## 、 共同研究 「作用素環論における対称性と従順性」プログラム Symmetry and amenability in operator algebras

日時:2022年1月24日–26日 Period: 24–26 January 2022 開催場所:京都大学数理解析研究所 111 号室+オンライン (Zoom) Location: Room 111 at RIMS, Kyoto University and Online via Zoom 研究代表者:縄田 紀夫 (大阪大学) Organizer: Norio Nawata (Osaka University)

# 1月24日(月) Monday, 24.01

13:20 - 14:20荒野 悠輝 (京都大学)Yuki Arano (Kyoto University)Actions of C\*-tensor categories on C\*-algebras

14:35 – 15:35道本 裕太(早稲田大学)Yuta Michimoto (Waseda University)On fullness of von Neumann algebras associated with some nonsingular Borel equivalence relations

15:50 - 16:50鈴木 悠平(北海道大学)Yuhei Suzuki (Hokkaido University)Noncommutative amenable actions: characterizations, applications, and new examples

## 1月25日(火) Tuesday, 25.01

9:30 – 10:30 勝良 健史 (慶應義塾大学) Takeshi Katsura (Keio University) Ideal structure of C\*-algebras of singly generated dynamical systems

10:45 – 11:45吉田 啓佑(北海道大学)Keisuke Yoshida (Hokkaido University)Simplicity of algebras associated to multispinal groups

13:20 - 14:20荒野 悠輝 (京都大学)Yuki Arano (Kyoto University)Actions of C\*-tensor categories on C\*-algebras

14:35 – 15:35荒神 健太 (名古屋大学)Kenta Kojin (Nagoya University)A refined nc Oka-Weil theorem

15:50 – 16:50 鈴木 悠平(北海道大学) Yuhei Suzuki (Hokkaido University) Noncommutative amenable actions: characterizations, applications, and new examples

#### 1月26日(水) Wednesday, 26.01

9:30 – 10:30 佐藤 康彦(九州大学) Yasuhiko Sato (Kyushu University) Non-simple rationally AF algebras and KMS states

10:45 – 11:45 紅村 冬大(慶應義塾大学) Fuyuta Komura (Keio University) A correspondence between inverse subsemigroups, open wide subgroupoids and Cartan intermediate C\*-subalgebras

#### 概要 (連続講演) Abstract (Minicourse)

Yuki Arano (Kyoto University)

Title: Actions of C\*-tensor categories on C\*-algebras

Abstract: An action of C<sup>\*</sup>-tensor category on a C<sup>\*</sup>-algebra, which is a generalization of (quantum) group actions, naturally arises from an inclusion of C<sup>\*</sup>-algebras of finite index. I will give an overview of the theory of actions of C<sup>\*</sup>-tensor categories which is an analogue of the subfactor theory for C<sup>\*</sup>-algebras. Especially, I will focus on the Rokhlin property and the equivariant KKtheory, which may be useful for the classification of inclusions of simple C<sup>\*</sup>-algebras.

Yuhei Suzuki (Hokkaido University)

Title: Noncommutative amenable actions: characterizations, applications, and new examples

Abstract: Amenable action on a space is a powerful tool to study non-amenable groups. Classically such actions were introduced and studied by Zimmer and Anantharaman-Deraloche around 40 years ago. In this talk, I would like to talk on the non-commutative analogue of amenable actions. Four years ago, such actions were discovered in my work [1]. After that, there are remarkable developments on this subject. Particularly the right definition and characterizations of amenable actions are now clear, thanks to many researchers, including my joint work with Ozawa [3]. A highlight of our joint work is a new (functorial) construction of amenable actions on simple C\*-algebras [3]. I also explain two applications of amenable actions where non-commutativity is essential.

- It turned out that amenability of the action, rather than amenability of the group, is the essential ingredient for the classification theory of equivariant Kirchberg algebras [2].

- Good crossed product decompositions are given for arbitrary Kirchberg algebras in this framework. This is applied to give exotic inclusions and endomorphisms on these algebras [4]. References:

[1] Y. Suzuki, Simple equivariant C\*-algebras whose full and reduced crossed products coincide. J. Noncommut. Geom. 13 (2019), 1577–1585.

[2] Y. Suzuki, Equivariant  $\mathcal{O}_2$ -absorption theorem for exact groups. Compos. Math. 157, Volume 7, 1492–1506.

[3] N. Ozawa, Y. Suzuki, On characterizations of amenable C\*-dynamical systems and new examples. Selecta Math.(N.S.) 27 (2021), Article number 92, 29pp.

[4] Y. Suzuki, Non-amenable tight squeezes by Kirchberg algebras. Math. Ann. (accepted)