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A. 研究概要

Carpi, Longo と共に境界共形場理論を作用素環論の立場から研究した。具体的には、2次元 Minkowski 空間上の $A \otimes A$ の形の完全有理的 CFT ネットに対し、それと局所的に同型な境界共形ネットを作り出す一般的方法を与えた。

Suthichitrantont と共に、正則局所共形枠付きネットの構成を行った。これは $c = 1/2$ の Virasoro ネット有限個のテンソル積を、ある条件を満たす binary code の組 (C, D) を用いて延長するもので、Lam-山内の頂点作用素の結果の作用素環版にあたる。

緒方, Størmer と共に III 型因子環 M , その有限次元 C^* 部分環 A , M 上の正規状態 φ_i , $i = 0, 1, \dots, n$, (φ_0 は忠実) に対し, M の unitary u があって, A 上 $\text{Ad } u \circ \varphi_i = \varphi_0$, $i = 1, 2, \dots, n$, となることを示した。

With Carpi and Longo, we have studied boundary conformal field theory from an operator algebraic viewpoint. We have shown how to construct boundary CFT nets which are locally isomorphic to $A \otimes A$ from a completely rational net of the form $A \otimes A$ on the 2-dimensional Minkowski space.

With Suthichitrantont, we have constructed a holomorphic local conformal framed nets extended from a tensor power of the Virasoro net with $c = 1/2$ with a pair of binary codes (C, D) satisfying certain conditions. This is an operator algebraic counterpart of the result of Lam-Yamauchi on vertex operator algebras.

With Ogata and Størmer, we have shown that for a type III factor M , its finite dimensional C^* -algebra A and finitely many normal states φ_i , $i = 0, 1, \dots, n$, with φ_0 faithful on it, we have a unitary $u \in M$ such that we have $\text{Ad } u \circ \varphi_i = \varphi_0$ on A for $i = 1, 2, \dots, n$.

B. 発表論文

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C. 口頭発表

1. Conformal Field Theory and Noncommutative Geometry, Colloquium, Seoul National University (Korea), April 2012.
2. Conformal field theory and subfactors, Seminar, Seoul National University (Korea), April 2012.
3. Superconformal Field Theory and Operator Algebras, “Noncommutative Geometry”, Cardiff (U.K.), April 2012.

4. Superconformal Field Theory and Non-commutative Geometry, “The Tenth Spring Institute on Noncommutative Geometry and Operator Algebras”, Nashville (U.S.A.), May 2012.
 5. 共形場理論の数学, 研究会「物質科学の数学的手法と数理物理」, 理研, 2012年6月.
 6. Superconformal field theory and noncommutative geometry, “The 24th International Conference on Operator Theory”, Timișoara (Romania), July 2012.
 7. Superconformal field theory and operator algebras (3 lectures), “XXth Oporto Meeting on Geometry, Topology and Physics”, Oporto (Portugal), July 2012.
 8. Operator Algebras and Vertex Operator Algebras, “Conference on Groups, VOAs and Related Structures in Honor of Masahiko Miyamoto”, Tsukuba University (Japan), September 2012.
 9. Framed local conformal nets, “Essays in Low Dimensional Quantum Field Theory”, Rome (Italy), October 2012.
 10. Operator Algebras and Mathematical Physics, “East Asian Core-to-Core Meeting”, Kyoto University (Japan), January 2013.
- E. 修士・博士論文
1. (課程博士)Qinlong LI: Nuclearlity of reduced free product C^* -algebras.
 2. (課程博士)Noppakhun SUTHICHITRANONT: Construction of holomorphic local conformal framed nets
 3. (修士)Yul OTANI: Warped convolutions of the Klein-Gordon field
 4. (修士) 嶋田 洸一 (Koichi SHIMADA): