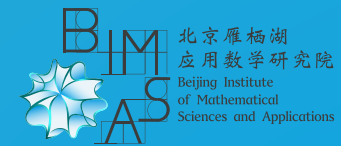


# String—Math 2025

📅 June 23 - 28, 2025    📍 BIMSA, Beijing

$$S = -T \int d^2\sigma \sqrt{-\det(h_{\alpha\beta})}$$



北京雁栖湖  
应用数学研究院  
Beijing Institute  
of Mathematical  
Sciences and Applications



丘成桐数学科学中心  
YAU MATHEMATICAL SCIENCES CENTER

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# DESCRIPTION

The String Math conference is an annual meeting that brings together researchers working at the interface of mathematics and physics, particularly in string theory, quantum field theory, and related areas. Recent advances in both fields have profoundly reshaped our perspectives and deepened the connections between them. This year, String Math 2025 will be held from June 23 to 28 at the Beijing Institute of Mathematical Sciences and Applications (BIMSA).

## Local Organizers

- Chi-Ming Chang (YMSC & BIMSA)
- Babak Haghighat (YMSC & BIMSA)
- Ling-Yan Hung (YMSC & BIMSA)
- Albrecht Klemm (University of Bonn)
- Kimyeong Lee (BIMSA)
- Si Li (Tsinghua University)
- Nicolai Reshetikhin (YMSC & BIMSA)
- Wei Song (YMSC)
- Junya Yagi (YMSC)
- Wenbin Yan (YMSC)
- Hossein Yavartanoo (BIMSA)

## Sponsors

- Beijing Institute of Mathematical Sciences and Applications (BIMSA)
- Yau Mathematical Sciences Center, Tsinghua University (YMSC)

Email: [stringmath2025@bimsa.cn](mailto:stringmath2025@bimsa.cn)

Address: 544 Hefangkou, Huairou District, Beijing, China

# COMMITTEE

## Steering Committee

- Ron Donagi (University of Pennsylvania)
- Dan Freed (Harvard University)
- Nigel Hitchin (University of Oxford)
- Sheldon Katz (University of Illinois Urbana-Champaign)
- Maxim Kontsevich (Institut des Hautes Etudes Scientifiques)
- David Morrison (University of California, Santa Barbara)
- Hiroshi Ooguri (California Institute of Technology)
- Boris Pioline (LPTHE, CNRS and Sorbonne Université)
- Piotr Sułkowski (University of Warsaw)
- Jörg Teschner (Universität Hamburg)
- Edward Witten (Institute for Advanced Study)
- Shing-Tung Yau (YMSC & BIMSA)

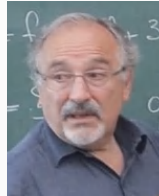
## Scientific Committee

- Tomoyuki Arakawa (Kyoto University)
- Chiu-Chu Melissa Liu (Columbia University)
- Bong-Hor Lian (SIMIS)
- Conan Nai Chung Leung (The Chinese University of Hong Kong)
- Albrecht Klemm (University of Bonn)
- Si Li (Tsinghua University)
- Mina Aganagic (UC Berkeley)
- Kefeng Liu (SIMIS)
- Hiraku Nakajima (Kavli Institute for the Physics and Mathematics of the Universe)
- Ashoke Sen (International Center for Theoretical Sciences)
- Gregory Moore (Rutgers University)
- Cumrun Vafa (Harvard University)
- Shu-Heng Shao (Stony Brook University)

# SPEAKERS



**Nathan Berkovits**  
Sao Paulo



**Philip Candelas**  
University of Oxford



**Ben Davison**  
The University of Edinburgh



**Mykola Dedushenko**  
SIMIS



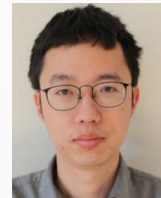
**John Duncan**  
Academia Sinica  
Taiwan



**Dongmin Gang**  
Seoul National  
University



**Rajesh Gopakumar**  
ICTS-TIFR  
Bengaluru



**Jie Gu**  
Southeast University



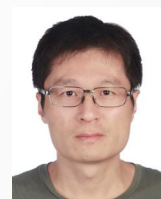
**Jonathan Heckman**  
University of  
Pennsylvania



