror.

D. Auroux (University of California Berkeley)

Title: Speculations about homological mirror symmetry for affine hypersurfaces

Abstract: The wrapped Fukaya category of an algebraic hypersurface H in $(\mathbb{C}^*)^n$ is conjecturally related via homological mirror symmetry to the derived category of singularities of a toric Calabi-Yau manifold X , whose moment polytope is determined by the tropicalization of H . In this talk we will first explain the statement, and illustrate it for the case of the pair of pants; then we will outline some more speculative ideas about "relative" homological mirror symmetry for pairs $((\mathbb{C}^*)^n, H)$ and wrapped Fukaya categories of higher-dimensional pairs of pants.

D. Calaque (Université de Montpellier)

Title: Two examples of fully extended TFTs

Abstract: these two lectures will be devoted to fully extended TFTs, in the sense of Baez-Dolan and Lurie.

We will focus on two specific examples: factorization homology on the one hand, taking values in a higher category of E_n -algebras and bimodules, and "classical" TFTs on the other hand, taking values in a higher category of shifted symplectic stacks (after Pantev-Toën-Vaquié-Vezzosi) and lagrangian correspondences.

R. Donagi (University of Pennsylvania)

Title: Homological Mirror Symmetry, Geometric Langlands, and Hitchin's system.

Abstract: We discuss an approach to the Geometric Langlands Conjecture based on Hitchin's system combined with non Abelian Hodge theory.

K. Fukaya (StonyBrook University)

Title: Some aspects of virtual technique

Abstract: In this talk I explain several points to build algebraic structure from a system of moduli spaces, taking the case of a system of holomorphic disks as an example. The main point I will discuss is: Some analytic aspects of the gluing of pseudoholomorphic disks. The main issue to obtain compatible system of (Kuranishi) charts. The notion of a system of virtual fundamental chains (rather than individual chains). How we obtain it especially what is the main point to work it out.

M. Gross (University of Cambridge)

Title: A general mirror symmetry construction.

Abstract: I will describe joint work with Bernd Siebert giving a general construction of mirrors to both log Calabi-Yau pairs and maximally unipotent degenerations of Calabi-Yau manifolds. The key ingredient is the notion of "punctured invariants", being developed jointly with Abramovich, Chen and Siebert, which are a type of Gromov-Witten invariant which allows negative orders of tangency with divisors. Using certain three-point invariants, one then directly defines the coordinate ring (or homogeneous coordinate ring in the case of a degeneration of Calabi-Yau manifolds) of the mirror.

K. Irie (Kyoto University)

Title: Chain-level string topology, pseudo-holomorphic disks, and Kuranishi structures

Abstract: I will talk about an application of chain-level string topology to pseudo-holomorphic curve theory in symplectic topology. Specifically, given a closed, oriented, and spin Lagrangian submanifold L in a symplectic vector space, one can define a Maurer-Cartan element of the chain-level loop bracket on the free loop space of L , using the virtual fundamental chain of the moduli space of pseudo-holomorphic disks with boundary on L . This idea is due to Fukaya, who also pointed out its important consequences in symplectic topology.

I will explain how to rigorously carry out this idea, using a novel chain model of the free loop space and theory of Kuranishi structures.

L. Katzarkov (Universität Wien)

Title: Differential Equation and categories

Abstract: In this talk we will take a new look at some classical geometric problems from the point of view of filtrations on categories. Several examples will be considered.

M. Kontsevich (Institut des Hautes Études Scientifiques)

Title 1: Stability for fibrations over curves.

Abstract: let X be a Kahler manifold endowed with a map to curve C . We want to study both A- and B-models on X (as triangulated categories with stability structures), in terms of certain data in C . The goal of the talk is to give relevant definitions.

Title 2: Riemann-Hilbert correspondence for q -difference holonomic modules via Fukaya categories.

Abstract: I'll describe two versions of RH correspondence for the quantized higher-dimensional algebraic symplectic torus.

P. Pandit (University of Wien)

Title: Calabi-Yau structures, spherical functors, and shifted symplectic structures.

Abstract: I will discuss the problem of constructing Calabi-Yau structures on Fukaya categories with coefficients, and shifted symplectic structures on moduli spaces of branes. This is based on joint work with Ludmil Katzarkov and Ted Spaide.

T. Pantev (University of Pennsylvania)

Title: BPS States, Torus Links, and Wild Character Varieties.

Abstract: We develop a string theoretic framework for understanding the recent results and conjectures on the topology of wildly ramified character varieties. Various physics dualities and constructions lead to a new generalization of the formula of Hausel, Mereb, and Wong and also provide a colored version of the conjecture of Shende, Treumann and Zaslow relating the topology of wild character varieties to knot and link invariants. I will also explain how the string theoretic approach provides evidence for the wild variant of the $P = W$ conjecture of de Cataldo, Hausel, and Migliorini. The main mathematical tool is an exhaustive spectral cover correspondence which works for all points in the moduli space of irregular Higgs bundles. This is based on recent joint works with Diaconescu, and Donagi.

L. Schaposnik (University of Illinois)

Title: Branes in the singular fibres of the Hitchin fibration

Abstract: The Hitchin fibration is a natural tool through which one can study the moduli space of Higgs bundles and its interesting subspaces (branes). We shall dedicate this talk to the study of certain singular fibres of the Hitchin fibrations, obtain correspondences between fibres, and provide a geometric description of branes which lie entirely over the singular loci. We will emphasize some novel nonabelianization of branes of orthogonal Higgs bundles and compare to other branes which can be described explicitly.

H. Tanaka (Harvard University)

Title: Morse theory and a stack of broken lines

Abstract: I'll talk about recent progress in re-organizing Morse theory as a deformation problem. A central player in my talk will be a stack classifying domains of broken Morse trajectories, over which all Morse theory seems to live. This is joint work with Jacob Lurie.