

International Conference on Operad Theory and Related Topics

12 – 16 October, 2026

Tianyuan Mathematics Research Center, Kunming, China

Tianyuan Mathematics Research Center — International Conference

About the Conference

This international conference focuses on operad theory and its related topics, including higher algebraic structures, homotopical and homological algebra, Gröbner–Shirshov bases and rewriting methods, Rota–Baxter algebras, vertex and chiral algebras, configuration spaces, and higher category theory. The conference brings together leading international experts and young researchers to exchange recent progress, to foster synergy between algebra, topology, and mathematical physics, and to chart new directions at the frontier of modern mathematics. The programme features one-hour invited talks, gong show sessions of short presentations by junior participants, and ample time for free discussion.

Organizers

- Chengming Bai (白承铭) — Chern Institute of Mathematics, Nankai University, Tianjin, China
- James Zhang (张坚) — Department of Mathematics, University of Washington, Seattle, USA
- Yanhong Bao (鲍炎红) — School of Mathematical Sciences, Anhui University, Hefei, China

Venue: Tianyuan Mathematics Research Center, Kunming, Yunnan, China

Dates: 12 – 16 October, 2026

Useful Information

About the venue. Tianyuan Mathematics Research Center (TMRC) is a mathematics and interdisciplinary science exchange institution jointly supported by the Chinese Academy of Sciences, the National Natural Science Foundation of China, the Chinese Mathematical Society, the Academy of Mathematics and Systems Science of the Chinese Academy of Sciences, and relevant departments of Kunming City. The center is located in a beautiful mountain area near Kunming, about one and a half hours' drive from Kunming Changshui International Airport. More information about TMRC can be found at <http://tianyuan.amss.ac.cn>.

Address. Tianyuan Mathematics Research Center, Chaishitan Reservoir area, Yiliang County, Kunming City, Yunnan Province, China (云南省昆明市宜良县柴石滩风景区天元数学国际交流中心) .

Arrival and registration. Participants arrive on Sunday, 11 October 2026. Registration and the opening ceremony take place 9:00–9:30 on Monday, 12 October 2026, at the conference venue. Departure is on Saturday, 17 October 2026.

Practical tips.

- The center is located halfway up the mountain in the Chaishitan Reservoir area. The temperature there is 2–3 °C lower than in the county town, and October mornings and evenings can be cool; warm clothing is recommended.
- The center sits within a national first-class public welfare forest, and mosquitoes are common; insect repellent is recommended. As the county hospital is about an hour's drive away, participants are advised to bring any commonly used medicines.
- The route to the center includes nearly 40 minutes of narrow, winding rural roads, followed by a three-kilometre mountain road from the reservoir gate to the center, where rockfalls may occur, especially on rainy days. For safety reasons, please plan to arrive before dark.

Programme

All talks take place in the main lecture hall. Registration and the opening ceremony start at 9:00 on Monday. Each invited talk is 60 minutes including discussion. Talks marked “(online)” are delivered remotely. The second morning session on Wednesday is a *Gong Show* of five short presentations by junior participants. Lunch is 12:00–13:00 and dinner is 18:00–20:00. Wednesday afternoon is free; Friday afternoon is reserved for discussion and departure.

Day	Morning (9:30–12:00)	Afternoon (15:00–17:30)
Sun 10/11	Arrival	
Mon 10/12	Markl, Xiang	Yang, Vargas (online)
Tue 10/13	Dotsenko, Lang	Zhang Y, Qin
Wed 10/14	Malbos, Gong Show	Free afternoon
Thu 10/15	Li G, Zou	Khoroshkin, Lyskov
Fri 10/16	Kolesnikov (online), Batanin	Discussion & Departure
Sat 10/17	Departure	