**Dmitry Kaledin**  
Higher School of  
Economics



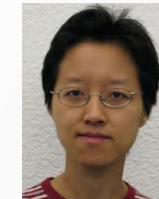
**Ahsan Khan**  
Harvard CMSA



**Liang Kong**  
SIQSE, Southern  
University of Science  
and Technology



**Conan Nai  
Chung Leung**  
The Chinese University  
of Hong Kong



**Chiu-Chu  
Melissa Liu**  
Columbia University



**Andrey Losev**  
SIMIS



**Yu Nakayama**  
Kyoto University



**Andrei  
Okounkov**  
Columbia University



**Hiroshi Ooguri**  
California Institute  
of Technology



**Boris Pioline**  
LPTHE, CNRS and  
Sorbonne Université



**Peng Shan**  
YMSC



**Shahin Sheikh  
-Jabbari**  
IPM



**Artan  
Sheshmani**  
BIMSA



**Meng-Chwan  
Tan**  
National University  
of Singapore



**Ben Webster**  
Perimeter Institute/  
University of Waterloo



**Timo Weigand**  
University of  
Hamburg



**Campbell  
Wheeler**  
Institut des Hautes  
Etudes Scientifiques



**Kai Xu**  
Harvard University



**Eric Zaslow**  
Northwestern  
University



# SCHEDULE

	June 23	June 24	June 25	June 26	June 27	June 28
	Opening <sup>1</sup>					
09:20-10:10	A. Okounkov	E. Zaslow	A. Sheshmani	H. Ooguri	C. Wheeler	Poster & Discussion <sup>5</sup>
10:30-11:20	P. Shan	S. Sheikh-Jabbari	B. Webster	B. Pioline	P. Candelas	
11:40-12:30	C. Leung	D. Gang	C. Liu	J. Gu	B. Davison	
14:00-14:50	N. Berkovits	L. Kong	M. Dedushenko	M.-C. Tan	Y. Nakayama	
15:10-16:00	T. Weigand	A. Khan	R. Gopakumar	D. Kaledin		
16:20-17:10	K. Xu	J. Duncan	J. Heckman	A. Losev		
	Reception <sup>2</sup>		Banquet <sup>3</sup>		Public Talk <sup>4</sup>	

1. Prof. Shing-Tung Yau will deliver a speech at the opening ceremony.
2. Prof. Albrecht Klemm will give a 20-min evening talk at the reception.
3. Conference Banquet.
4. Public talk by Prof. Hiroshi Ooguri in Tsinghua University.
5. Poster Session plus Discussion Session.




# String-Math 2025

# PUBLIC TALK

## The Science of "The Man from the 9 Dimensions"



### Hiroshi Ooguri

### 大栗博司

Chair Professor  
California Institute of Technology  
University of Tokyo

19:00, June 27, 2025

清华大学 · 大礼堂

Auditorium, Tsinghua University

### Abstract:

The Man from the 9 Dimensions" is a movie on Superstring Theory, the leading candidate for the unified theory of forces and matters including gravity. Professor Ooguri served as an advisor to the movie to ensure its scientific accuracy. The movie has received numerous prizes and honors including the 2016 Best Educational Production Award of the International Planetarium Society and the 2017 Best Full Feature Film and Best 3D Show science behind the movie, which will take us from the microscopic world of elementary particles to the macroscopic world of the universe, and to its beginning - the Big Bang.

Please scan the QR code to register →



# PROGRAM

2025-06-23

🕒 09:20 ~ 10:10

**Andrei Okounkov (Columbia University)**

**Stable envelopes for critical loci**

In a joint work with Yalong Cao, Yehao Zhou, and Zijun Zhou, we develop the theory of stable envelopes for critical K-theory and cohomology. It has the same scope of applications to enumerations of quasimaps to critical loci, and to the geometric representation theory of shifted quantum groups, as the original theory of stable envelopes. In particular, we geometrically realize the quantum Knizhnik-Zamolodchikov connection of Frenkel-Reshetikhin as miniscule shift operators. In my lecture, I will give an introduction to the subject with a particular focus on the qKZ equations.

