Stringy Geometry
Géométrie des cordes

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ALEJANDRO ADEM, University of British Columbia
Twisted K-theory for Actions with Maximal Rank Isotropy

In this talk we discuss twisted K-theory for actions of compact Lie groups with maximal rank isotropy. This is joint work with Jose Manuel Gomez and Jose Maria Cantarero.

VINCENT BOUCHARD, University of Alberta
Quantization and Topological Recursion

The Eynard-Orantin topological recursion appears in a wide variety of geometric contexts, from Gromov-Witten theory to knot theory. From the data of a spectral curve, it reconstructs recursively generating functions for appropriate enumerative invariants. The ubiquity of this recursive structure can be understood in terms of quantization. From the topological recursion, one can construct a wave-function, which is then conjectured to be annihilated by a differential operator that is a quantization of the spectral curve. In this talk I will give an overview of the conjectural relation between topological recursion and quantization, highlighting its foundations in terms of tau functions and variational formulae. I will also present a recent theorem that proves the conjecture for a large class of genus zero spectral curves, and briefly mention recent results on higher genus spectral curves.

This is based on joint work with N.K. Chidambaram, T. Dauphinee and B. Eynard.

EMILY CLADER, San Francisco State University
Higher-genus wall-crossing in Gromov-Witten and Landau-Ginzburg theory

The theory of quasi-maps, developed in recent work of Ciocan-Fontanine and Kim, is a generalization of Gromov-Witten theory that depends on an additional stability parameter varying over positive rational numbers. When that parameter tends to infinity, Gromov-Witten theory is recovered, while when it tends to zero, the resulting theory encodes B-model information. Ciocan-Fontanine and Kim proved a wall-crossing formula exhibiting how the theory changes with the stability parameter, and in this talk, we discuss an alternative proof of their result as well as a generalization to other gauged linear sigma models. This is joint work with Felix Janda and Yongbin Ruan.

CARLA FARSI, University of Colorado
The spectrum of orbifold connected sums and collapsing

The Laplace operator on an orbifold is a non-negative self-adjoint operator on functions (or forms), and its spectrum is an orbifold invariant. Isospectral orbifolds are orbifolds whose Laplace spectra coincide. Though many geometric quantities, such as volume and dimension, are determined by the spectrum, it is known that there are pairs of isospectral orbifolds with different numbers and kinds of singular points. In particular, by the work of Rossetti-Schueth-Weildandt, there are isospectral pairs for whom the maximum order of the orbifold isotropy groups is different. The question of whether an orbifold with singular points can be isospectral to a manifold, i.e. an orbifold without singular points, is currently open. Generalizing work of Anné, Colbois, and Takahashi for manifolds, we study the behavior of the spectrum of a connected sum of orbifolds when one component of the connected sum is collapsed to a point. We use this to demonstrate that there are singular orbifolds and manifolds whose spectra are arbitrarily close to one another. In the process, we derive a Hodge-de-Rham theory for orbifolds.

Joint work with Emily Proctor and Chris Seaton

YUNFENG JIANG, University of Kansas
On motivic virtual signed Euler characteristics

In a joint work with R. Thomas we defined several invariants for the total space of the dual obstruction cone for a perfect obstruction theory, which we call the virtual signed Euler characteristics. These invariants can be used to study the Vafa-Witten invariants for projective surfaces. In this talk I will talk about a motivic version of the invariants of the dual obstruction cone.

BERNARDO URIBE JONGBLOED, Universidad del Norte
Stringy structures in cohomology and K-theory of orbifolds

The adjective stringy was coinned by Yongbin Ruan in order to denote those structures that can be associated to orbifolds which are constructed from loops or strings on the orbifold. The first one was the orbifold cohomology of Chen-Ruan and then several others appear in the literature such as the stringy product on twisted orbifold K-theory of Adem-Leida-Ruan and the Stringy K-theory of Jarvis-Kaufmann-Kimura. These stringy K-theory structures once applied to an orbifold point [*/G] could be understood as the isomorphism classes of representations of a twisted Drinfeld double of G. In this talk I will explain how the study of the isomorphism classes of twisted Drinfeld doubles gives us information on nontrivial isomorphisms of stringy K-theories for different orbifolds.

TAKASHI KIMURA, Boston University
Stringy operations in equivariant K-theory and cohomology

We describe algebraic structures in the K-theory and the cohomology of complex orbifolds in the framework of equivariant K-theory and cohomology which generalize familiar operations from topology. These include Chen-Ruan products on orbifold cohomology whose K-theoretic analog, under some conditions, admit power operations and compatible characteristic classes. We will explain how this structure can be used to endow such a K-theory with a positive structure which plays a role analogous to classes of vector bundles in topology. We describe some applications and some open problems.

ERNESTO LUPERCIO, CINVESTAV

DORETTE PRONK, Dalhousie University
Mapping Groupoids for Topological Orbifolds

We consider topological orbifolds as proper étale groupoids, i.e., topological groupoids with a proper diagonal and étale structure maps. We call these orbigroupoids. To describe maps between these groupoids and 2-cells between them, we will use the bicategory of fractions of the 2-category of orbigroupoids and continuous functors with respect to a subclass of the Morita equivalences which is suitably small and gives a bicategory of fractions that is equivalent to the usual one. We will present several nice results about the equivalence relation on the 2-cell diagrams in this bicategory that then enable us to obtain a very explicit description of the topological groupoids Map (G, H) encoding the new generalized maps from G to H and equivalence classes of 2-cell diagrams between them. When G has a compact orbit space we show that the mapping groupoid is an orbigroupoid and has the appropriate universal properties to be the mapping object. In particular, sheaves on this groupoid for the mapping topos for geometric morphisms between the toposes of sheaves on G and H. This construction is invariant under Morita equivalence: Morita equivalent copies of G and H result in a Morita equivalent mapping groupoid. This groupoid can also be viewed as a pseudo colimit of mapping groupoids in the original 2-category of topological groupoids and continuous functors.

ILYA SHAPIRO, University of Windsor
Some invariance properties of cyclic cohomology with coefficients

While Morita invariance of cyclic cohomology is well understood, in light of recent work on a categorical approach to cyclic cohomology with coefficients it became possible to formulate and consider 2-Morita invariance. Just as the usual Morita invariance can be viewed as the dependence of cohomology only on the category of modules, 2-Morita invariance requires a modification of the definition so that the cohomology depends only on the 2-category of categorical representations of a monoidal category. This is natural from the point of view of local 3d-TFTs which are determined by their value (2-category) at a point, or the invariance of cyclic cohomology under a version of a categorified Fourier transform.

XIANG TANG,

HSIAN-HUA TSENG, Ohio State University
A tale of four theories

Around a decade ago the following four $(\mathbb{C}^*)^2$-equivariant theories are proven to be equivalent: (1) Gromov-Witten theory of $\mathbb{P}^1 \times \mathbb{C}^2$ relative to three fibers; (2) Donaldson-Thomas theory of $\mathbb{P}^1 \times \mathbb{C}^2$ relative to three fibers; (3) Quantum cohomology of Hilbert schemes of points on $\mathbb{C}^2$; (4) Quantum cohomology of symmetric product stacks of $\mathbb{C}^2$. In this talk we'll discuss these four equivalence. We'll also sketch some new development, namely higher genus extensions of these equivalences (joint work with R. Pandharipande).