Beijing-Hangzhou-Zurich Moduli Workshop

May 13-16, 2026
Ding Shisun Lecture Hall, School of Mathematical Sciences, Peking University, Beijing
May 18-19, 2026
Lecture Hall 210, School of Mathematical Sciences, Zhejiang University, Hangzhou

Younghan Bae (University of Michigan)

Fourier transform and Abel–Jacobi sections

For a family of smooth curves, the relative Jacobian parametrizing degree-zero line bundles provides a fundamental example of a principally polarized abelian variety. Over the moduli space of stable curves, the relative Jacobian admits several different toroidal compactifications, depending on the choice of stability condition.

This talk focuses on the intersection theory of fine compactified Jacobians over the moduli space of stable curves. I will explain a connection between the extended Poincaré line bundle and the logarithmic Abel–Jacobi theory. This connection produces a powerful tool to study intersection theory of compactified Jacobians. Moreover, by relating this construction with the Chern map, we obtain many interesting tautological relations on fine compactified Jacobians and their fiber products.

This is a joint work with S. Molcho and A. Pixton, and includes a work in progress with A. Pixton.

Samir Canning (ETH Zurich)

Intersection theory of the moduli space of abelian fourfolds

I will explain how to compute the Chow ring of the moduli space of principally polarized abelian fourfolds. I will also discuss some aspects of the Chow ring of its toroidal compactifications. This is joint work in progress with Drakengren and Iribar López.

Yalong Cao (Chinese Academy of Sciences)

Quantum multiplication by divisors for Hilbert schemes on $\mathbb{C}^3$

In 2004, Okounkov–Pandharipande wrote down a formula of quantum multiplication by divisors for Hilbert schemes on $\mathbb{C}^2$. It was reinterpreted and generalised to Nakajima varieties by Maulik–Okounkov in 2012.

In this talk, we will present the corresponding formula for Hilbert schemes on $\mathbb{C}^3$, which is built from the theory of critical stable envelopes. Joint works with Andrei Okounkov, Yehao Zhou and Zijun Zhou.

Alessandro Giacchetto (ETH Zurich)

Matrices and moduli

Matrix models provide one of the oldest examples of a genus expansion suggestive of an underlying string theory, yet the identification of the corresponding worldsheet description has remained subtle. In this talk, I will explain how every Hermitian matrix model admits a dual closed-string description, mathematically formalised as a cohomological field theory on the moduli space of curves and explicitly governed by oscillatory integrals. This cohomological field theory is a mathematical incarnation of a B-twisted Landau–Ginzburg model coupled to gravity. The key ingredient is the spectral curve emerging from the large-N loop equations. In this framework, the ramification points of the spectral curve correspond to the critical points of the Landau–Ginzburg superpotential, while expectation values in random matrix theory are identified with integrals of tautological classes on the moduli space of curves. From a physics perspective, this provides a concrete and fully controlled example of gauge/string duality. Based on joint work with R. Gopakumar and E. A. Mazenc.

François Greer (Michigan State University)

Kudla's Conjecture and tautological projection

A unitary Shimura variety of signature $(n,1)$ contains special cycles in every codimension g, which form the coefficients of Hermitian modular forms of genus g. Kudla conjectured that the closures of these cycles in a toroidal compactification can be modified by cycles supported in the boundary to restore modularity. I will discuss the solution in cohomology for $g < n/2$, which is joint work with Salim Tayou. Then I will present some partial results in the case of orthogonal Shimura varieties, and an application to Noether–Lefschetz cycles in the moduli of abelian surfaces with level structure. The latter is joint work with Carl Lian.

Shuai Guo (Peking University)

Genus one Virasoro constraints for Fano complete intersections in projective spaces

The Virasoro conjecture is a central problem in enumerative geometry, predicting that the generating function of Gromov–Witten invariants of any smooth projective variety is annihilated by a half-branch of the Virasoro algebra. In this talk, we focus on the genus-one Virasoro conjecture for Fano complete intersections in projective spaces. To this end, we first present a wall-crossing formula relating heavy and light marked points. We then establish a key equivalence between two formulations of the Virasoro conjecture for these spaces: the general version with arbitrary ambient insertions and a reduced version admitting only a single ambient insertion. Finally, by combining these wall-crossing techniques with twisted Gromov–Witten theory, we verify the genus-one conjecture in the single-insertion setting. This is ongoing joint work with Qingsheng Zhang and Yang Zhou.

Aitor Iribar López (ETH Zurich)

Tautological projections on the moduli space of abelian varieties

Inside the cohomology of the moduli space of abelian varieties sits a very natural subring: The tautological ring, generated by the Chern classes of the Hodge bundle. Two years ago Canning, Molcho, Oprea and Pandharipande constructed a canonical projection onto this subring. I will discuss recent progress around this projection, more concretely in trying to see if it is a ring homomorphism, opening up a variety of follow up questions. The talk will be based on joint works with Pandharipande, Tseng and with Canning, Drakengren, Feusi, Holmes, Nesterov, Oprea, Pandharipande, Schmitt and Sun.

Zhiyuan Li (Fudan University)

Noether–Lefschetz cycles on moduli spaces of K3 type and their compactifications

In this lecture, we explore the geometric and arithmetic properties of Heegner cycles on Shimura varieties and their compactifications, with a focus on their role in the theory of moduli spaces. A central aspect is the modularity of these cycles: they arise as Fourier coefficients of modular forms, a principle encapsulated in the Kudla program. From the perspective of moduli theory, Heegner cycles can be interpreted as Noether–Lefschetz cycles in many cases of K3 type. I will present recent advances and discuss several open questions regarding their structure and arithmetic significance on certain compactifications.