🕒 10:30 ~ 11:20

**Peng Shan (单凡, YMSC)**

**Monoidal categorification of genus zero skein algebra**

We explain an isomorphism between the Kauffman bracket skein algebra of a genus zero surface with boundary and a quantized K-theoretic Coulomb branch. As a consequence, we see that our skein algebra arises as the Grothendieck ring of the bounded derived category of equivariant coherent sheaves on the Braverman-Finkelberg-Nakajima variety of triples with monoidal structure defined by the convolution product. We thus give a monoidal categorification of the skein algebra, partially answering a question posed by D. Thurston.

This is based on joint work with Dylan Allegretti and Hyun Kyu Kim.

🕒 11:40 ~ 12:30

**Conan Nai Chung Leung (梁乃聪, The Chinese University of Hong Kong)**

**3d Mirror Symmetry is Mirror Symmetry**

3d mirror symmetry is a mysterious duality for certain pairs of hyperkähler manifolds, or more generally, complex symplectic manifolds/stacks. In this talk, I will describe its relationships with 2d mirror symmetry. This could be regarded as a 3d analog of the paper "Mirror Symmetry is T-Duality" by Strominger, Yau, and Zaslow which described 2d mirror symmetry via 1d dualities. This is a joint work with Kifung Chan.

🕒 14:00 ~ 14:50

**Nathan Berkovits (ICTP-SAIFR/IFT-UNESP Sao Paulo)**

**Topological A-Model for Superstring and the Maldacena Conjecture**

A topological A-model constructed from  $CP^{3/4}$  supertwistor variables is proposed for  $AdS_5 \times S^5$  the superstring. At zero  $AdS$  radius, free  $N=4$   $d=4$  super-Yang-Mills amplitudes are reproduced by topological amplitudes of the corresponding gauged linear sigma model where the closed superstring vertex operator for a trace of  $k$  super-Yang-Mills fields is described by a boundary state with  $U(1)$  worldsheet instanton number  $k$ . After turning on a Fayet-Iliopoulos term in the sigma model with coefficient  $R^2 = \sqrt{g^2 N}$ , the topological amplitudes are claimed to reproduce the 't Hooft expansion of perturbative super-Yang-Mills amplitudes. Finally, this topological A-model is related to the usual  $AdS_5 \times S^5$  superstring in the pure spinor formalism.

🕒 15:10 ~ 16:00

**Timo Weigand (University of Hamburg)**

**Geometry of complex structure degenerations and Quantum Gravity**

We analyse the rich interplay between the geometry of complex structure degenerations of Calabi-Yau threefolds and general ideas about the structure of asymptotically weakly coupled theories in Quantum Gravity. Near infinite distance boundaries of the complex structure moduli space, a Calabi-Yau threefold splits into several components, corresponding to limits of type II, III, and IV.

General expectations of quantum gravity, including the Emergent String Conjecture, predict that the effective field theory of string theory probing these singularities should either undergo a partial decompactification or exhibit a new description in terms of a dual weakly coupled critical string. In the context of Type IIB string theory, these predictions have so far largely remained elusive.

We address this problem by combining insights both from the algebraic and, as a new ingredient, the geometric mixed Hodge structures near the asymptotic boundaries. Of particular interest are the type II limits, for which we establish the presence of a critical string that becomes tensionless in the degeneration limit. We furthermore identify a class of 3-cycles whose BPS indices give rise to an accompanying tower of KK or winding modes, in perfect agreement with expectations from Quantum Gravity. Generalising these observations leads to several new conjectures constraining the possible types of degenerations of Calabi-Yau threefolds as well as for the modular properties of the BPS indices for the leading towers of BPS states.

🕒 16:20 ~ 17:10

**Kai Xu (徐凯, Harvard University)**

**Finite Landscape of 6d N=(1,0) Supergravity**

We present a bottom-up argument showing that the number of massless fields in six-dimensional quantum gravitational theories with eight supercharges is uniformly bounded. Specifically, we show that the number of tensor multiplets is bounded by  $T \leq 193$ , and the rank of the gauge group is restricted to  $r(V) \leq 480$ . Given that F-theory compactifications on elliptic CY 3-folds are a subset, this provides a bound on the Hodge numbers of elliptic CY 3-folds:  $h^{1,1}(CY\,3) \leq 491$ ,  $h^{1,1}(Base) \leq 194$  which are saturated by special elliptic CY 3-folds. This establishes that our bounds are sharp and also provides further evidence for the string lamppost principle.

