

2019年度 河野研集中セミナー

スケジュール

| 9/24 | | 9/25 | |
|---------------|------------------------|---------------|-------------------------------------|
| 10:00 - 11:30 | Sergei Burkin (河野研 D3) | 9:15 - 10:45 | 浅尾泰彦 (河野研 D3) |
| 11:45 - 13:15 | 福嶋翔太 (伊藤研 D1) | 13:00 - 14:40 | ミーティング 「数学の可視化と Virtual Reality」 |
| 9/26 | | 9/27 | |
| 9:15 - 10:45 | 伊藤昇 (特任研究員) | | 佐藤玄基 (河野研 D3) |
| 11:00 - 12:30 | キムミンギョ (古田研 D2) | | De Campos Affonso Henrique (中島啓研) |
| 14:00 - 15:30 | 吉田純 (特任研究員) | | |
| 15:45 - 17:15 | 田森宥好 (小林研 D3) | | |
| 18:30 - | 懇親会 | | |

懇親会

会場 4番サード魚真 (東京都渋谷区松濤 1-29-5 松濤CSコート 1F)

時間 18:30 開始 (18:15 に図書館前集合、もしくは現地集合)

予算 5500 円

アブストラクト

Sergei Burkin

Twisted arrow category of an operad : Twisted arrow category of a category is fundamental notion in Baues-Wirsching cohomology theory of small categories. We introduce a generalization of this notion to operads. For many classical operads the following holds: (simplicial) presheaves over $Tw(P)$ are models of ∞ - P -spaces. For associative operad these are simplicial sets, for commutative operad these are Segal Γ -sets, for cyclic version of associative operad these are Connes cyclic sets, and for operad of operads these are dendroidal sets. Five recent articles by Hackney, Robertson and Yau also study particular instances of $Tw(P)$. We show that $Tw(P)$ has a ternary factorization system and, under mild assumptions, is a Reedy category.

福嶋翔太

On pseudodifferential operators on manifolds with end : We introduce a class of pseudodifferential operators on non-compact manifolds with polar coordinate. The symbol class which we treat depends on the behavior of metric in end, for instance, asymptotically conical or hyperbolic end. I will talk on the Calderón-Vaillancourt type L^2 boundedness theorem, which is not obvious in the case of hyperbolic end, and the approximation of resolvents of elliptic differential operators by our pseudodifferential operators.

浅尾泰彦

Magnitude homology v.s. Vietoris-Rips homology : Magnitude homology (MH) is a categorification of Tom Leinster's "magnitude" which counts the "efficient number of points" of finite metric spaces. Little properties of MH is known and revealing it is an attractive problem upon today's active interaction between algebraic and applied topology. MH is defined by considering the length of sequences of points on metric spaces. On the other hand, Vietoris-Rips homology (VH) is defined by considering the diameter of points on metric spaces. VH is one of origins of ordinary homology theory, and recently it is getting attractive among areas of data science. In this talk, we compare these homology groups by restricting them on Riemannian manifolds.

伊藤昇

Extending Khovanov homology to singular knots based on Vassiliev skein relation (Joint work with Jun Yoshida) : In the definition of Khovanov homology, the skein relation of Kauffman bracket is categorified by the mapping cone of a map corresponding to a saddle of $(1 + 1)$ TQFT. In this talk, using a correspondence between a canonical short exact sequence of another mapping cone and the Vassiliev skein relation at each crossing, we define a chain map that induces crossing changes on Khovanov chain groups. This chain map is invariant under moves of singular knots. By this setting, taking Euler characteristics, a Vassiliev skein relation for a Jones polynomial is recovered.

キムミンギョ

Bicommutative Kitaev lattice model : Kitaev lattice model(いわゆる toric code)とは三角形分割されている曲面と有限群 G から誘導される「lattice Hamiltonian」のことである。その Hamiltonian の「基底状態の空間」は曲面の第 1 ベッチ数から決まり、また 3 次元の TQFT(Dijkgraaf-Witten theory) に拡張されることが知られている。Balsam-Kirillov から有限群 G より一般的な有限次元の semisimple Hopf algebra A まで理論が拡張された。本発表では A が bicommutative(即ち commutative and cocommutative) な場合に限って以下のような一般化を行う。

- (1) Hamiltonian の構成に対して、三角形分割された曲面だけではなく有限セル複体、特に任意のコンパクト多様体まで理論を拡張する。

- (2) Hamiltonian の「基底状態空間」は「Hopf algebra A を係数とする特異ホモロジー理論」と Hopf algebra として同型である。特に Hamiltonian の「基底状態空間」はセル複体構造によらない。
- (3) $(n-1)$ -多様体の Hamiltonian の「基底状態空間」は n -TQFT に拡張される。TQFT の構成ではいわゆる「有限経路積分」を行うために自分で導入した integral along bialgebra homomorphism およびその存在性を使った。

吉田純

Multiplication on homologies over group operads : Homologies over group operads are new homology theories for associative algebras in monoidal categories over group operads. Examples include symmetric homology and braid homology which were studied by Fiedorowicz and Ault. The definition is analogous to Hochschild homology though they have some algebraic features that Hochschild homology doesn't.

In this talk, we will discuss multiplication specifically. More precisely, I will show that, for every group operad G , the G -homology HG admits a canonical G_∞ -algebra structure. Multiplicativity of a spectral sequence will also be discussed.

田森宥好

On minimal representations : Let G be a connected simple real Lie group not of type A . An irreducible admissible representation of G is called minimal if the annihilator of the underlying (\mathfrak{g}, K) -module is the Joseph ideal, which is the unique completely prime two-sided ideal whose associate variety is the closure of the minimal nilpotent orbit \mathcal{O}_{\min} . Minimal representations are supposed to be a part of building blocks of the unitary dual of G .

In this talk, we will construct minimal representations as the kernel of some intertwining differential operator between parabolically induced representations, and prove that there exist no other minimal representations up to infinitesimal equivalence. We also obtain an analogous classification for simple Lie groups of type A .

佐藤玄基

TBA

De Campos Affonso Henrique

Bow varieties : Bow varieties were introduced by Cherkis as an ADHM type description of moduli spaces of $U(n)$ -instantons on the Taub-NUT space equivariant under a cyclic group action. They were then studied by Nakajima and Takayama, and were shown to be, under the balanced condition, isomorphic to Coulomb branches of quiver gauge theories of affine type A . I am currently working on extending the definition of bow varieties to types B, C and D .

In this talk I will first give an introduction to bow varieties of type A , giving some examples and a brief overview of the results shown by Nakajima and Takayama. I will then talk about my current progress on expanding the definition to other types, talking about the definition of these varieties and some of their properties.