Monday, 12 October 2026

09:00–09:30	Registration and Opening Ceremony
	Morning session — Chair: Chengming Bai (白承铭)
09:30–10:30	Martin Markl <i>Mac Lane type coherence for lax algebras</i>
10:30–11:00	Coffee break
11:00–12:00	Maosong Xiang (向茂松) <i>Locally finite ∞-modules and weak Loday–Pirashvili modules over dg Lie algebras</i>
12:00–13:00	Lunch
	Afternoon session — Chair: Yanhong Bao (鲍炎红)
15:00–16:00	Peng Yang (杨鹏) <i>On the formality of configuration spaces of $\mathbb{R}^{n'} \times \mathbb{C}^n$</i>
16:00–16:30	Coffee break
16:30–17:30	Yannic Vargas (online) <i>Nested pre-Lie operads and infinitesimal Hopf algebras</i>
18:00–20:00	Dinner

Tuesday, 13 October 2026

Morning session — Chair: Kai Wang (王凯)

09:30–10:30	Vladimir Dotsenko <i>Identities of Lie algebras from the operadic viewpoint</i>
10:30–11:00	<i>Coffee break</i>
11:00–12:00	Honglei Lang (郎红蕾) <i>Polyubles of Rota–Baxter Lie algebras, post-Lie algebras, and their integrations</i>
12:00–13:00	<i>Lunch</i>
Afternoon session — Chair: Dingguo Wang (王顶国)	
15:00–16:00	Yi Zhang (张毅) <i>A monoidal categorical approach to augmented Rota–Baxter algebras and free cocycle bialgebras</i>
16:00–16:30	<i>Coffee break</i>
16:30–17:30	Yufei Qin (秦雨非) <i>From cyclic Rota–Baxter operads to homotopy double brackets</i>
18:00–20:00	<i>Dinner</i>

Wednesday, 14 October 2026

Morning session — Chair: Vladimir Dotsenko	
09:30–10:30	Philippe Malbos <i>Higher symbolic calculus for diagrammatic algebras</i>
10:30–11:00	<i>Coffee break</i>
11:00–12:00	Gong Show — short presentations Yuanfeng Zhang (张远峰) (Anhui University) · Xiabing Ruan (阮夏冰) (Université de Strasbourg) · Jose Sao Joao (Université de Strasbourg) · Xiaoying Wang (王啸颖) (East China Normal University) · Tao Zhang (张涛) (East China Normal University)
12:00–13:00	<i>Lunch</i>
Afternoon	<i>Free afternoon</i>

Thursday, 15 October 2026

Morning session — Chair: Jia Kong (孔嘉)	
09:30–10:30	Guchuan Li (李谷川) <i>Operads in the solution of the Kervaire invariant one problem</i>
10:30–11:00	<i>Coffee break</i>
11:00–12:00	Foling Zou (邹佛灵) <i>Equivariant variants of topological Hochschild homology</i>
12:00–13:00	<i>Lunch</i>
Afternoon session — Chair: Yu Ye (叶郁)	

15:00–16:00	Anton Khoroshkin <i>Hilbert series and Gröbner machinery for dioperads</i>
16:00–16:30	<i>Coffee break</i>
16:30–17:30	Denis Lyskov <i>Graphical configuration spaces and contractads</i>
18:00–20:00	<i>Dinner</i>

Friday, 16 October 2026

Morning session — Chair: Guodong Zhou (周国栋)

09:30–10:30	Pavel Kolesnikov (online) <i>Splittings of operads with an application to chiral algebras</i>
10:30–11:00	<i>Coffee break</i>
11:00–12:00	Michael Batanin <i>Polynomial monads and related homotopy theory</i>
12:00–13:00	<i>Lunch</i>
Afternoon	<i>Discussion and Departure</i>

Abstracts

Michael Batanin

Higher School of Economics, Moscow, Russia

Polynomial monads and related homotopy theory

In my talk I will show how many classical concepts of Category Theory concerning small categories, their presheaves categories and related homotopy theory can be generalised to polynomial monads and their algebras. I briefly mention some applications of these ideas to homotopy theory of operads, knot theory and higher category theory.