**2025-06-24**

🕒 09:20 ~ 10:10

**Eric Zaslow (Northwestern University)**

**Skeins, Clusters and Wavefunctions**

The brane wavefunction is the generating function of open Gromov-Witten invariants of a Lagrangian brane in a Calabi-Yau threefold. Ekholm and Shende defined a skein-theoretic version of this wavefunction, counting a holomorphic map by the skein of its boundary. I will describe how to use a skein-theoretic version of cluster theory to compute these wavefunctions for a class of branes defined by cubic graphs. This talk is based on joint work with Gus Schrader and Mingyuan Hu, generalizing previous work with Gus Schrader and Linhui Shen.

🕒 10:30 ~ 11:20

**Shahin Sheikh-Jabbari (IPM)**

**String Sandwiches & Worldsheet Quantum Equivalence Principle**

Worldsheet theory of strings is a generic Weyl-invariant 2d gravity and is customarily quantized by requiring vanishing of Virasoro constraints on physical string states up to spurious states. This customary choice obscures WQEP, Equivalence Principle at the Quantized Worldsheet theory level. We discuss that QWEP for closed strings can be made explicit by requiring Sandwich Virasoro Constraints (SVC), requiring vanishing of Virasoro constraints sandwiched between any two physical states. We show solutions to SVC come in four classes which are specified with whether they keep or break worldsheet parity  $P$  and/or time reversal  $T$ . The class which makes  $P$  and  $T$  manifest is associated with the usual Minkowski worldsheet observer discussed in the string theory textbooks. The three other classes constitute Hilbert spaces of generic non-inertial worldsheet observers in which  $P$  or  $T$  or both are not broken. We apply our formulation to an accelerated worldsheet with horizons, initiating the worldsheet formulation of a thermal string theory and strings probing horizon of black holes.

🕒 11:40 ~ 12:30

**Dongmin Gang (Seoul National University)**

**3D  $N=4$  rank-0 Superconformal Field Theories**

I will review recent developments in three-dimensional  $N=4$  rank-0 superconformal field theories. These theories are characterized by having trivial Higgs and Coulomb branches. Through a full topological twist, they offer a physical realization of non-unitary topological quantum field theories (TQFTs), with corresponding non-unitary rational vertex operator algebras (VOAs) appearing as edge modes. Such theories can arise as infrared (IR) limits of three-dimensional  $N=2$  supersymmetric gauge theories and as twisted dimensional reductions of higher-dimensional superconformal field theories.

🕒 14:00 ~ 14:50

**Liang Kong (孔良, SIQSE, Southern University of Science and Technology)**

**From the notion of a morphism between QFTs to SymTFT**

A morphism between two mathematical objects of the same type (e.g. groups, algebras, representations, categories, etc.), preserving the defining structures of the objects, is one of the most important notions in mathematics. However, how to define such a morphism between two QFT's (or quantum phases) had never been considered in physics until arXiv:1502.01690. In this talk, I will give a review of this notion and discuss its applications in the study of topological orders and more general quantum liquids. I will show that it leads us a sequence of fundamental results, including boundary-bulk relation (i.e., bulk is the center of a boundary) and topological Wick rotation (1705.01087). Topological Wick rotation is a consequence of a more complete mathematical theory of gapped and gapless boundaries of 2+1D topological orders and boundary-bulk relation, and was proposed to generalize to all dimensions. It automatically includes topological holography or "SymTFT" (rediscovered in 2022) as a special case. Topological Wick rotation is a stronger result than topological holography, provides a deeper understanding of SymTFT and a powerful tool for computation.

🕒 15:10 ~ 16:00

**Ahsan Khan (Harvard CMSA)**

**Algebra of the Infrared and 3d  $N=4$  Theories**

The Algebra of the Infrared is a mathematical framework that allows one to construct the category of half-BPS boundary conditions in massive 2d  $N=(2,2)$  theories from the spectrum of BPS solitons. In this talk I will sketch how a three-dimensional version of this framework can potentially apply to the study of massive 3d  $N=4$  theories. In particular I will aim towards discussing 2-categories of boundary conditions and a formulation of symplectic duality in these terms.



