

Rencontres en GENRE : Talks

Hülya Argüz

A tropical and log geometric approach to A-infinity relations

It is shown by Gross–Siebert that the product structure in the ring of theta functions (constructed by Gross–Hacking–Siebert as the coordinate ring for the mirrors to varieties with effective anti-canonical class) can be understood by counts of certain punctured maps, defined using logarithmic algebraic geometry. In this talk, we will discuss algebro-geometric analogues of the A-infinity relations in Fukaya categories, in the ring of theta functions, in terms of tropical geometry, and punctured log Gromov–Witten invariants. Our main object of study for this is a degeneration of elliptic curves, to a cycle of projective lines.

Pierrick Bousseau

Quasimodular forms from Betti numbers

This talk will be about refined curve counting on local P^2 , the noncompact Calabi-Yau 3-fold total space of the canonical line bundle of the projective plane. I will explain how to construct quasimodular forms starting from Betti numbers of moduli spaces of one-dimensional coherent sheaves on P^2 . This gives a proof of some stringy predictions about the refined topological string theory of local P^2 in the Nekrasov-Shatashvili limit. Partly based on work in progress with Honglu Fan, Shuai Guo, and Longting Wu.

Baptiste Chanteraine

Invariants of Legendrian submanifolds in non co-orientable contact structure

I want to talk on some very preliminary work on invariant of Legendrian submanifolds in contact manifold where the contact is not co-orientable arising from the Z_2 action on its co-orienting cover. In the space of contact elements of a manifold M such Legendrian submanifolds arise naturally by applying the conormal construction to submanifolds of M . I will explain some situations where usual Legendrian invariants fail to grasp the whole picture. I will mainly focus on the background and the construction of known Legendrian invariants and will be very speculative on the usefulness of all this to the situations that lead me to consider this type of invariants.

Xujia Chen

Solomon-Tukachinsky's vs Welschinger's open Gromov-Witten invariants

Motivated by Fukaya'11, J. Solomon and S. Tukachinsky constructed open Gromov-Witten invariants in their 2016 papers from an algebraic perspective of A_∞ -algebras of differential forms. We present a geometric translation of their construction which works over arbitrary coefficient rings. It readily reduces these invariants to Welschinger's open invariants for symplectic sixfolds, which count multi-disks weighted by the linking numbers between their boundaries.

Yanqiao Ding

Genus decreasing phenomenon of higher genus Welschinger invariants

I will explain a genus decreasing formula for higher genus Welschinger invariants. As an application, one gets that higher genus Welschinger invariants of del Pezzo surface X of degree greater than 2 only depends on the number of real interpolated points, and some homological data associated to X .

Goulwen Fichou

Continuous rational functions

I will introduce continuous rational functions together with regulous functions (those continuous rational functions that remains rational by restriction to subvarieties), and present some applications.

Frédéric Mangolte

Algebraic models of the line in the real affine plane

We study the following real version of the famous Abhyankar-Moh Theorem: Which real rational map from the affine line to the affine plane, whose real part is a non-singular real closed embedding of R into R^2 , is equivalent, up to a birational diffeomorphism of the plane, to the linear one? In this setting, we show that there exists non-equivalent smooth rational closed embeddings up to birational diffeomorphisms. Some of them are simply detected by the non-negativity of the real Kodaira dimension of the complement of their images. This new invariant is derived from topological properties of some "fake real planes" associated with such embeddings. (Joint Work with Adrien Dubouloz.)

Arthur Renaudineau

Induction type relations on Welschinger invariants on symplectic 4-manifolds and applications

Surgery along a real Lagrangian sphere is an elementary operation on real symplectic manifolds, which was first used by Brugallé-Puignau to study Welschinger invariants on 4-manifolds. In a joint work in progress with Erwan Brugallé, we use this operation to obtain an induction type formula relating various Welschinger invariants of 4-manifolds. I will present this formula and give an application relating Welschinger invariants of the quadric ellipsoid and Welschinger invariants of $\mathbb{R}P^3$.

Alexandru Oancea

String topology of compact rank one symmetric spaces

String topology is the study of algebraic operations on the homology and cohomology of loop spaces. I will explain how to compute homological and cohomological string topology algebras, with Chas-Sullivan and Goresky-Hingston products, for compact rank one symmetric spaces (CROSS). The main tool is a new version of loop homology, of symplectic origin. As an application, and using recent work of Shelukhin, I will infer new cases of a conjecture of Viterbo regarding the spectral norm of closed exact Lagrangians inside cotangent bundles.

Sara Tukachinsky

Counts of pseudoholomorphic curves: Definition, calculations, and more

Open Gromov-Witten (OGW) invariants should count pseudoholomorphic maps from Riemann surfaces with boundary to a symplectic manifold, with boundary conditions and various constraints on boundary and interior marked points. The presence of boundary leads to bubbling phenomena that pose a fundamental obstacle to invariance. In a joint work with J. Solomon, we developed a general approach to defining genus zero OGW invariants. For real symplectic manifolds in dimensions 2 and 3, these invariants are strongly related to Welschinger's invariants.

The construction uses the heavy machinery of Fukaya A_∞ algebras. Nonetheless, in a recent work, also joint with J. Solomon, we find that the generating function of OGW invariants has many properties that enable explicit calculations. Most notably, it satisfies a system of PDE called the open WDVV equations. For projective spaces, this system of PDE generates recursion relations that allow the computation of all invariants.

No prior knowledge of any of the above notions will be assumed.

Olivier Wittenberg

Curves on real varieties and tight approximation

(Joint with Olivier Benoist.) We prove that various classes of real varieties, such as smooth cubic hypersurfaces of dimension at least 2, or linear algebraic groups and their homogeneous spaces, satisfy the following property: every loop can be approximated by a rational algebraic curve. To this end, we introduce the tight approximation property for varieties defined over the function field of a real or complex curve, and establish descent and fibration theorems for this latter property.

Susanna Zimmermann

Quotients of Cremona groups

I will discuss homomorphisms of Cremona groups to finite groups that count "complicated points"