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A. 研究概要

Bischoll，Longo と共にモジュラーテンソル圏から生じる Q-sytem について，一般化された Longo-Rehren subfactor の構成と，Fuchs-Runkel-Schweigert の full center の構成は同じものであることを証明した．これは Kong と Runkel によって予想されていたものである．さらにその応用として，境界共形場理論における境界条件の分類を行い，境界の除去と添加の関係を明らかにした．

さらに Bischoll, Longo, Rehren と共に境界共形場理論の defect の研究と作用素環的分類を行った．

With Bischoff and Longo, we have proved that Rehren's construction producing the generalized Longo-Rehren subfactor and the full center construction of Fuchs-Runkel-Schweigert coincide for a Q-system arising from a modular tensor category. This proves a conjecture of Kong and Runkel. As an application, we have classified boundrary conditions in boundary conformal field theory and clarified relations between removing and adding a boundary.

With Bischoff, Longo and Rehren, we have also studied and classified defects in boundary conformal field theory within the operator algebraic framework.

B. 発表論文

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2. Y. Kawahigashi: "Conformal field theory and operator algebras", in "New Trends in Mathematical Physics", Springer (2009), 345–356.

3. Y. Kawahigashi: "Superconformal field theory and operator algebras", in "Noncommutativity and Singularities", Adv. Stud. Pure Math. **55**, (2009), 69–81.

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C. 口頭発表

1. Normal states on factors and finite dimensional subalgebras, Operator Algebra Seminar, Institut de Mathématiques de Jussieu (France), April 2013.

2. Superconformal field theory, boundary conformal field theory and noncommutative geometry, "China-Japan Conference on Noncommutative Geometry and K-Theory", Changchun (China), June 2013.

3. Trivial representation theory in conformal field theory and operator algebras, "Joint International Meeting of the American Mathematical Society and the Romanian Mathematical Society", Alba Iulia (Romania), June 2013.

4. Conformal field theory, operator algebras and tensor categories, "Mathematics and Quantum Physics", Roma (Italy), July 2013.

5. Local conformal nets with trivial representation theory, "Subfactors in Maui", University of Hawaii (U.S.A.), July 2013.

6. Operator algebras and conformal field theory, "Mathematical Statisitical Physics", Yukawa Institute for Theoretical Physics (Japan), July 2013.

7. Boundary conformal field theory, operator algebras and vertex operator algebras, "Majorana Theory, the Monster and Beyond", Imperial College London (U.K.), September 2013.

8. Conformal field theory and operator algebras, "JSPS-DST Asian Academic Seminar 2013: Discrete Mathematics & its Applications", the University of Tokyo (Japan), November 2013.

9. Superconformal field theory and non-commutative geometry, Kolloquium über Reine Mathematik, Universität Hamburg (Germany), December 2013.

10. Conformal field theory and operator algebras I–III, Seminar, Universität Göttingen (Germany), December 2013.

D. 講義

1. 数学 I : 理科二三類の微分積分学. (教養学部 1 年生講義)

2. 全学自由研究ゼミナール「超準解析学」: Nonstandard Analysis の入門. (教養学部 1,2 年生講義)

E. 修士・博士論文

1. (修士) 荒野 悠輝 (ARANO Yuki): Maximalization of Quantum Group Equivariant Hilbert C*-modules

2. (修士) 窪田 陽介 (KUBOTA Yosuke): Joint Spectral Flow and Localization of Index

3. (修士) 増本 周平 (MASUMOTO Shuhei): Countable Chain Condition for C*-algebras

4. (博士) 磯野 優介 (ISONO Yusuke): Examples of factors which have no Cartan subalgebras

F. 対外研究サービス

1. *Communications in Mathematical Physics* の editor.

2. *International Journal of Mathematics* の editor.

3. *Japanese Journal of Mathematics* の managing editor.

4. *Journal of Mathematical Physics* の associate editor.

5. *Journal of Mathematical Sciences, the University of Tokyo* の editor-in-chief.

6. *Reviews in Mathematical Physics* の associate editor.

7. 日本数学会「第 12 回高木レクチャー」(東京大学大学院数理科学研究科, 2013 年 5 月 25, 26 日) のオーガナイザー.

8. 日本数学会「第 13 回高木レクチャー」(京都大学数理解析研究所, 2013 年 11 月 16, 17 日) のオーガナイザー.

9. Session "Functional Analysis and Applications", Asian Mathematical Conference 2013 (Busan, Korea, June 30-July 4, 2013) のオーガナイザー.

10. サマースクール数理物理「量子場の数理」(東京大学大学院数理科学研究科, 2013 年 9 月 28–30 日) のオーガナイザー.

11. East Asian Core Doctoral Forum on Mathematics (京都大学理学研究科, 2014 年 1 月 20–24 日) のオーガナイザー.

12. Kavli IPMU-FMSP Workshop "Supersymmetry in Physics and Mathematics" (東京大学 Kavli IPMU (WPI), 2014 年 3 月 10–20 日) のオーガナイザー.