🕒 16:20 ~ 17:10

**John Duncan (Academia Sinica, Taiwan)**

**Magnetic Moonshine**

We will discuss an appearance of finite-group representations in the partition functions of superstring models with Melvin-type magnetic backgrounds.

## 2025-06-25

🕒 09:20 ~ 10:10

**Artan Sheshmani (BIMSA)**

**Derived Lagrangian foliations on Fano 4 folds, and Categorification of DT invariants**

We discuss construction of a derived degeneration technique and Lagrangian intersection theory on moduli spaces of perfect complexes supported on Fano 4 folds given as the Tyurin degeneration of general complete intersection Calabi Yau threefolds. As an example of this construction we discuss computation and proof of modular property for certain categorical and numerical DT invariants associated to the moduli space of coherent sheaves with support on hyperplane sections of a degenerating family of quintic Calabi Yau threefold. This talk is based on joint work with Ludmil Katzarkov, Maxim Kontsevich, and Jacob Krczyka, and separately, joint work with Amin Gholampour.

🕒 10:30 ~ 11:20

**Ben Webster (Perimeter Institute/University of Waterloo)**

**The Geometry of Coulomb Branches**

In the last decade, work of Braverman-Finkelberg-Nakajima and Bullimore-Dimofte-Gaiotto revolutionized our understanding of the Coulomb branches of  $3d$   $N=4$  gauge theories, but still left many aspects of these important spaces difficult to understand. I'll report on recent progress on understanding these spaces geometrically and algebraically.

🕒 11:40~12:30

**Chiu-Chu Melissa Liu (刘秋菊, Columbia University)**

**Remodeling Conjecture with descendants**

The Remodeling Conjecture proposed by Bouchard-Klemm-Mariño-Pasquetti relates Gromov-Witten (GW) invariants counting holomorphic curves in a toric Calabi-Yau 3-manifold/3-orbifold to the Chekhov-Eynard-Orantin Topological Recursion (TR) invariants of its mirror curve. In this talk, I will describe the Remodeling Conjecture with descendants, which is a correspondence between all-genus equivariant descendant GW invariants and oscillatory integrals (Laplace transforms) of TR invariants along relative 1-cycles on the equivariant mirror curve. Our genus-zero correspondence is a version of equivariant Hodge-theoretic mirror symmetry with integral structures. In the non-equivariant setting, we prove a conjecture of Hosono which equates quantum cohomology central charges of compactly supported coherent sheaves with period integrals of a holomorphic 3-form along integral 3-cycles on the Hori-Vafa mirror. This talk is based on joint work with Bohan Fang, Song Yu, and Zhengyu Zong.

🕒 14:00 ~ 14:50

**Mykola Dedushenko (SIMIS)**

**Three Puzzles on VOAs in Supersymmetric QFT**

A  $4d$   $N=2$  superconformal theory compactified on a cigar geometry with topological twist and Omega-deformation allows to address three questions related to Vertex Algebras in SQFT.

Firstly, it provides a direct link between the VOA of a  $4d$   $N=2$  SCFT and boundary VOAs of  $3d$   $N=4$  theories, embedding the former construction into the latter.

Secondly, it naturally explains a previously observed relation between Argyres-Douglas theories and  $3d$  TQFT (whose modular tensor category is the module category of the VOA), as well as connects to the recently introduced rank-0  $3d$   $N=4$  theories. Thirdly, it demystifies the "IR" formula for the Schur index in terms of the wall-crossing invariant of the BPS spectrum.

In this talk, we will see how the cigar compactification helps with these problems.