Woonam Lim (Yonsei University)

The geometry of Nekrasov's gauge origami theory

The study of classical instantons on spacetime has led to many interesting developments in mathematics. In a series of papers, Nekrasov introduced the generalized ADHM equations, whose solutions are instantons on the "origami spacetime". In this talk, I will explain how to interpret gauge origami via DT_4 theory. The main result shows that Nekrasov's origami partition function, defined by local contributions, coincides with a global definition via Oh–Thomas classes in DT_4 theory. This global definition is crucial for deriving the Dyson–Schwinger equation, which was one of Nekrasov's main motivations for introducing gauge origami theory. I will also briefly discuss a conjectural sheaf-theoretic description of gauge origami. This is joint work with N. Arbesfeld and M. Kool.

Zhiyu Liu (Zhejiang University)

Bridgeland stability conditions on projective families

Recently, Chunyi Li proves the existence of stability conditions on the derived categories of coherent sheaves on all projective schemes. I will explain a generalization of Li's construction to the relative setting, which implies the properness of the moduli spaces of semistable objects. This is based on the joint work with Chunyi Li, Ziqi Liu, Emanuele Macrì, Alex Perry, Paolo Stellari, and Xiaolei Zhao.

Samouil Molcho (Sapienza University of Rome)

Resolution of the Fourier transform and the Abel–Jacobi section

The universal Jacobian is a remarkable family of abelian varieties over the moduli space of curves, whose intersection theory is connected to many central enumerative problems, such as tautological relations, Brill–Noether theory, and Gromov–Witten theory. On account of the group structure of its fibers, the Chow groups of the universal Jacobian are highly ordered, possessing several special structures, such as a convolution product and a Fourier–Mukai transform. Compactifications of the universal Jacobian over the moduli space of stable curves however necessarily break the group structure and consequently the special structures that accompany it. In this talk, I will review the nicest compactifications of the universal Jacobian we know, the fine compactified Jacobians, and give the detailed construction of a line bundle that will serve as a Fourier–Mukai kernel. The construction will be used in subsequent talks to connect the Fourier transform of Abel–Jacobi sections with Pixton's formula.

Denis Nesterov (ETH Zurich)

-6 *and all that*

I will introduce the space of "embedded" nodal conics on local $\mathbb{P}^2$, and explain how it computes the degree-2, genus-0 Gopakumar–Vafa invariant, -6. Its higher-degree generalisation, along with a substantial body of additional evidence, suggests the existence of moduli spaces of "embedded" nodal curves that are closely related to stable maps, Hilbert schemes, and KSBA spaces. This is based on joint work with Yang Zhou.

Dragos Oprea (University of California San Diego)

The twisted Hodge numbers of the Quot schemes of zero dimensional quotients over curves

We study Quot schemes of rank 0 quotients on smooth projective curves. These Quot schemes exhibit a rich and highly structured geometry, with formal analogies to the Hilbert scheme of points on surfaces. The main result (obtained jointly with Sabin Cautis) identifies the pushforward of the sheaves of differentials under the Quot-to-Chow morphism to the symmetric product of the curve. As an application, we compute the twisted Hodge numbers of Quot schemes with values in tautological line bundles pulled back from the symmetric product.

Aaron Pixton (University of Michigan)

Abel–Jacobi pullbacks

I will give two different descriptions of the same subspace of the Chow ring of the moduli space of stable curves. On one hand, the subspace is the intersection of kernels of certain linear maps built from the tautological gluing and forgetful maps between moduli spaces of stable curves. On the other hand, it is the space of certain "Abel–Jacobi pullbacks" — classes given by starting with a cycle on a fine compactified Jacobian, pulling back that cycle along all possible Abel–Jacobi sections, and polynomially interpolating between the pullbacks by different sections to get a single class. I will discuss some applications of the equivalence of these two descriptions, including a new characterization of the double ramification cycle. This talk presents joint work with Younghan Bae.

Junliang Shen (Yale University)

On the topology of the moduli of Higgs bundles

For fixed rank, Harder–Narasimhan proved in the 70s that the topology of the moduli space of stable vector bundles depends crucially on the degree, where they used Betti numbers to distinguish the spaces. A long standing question (at least dating back to 2005 by Hausel) asked how the topology of the moduli space of Higgs bundles is dependent on the degree. I will first explain why this question is much harder — most natural topological and algebro-geometric invariants satisfy the "degree-invariant property". Then I will discuss a conjectural proposal, based on the (degree independent!) tautological relations, which suggests a negative answer to Hausel's question. Based on joint work in progress with Siqing Zhang.

Yang Zhou (Fudan University)

Quasimap wall-crossing, generalizations and applications

Gromov–Witten theory counts curves in a smooth projective manifold via intersection theory on the moduli of stable maps. The theory of quasimaps provides alternative compactifications of the moduli of such maps, depending on a stability parameter epsilon. The space of stability conditions is divided into chambers and the invariants are related by wall-crossing formulas. Roughly speaking, the wall-crossing formula extracts the contribution from all rational tails to the Gromov–Witten invariants. In this talk I will first explain the geometry of quasimap wall-crossing. And then I will talk about some recent generalizations and applications.