Vladimir Dotsenko

Université de Strasbourg, France

Identities of Lie algebras from the operadic viewpoint

Identities of Lie algebras is a classical topic where many exciting results were obtained in 1970s–1990s. In this talk, I shall explain how to view many of those results from the point of view of the theory of operads, explain some new results that myself and some of my collaborators obtained, and also explain how this topic fits into a more general representation-theoretic context, and outline some natural questions for further study.

Anton Khoroshkin

University of Haifa, Israel

Hilbert series and Gröbner machinery for dioperads

Many fundamental algebraic structures (including Lie bialgebras, triangular Lie bialgebras, and double Poisson algebras) are governed by operations with multiple inputs and multiple outputs. The compositions of such

operations are naturally encoded by graphs of arbitrary genus, giving rise to different categorical frameworks depending on the types of graphs one considers: properads, wheeled properads, PROPs, modular operads.

This talk focuses on the simplest genus-zero case, which corresponds to the algebraic structure called dioperad. I will present combinatorial techniques developed for dioperads and show how the theory of Gröbner bases yields detailed and elegant results for key examples, including Lie bialgebras, triangular Lie bialgebras, and string topology operations. (Based on the paper arXiv:2602.20069.)

Pavel Kolesnikov (online)

Sobolev Institute of Mathematics, Novosibirsk, Russia

Splittings of operads with an application to chiral algebras

Vertex algebras constitute one of the most studied classes of objects in modern mathematical physics and representation theory. A categorical approach to the notion of a vertex algebra was proposed by A. Beilinson and V. Drinfeld (*Chiral algebras*, 2004). A more algebraic approach was developed by B. Bakalov and V. Kac (*Field algebras*, 2002). According to this approach, a vertex algebra (without a vacuum) is just a Lie algebra in the multi-category (or pseudo-tensor category) ChHom of chiral linear maps, much as conformal algebras correspond to the multi-category CHom , and ordinary algebras correspond to the classical tensor category Hom of ordinary linear maps. From this point of view, the definitions of Leibniz vertex algebras by H. Li (*On vertex Leibniz algebras*, 2013) and of dendriform vertex algebras by C. Bai, L. Guo, J. Liu, and X. Wang (*On Rota–Baxter vertex operator algebras*, 2026) are exactly those of Leibniz and pre-Lie algebras, respectively, in the category ChHom .

In this talk, we discuss a family of transformations of operads called *splittings*. An arbitrary operad $\mathcal{Q}$ can be *split* by a binary quadratic operad $\mathcal{P}$ to produce a resulting operad $\mathcal{Q} \bullet \mathcal{P}$. In particular, if the operad $\mathcal{Q}$ is also binary quadratic, the result coincides with the Manin black product of operads. For example, for $\mathcal{P} = \text{LSym}$, the operad $\mathcal{Q} \bullet \mathcal{P}$ is the operad $\text{pre}\mathcal{Q}$ of *dendriform* $\mathcal{Q}$ -algebras.

We will discuss an analogue of dendriform splitting applied to the operad of chiral endomorphisms. As a corollary, we derive a series of statements on chiral $\mathcal{Q}$ -algebras for any operad $\mathcal{Q}$.

Honglei Lang (郎红蕾)

China Agricultural University, Beijing, China

Polyubles of Rota–Baxter Lie algebras, post-Lie algebras, and their integrations

First, we construct a nontrivial Rota–Baxter operator on the n -th direct product Lie algebra associated to a Rota–Baxter Lie algebra, which is called the n -uble. We also give the polyuble construction for quadratic Rota–Baxter Lie algebras, and establish their connection with polyubles of quasitriangular Lie bialgebras introduced by Fock and Rosly. Then we develop the polyuble theory for post-Lie algebras and show that the induced post-Lie algebra of the polyuble of a Rota–Baxter Lie algebra is exactly the polyuble of the induced post-Lie algebra. Finally, we give the polyuble construction for Rota–Baxter (Lie) groups and post-(Lie) groups, and show that they are integrations of polyubles of Rota–Baxter Lie algebras and post-Lie algebras.