🕒 15:10 ~ 16:00

**Rajesh Gopakumar (ICTS-TIFR, Bengaluru)**

**Strings from Feynman Diagrams: A Picture Scrapbook**

Feynman Diagrams in large  $N$  gauge theories correspond to individual closed string configurations. We give evidence for this somewhat heterodox picture of gauge-string duality in the context of a simple set of correlators in  $N = 4$  Super Yang-Mills theory. These are described by a two matrix model. We describe, almost entirely pictorially, how each ribbon graph is glued in a unique way into a closed string worldsheet. These string configurations lie on a rather special lattice in the moduli space of punctured Riemann surfaces. In this approach, graph dualities point to the existence of multiple open string descriptions, physically arising from giant gravitons. Furthermore, we will also have a simple geometric picture of how the target space of the dual closed string can also be reconstructed in this case. These pictures are also buttressed by direct worldsheet calculations which exhibit this unusual localisation to these lattice points on moduli space.

🕒 16:20 ~ 17:10

**Jonathan Heckman (University of Pennsylvania)**

**Cobordism Utopia: U-dualities, Bordisms, and the Swampland**

The U-dualities of maximally supersymmetric supergravity theories lead to celebrated non-perturbative constraints on the structure of quantum gravity. They can also lead to the presence of global symmetries since manifolds equipped with non-trivial duality bundles can carry topological charges captured by non-trivial elements of bordism groups. The recently proposed Swampland Cobordism Conjecture thus predicts the existence of new singular objects absent in the low-energy supergravity theory, which break these global symmetries. In this talk we investigate this expectation, computing the first bordism groups for all the U-duality groups, and all the relevant bordism groups for 8D supergravity. We also construct the relevant geometric and non-geometric backgrounds in string / M- / F-theory. Based on joint work with Braeger, Debray, Dierigl, and Montero.

2025-06-26

🕒 09:20 ~ 10:10

**Hiroshi Ooguri (大栗博司, California Institute of Technology)**

TBA

🕒 10:30 ~ 11:20

**Boris Pioline (LPTHE, CNRS and Sorbonne Université)**

**Counting BPS black hole micro-states with (mock) modular forms**

A central goal in quantum gravity is to reproduce the Bekenstein-Hawking entropy of black holes from a microscopic counting of states. In type IIA strings compactified on a Calabi-Yau threefold, supersymmetric black hole microstates arise from bound states of D-branes wrapped on complex submanifolds, or in mathematical terms from stable objects in the derived category of coherent sheaves. String dualities predict that suitable generating series of indices counting such stable objects (known as Donaldson-Thomas invariants) possess strong modular properties. I will present recent progress in computing DT invariants on compact Calabi-Yau manifolds such as the quintic threefold, using wall-crossing and relations to topological string theory, and present strong evidence that modularity is indeed at work. Conversely, by assuming modularity one may compute topological string amplitudes to higher genus than before. Based on works in collaboration with Sergey Alexandrov, Soheyla Feyzbakhsh, Albrecht Klemm and Thorsten Schimannek.

🕒 11:40 ~ 12:30

**Jie Gu (顾杰, Southeast University)**

**Resurgence of TTbar deformed CFT**

TTbar deformation is an important irrelevant deformation of 2d QFT which is exactly solvable. We consider TTbar deformed conformal field theories, whose torus partition functions can be calculated as a perturbative series of the deformation parameter. We develop an efficient analytic method to calculate the perturbative series to very high orders, and determine its asymptotic behavior. We then use the resurgence theory to uncover a nouveau type of non-perturbative corrections to the deformed torus partition function.

🕒 14:00 ~ 14:50

**Meng-Chwan Tan (陈明传, National University of Singapore)**

**Topological 8d  $N=1$  Gauge Theory: Novel Floer Homologies, and A-infinity categories of Six, Five, and Four-Manifolds**

We show how one can define novel gauge-theoretic (holomorphic) Floer homologies of seven, six, and five-manifolds, from the physics of a topologically-twisted 8d  $N=1$  gauge theory on a  $\text{Spin}(7)$ -manifold via its supersymmetric quantum mechanics interpretation. We will then derive Atiyah-Floer type dualities between these gauge-theoretic Floer homologies and symplectic intersection Floer homologies of instanton moduli spaces. Via a 2d gauged Landau-Ginzburg model interpretation of the 8d theory, we will also obtain novel Fukaya-Seidel type A-infinity categories that categorify the aforementioned gauge-theoretic Floer homologies of six and five-manifolds, and that of four-manifolds by Er-Ong-Tan. Our work therefore furnishes purely physical proofs and generalizations of the conjectures by Donaldson-Thomas, Donaldson-Segal, Cherkis, Hohloch-Noetzel-Salamon, Salamon, Haydys, and Bousseau, and more.

🕒 15:10 ~ 16:00

**Dmitry Kaledin (Higher School of Economics)**

**How to enhance categories, and why**

I am going to describe a framework for working with homotopically enhanced categories loosely based on Grothendieck's idea of a "derivator". The framework is manifestly model-independent, does not use the machinery of model categories, nor simplicial homotopy theory, and is pretty close to the usual categorical intuition and way of thinking.

🕒 16:20 ~ 17:10

**Andrey Losev (SIMIS)**

**Tropical mirror symmetry**

I will introduce the Landau-Ginzburg-Saito theory stressing on importance of contact terms and concept of Saito's good section. Then I will describe enumerative counting of tropical curves in toric manifolds and reformulate it in terms of topological quantum mechanics on trees. Then I will prove that resummation of trees leads to recursion relations in Landau-Ginzburg-Saito theory and present the formula for good section obtained in this procedure. Based on a joint project with Vyacheslav Lysov.

**2025-06-27**

🕒 09:20 ~ 10:10

**Campbell Wheeler (Institut des Hautes Etudes Scientifiques)**

TBA

🕒 10:30 ~ 11:20

**Philip Candelas (University of Oxford)**

TBA

🕒 11:40 ~ 12:30

Ben Davison (The University of Edinburgh)

BPS cohomology

I will introduce BPS cohomology. This is a sub vector space of the Kontsevich–Soibelman cohomological Hall algebra that generates it in the sense that the cohomology of the space of 1-particle configurations generates the cohomology of the space of multi-particle configurations, or in the sense that a Yangian-type quantum group is generated by the classical Lie algebra it contains. The BPS cohomology associated to a 3-Calabi–Yau category forms a Lie algebra, via restriction of the commutator Lie bracket for the Hall algebra, and BPS Lie algebras generalise classical simple Lie algebras, often giving rise to generalised Kac–Moody Lie algebras. BPS cohomology categorifies (refined) BPS invariants coming from supersymmetric theories associated to quivers with potential, in the sense that these invariants are recovered by taking the graded dimensions of this cohomology. Although motivated by physics constructions, BPS cohomology has provided the key to proving various problems in pure mathematics, including understanding general properties of Kac polynomials and quantum cluster algebras; I will give a tour of applications in geometry, representation theory and algebra, as well as mentioning some future directions.

🕒 14:00 ~ 14:50

Yu Nakayama (中山優, Kyoto University)

Two applications of non-invertible symmetries in Virasoro minimal models

I discuss two applications of non-invertible symmetries in Virasoro minimal models. The first is that the categorical structure gives a strong constraint on the RG flow between them so that we can propose infinitely new RG flows  $M(kq + I, q) \rightarrow M(kq - I, q)$ . The second is that gauging non-invertible symmetries makes it possible for ADE modular invariant partition functions to be exchanged. In particular, to obtain E-series from A-series or D-series (and vice versa), we need non-invertible symmetries gauging.