Joint work with Yunhe Sheng.

Guchuan Li (李谷川)

Peking University, Beijing, China

Operads in the solution of the Kervaire invariant one problem

The Kervaire invariant one problem asks which dimensions admit a closed framed manifold with Kervaire invariant one. I will discuss the equivariant norms underlying Hill–Hopkins–Ravenel's nonexistence theorem in

dimensions greater than 126 and explain how these norms are organized by N_∞ -operads. I will then introduce the Steenrod algebra and the secondary Steenrod algebra, highlighting their roles in the Adams spectral sequence computations that contributed to Lin–Wang–Xu's proof of existence in dimension 126, the final case of the problem. If time permits, I will conclude with joint work on applications of these structures in chromatic homotopy theory.

Denis Lyskov

Université Paris Cité, France

Graphical configuration spaces and contractads

Operads and related structures play a significant role in algebraic topology and homotopy theory, particularly in the study of configuration spaces of manifolds. In this report, we will discuss generalised configuration spaces indexed by graphs in which some marked points may coincide and contractads — new operad-like structures that underlie these configuration spaces.

Operations in contractads are indexed by connected graphs and composition rules are numbered by contractions of connected subgraphs. We will show that many classical operads, such as the operad of commutative/associative/Lie algebras, the little disks operad, and the operad of moduli spaces of stable curves admit generalisations to contractads. In most of the report, we will discuss which results on little disks operads are valid in the contractad case, as well as open problems.

Philippe Malbos

Institut Camille Jordan, Université Claude Bernard Lyon 1, France

Higher symbolic calculus for diagrammatic algebras

In this talk, I will show how rewriting theory can be used to develop a symbolic calculus for strict linear monoidal categories arising in algebra. After reviewing the basic principles of algebraic rewriting theory, I will describe how presentations of linear monoidal categories can be stratified according to the confluence and normalization properties of their associated rewriting systems. This leads to a stratified version of the Diamond Lemma for diagrammatic rewriting with coefficients in a commutative ring, which in turn yields basis theorems for these categories. To illustrate this approach, I will apply it to the q -Schur category, obtaining a new explicit integral basis for its morphism modules.

Martin Markl

Czech Academy of Sciences, Prague, Czech Republic

Mac Lane type coherence for lax algebras

Mac Lane proved that, in a lax monoidal category, a single condition, namely the pentagon, implies that all sensible diagrams involving iterated multiplications commute. We present an analogous statement for lax algebras, that is, algebras whose axioms are satisfied only up to coherent transformations.

Yufei Qin (秦雨非)

Nanjing University of Information Science and Technology, Nanjing, China

From cyclic Rota–Baxter operads to homotopy double brackets

In this talk, we investigate the connections between homotopy Rota–Baxter structures and homotopy double brackets. Our motivation is to lift the classical correspondence between skew-adjoint Rota–Baxter operators on endomorphism algebras and double Lie algebra structures to the homotopy level. We first introduce compatible cyclic structures on the operad of Rota–Baxter algebras of weight zero and its minimal model, and discuss cyclic

homotopy Rota–Baxter algebras and their cyclic completion. We then establish a Poincaré-type duality identifying Rota–Baxter cohomology with the dual of homology for finite-dimensional cyclic Rota–Baxter algebras. Finally, via pre-Calabi–Yau constructions and the correspondence of Fernández and Herscovich, we obtain homotopy double Lie and double Poisson structures from suitable homotopy Rota–Baxter structures. In the finite-dimensional endomorphism setting, this gives a homotopy lift of the classical correspondence.

Joint work with Kai Wang.