# SHUTTLE BUS

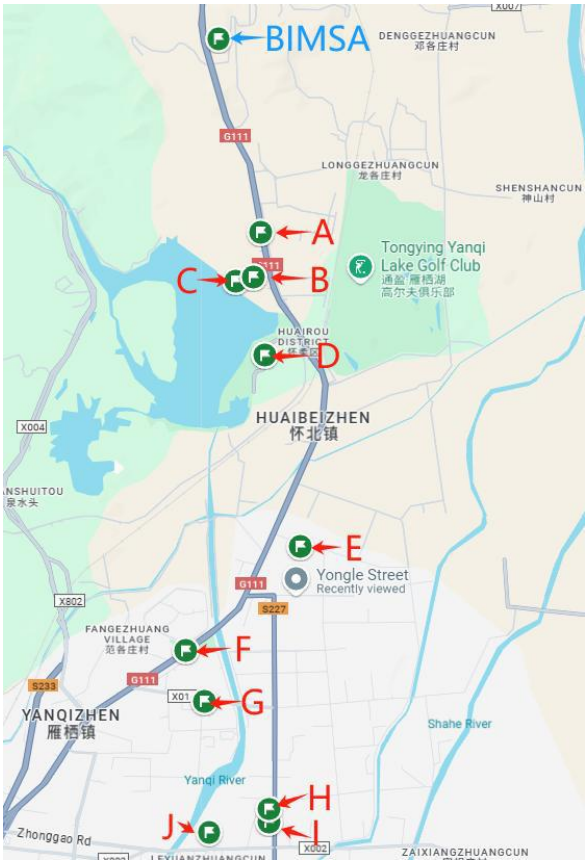
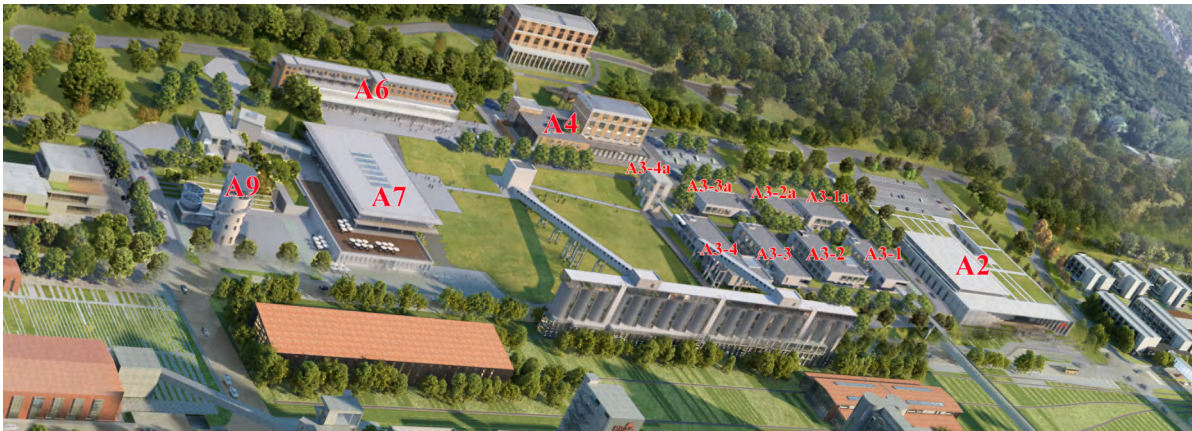
June 23, 2025

Pick-up Point	Departure	Plate
To BIMSA		
A	8:20 AM	京B07020D
B&C	8:15 AM	京B10671
D	8:15 AM	京B07020D
E	8:15 AM	京B10669
F	8:05 AM	京B10669
G	8:00 AM	京B10669
H&I	7:45 AM	京B10669

June 24-28, 2025

Pick-up Point	Departure	Plate
To BIMSA		
A	8:50 AM	京B07020D
B&C	8:45 AM	京B10671
D	8:45 AM	京B07020D
E	8:45 AM	京B10669
F	8:35 AM	京B10669
G	8:30 AM	京B10669
H&I	8:20 AM	京B10669

# MAP OF BIMSA







**BIMSA A2**



**A**  
At the gate of the UCAS  
国科大门口



**B&C**  
B: Qihu Hotel & C: Zhongjian Swan Lakeview Hotel  
栖湖饭店&中建湖景酒店  
B and C hotels are close to each other, please take the shuttle in the front of the flagpole of C  
住在B、C酒店, 请在C酒店的旗杆前乘车



**D**  
Beijing Yuanheng Yuanlin Forest Villa  
北京苑林山庄



**E**  
Aloft Hotel  
雅乐轩



**F**  
Spring Legend Holiday Hotel  
顶秀美泉假日酒店



**G**  
Shanshui Hotel  
山水酒店  
The pick-up point is near the parking lot east of the Shanshui Hotel  
乘车点在山水酒店东侧的停车场附近



**H&I**  
H: Starway Hotel & I: Lavande Hotels  
星程酒店&麗枫酒店  
The pick-up point is near the flagpole between the two hotels  
乘车点在两家酒店之间的旗杆附近