Yannic Vargas (online)

CUNEF Universidad, Madrid, Spain

Nested pre-Lie operads and infinitesimal Hopf algebras

We present a “pre-Lie-like” notion of symmetric operads, called Nested Pre-Lie operads (NPL for short). After giving several examples of NPL operads, we explain how to construct NPL-algebras, in the same way algebraic structures emerge from operads by considering algebras over operads. To do so, we use a new variant of combinatorial species based on polynomial functions. Finally, we show that the NPL-operad on cycles induces an infinitesimal bialgebra structure (in the sense of Loday–Ronco) on the tensor algebra $T(V)$, together with a pre-Lie algebra structure using a construction from Aguiar and a new post-Lie algebra structure.

Part of this talk is joint work with Dominique Manchon, Hedi Regeiba, and Imen Rjaiba.

Maosong Xiang (向茂松)

Huazhong University of Science and Technology, Wuhan, China

Locally finite ∞ -modules and weak Loday–Pirashvili modules over dg Lie algebras

It is proved by Loday and Pirashvili that there is an adjunction between the category of Leibniz algebra and that of Lie algebra objects in the tensor category of linear maps. In this talk, I will discuss a homotopy lifting of constructing Leibniz algebras in the aforementioned correspondence. More precisely, given a dg Lie algebra $\mathfrak{g}$, I will show you how to produce Leibniz_∞ algebras out of the category of weak Loday–Pirashvili modules consisting of morphisms from locally finite ∞ - $\mathfrak{g}$ -modules to the adjoint $\mathfrak{g}$ -module.

Joint work with Zhuo Chen, Yu Qiao, and Tao Zhang.

Peng Yang (杨鹏)

BIMSA, Beijing, China

On the formality of configuration spaces of $\mathbb{R}^{n'} \times \mathbb{C}^n$

We present a complete classification of the formality of configuration spaces of $\mathbb{R}^{n'} \times \mathbb{C}^n$. For $(n' = 0, n \geq 2)$ or $(n' = 1, n \geq 1)$, the configuration spaces are non-formal. For $n' \geq 2, n \geq 1$, we establish an explicit quasi-isomorphism between the CDGA of differential forms on configuration spaces and its cohomology by using a diagram complex and a regularized configuration space integral, which leads to the formality. In the formal case, we get a higher dimensional analog of vertex algebras.

The talk is based on arXiv:2608.28200.

Yi Zhang (张毅)

Nanjing University of Information Science and Technology, Nanjing, China

A monoidal categorical approach to augmented Rota–Baxter algebras and free cocycle bialgebras

The ordinary tensor product of Rota–Baxter operators is not stable and therefore does not provide a natural monoidal structure on the category of Rota–Baxter algebras. We resolve this obstruction by passing to

augmented Rota–Baxter algebras and by introducing a triangular tensor product governed by the augmentation. This construction makes the category of augmented Rota–Baxter algebras into a monoidal category. We identify its comonoid objects with Rota–Baxter cocycle bialgebras, thereby giving a categorical explanation for the Hochschild 1-cocycle condition. As an application, we construct a canonical bialgebra structure on the free commutative Rota–Baxter algebra generated by a commutative bialgebra, prove its universal property as a free commutative Rota–Baxter cocycle bialgebra, and obtain a Hopf algebra in the connected filtered case.

Joint work with Li Guo and Yunzhou Xie.

Foling Zou (邹佛灵)

Chinese Academy of Sciences, Beijing, China

Equivariant variants of topological Hochschild homology

I will begin with a brief introduction to topological Hochschild homology (THH) and Real topological Hochschild homology (THR), which are invariants of E_1 -rings and some C_2 -equivariant analogue of E_1 -rings. I will then introduce spoke THH, a C_p -equivariant analogue of THH that recovers THR when $p = 2$. I will describe a spoke version of Bökstedt periodicity and, time permitting, its application to the Segal conjecture for C_p .

Joint work with Gabriel Angelini-Knoll.

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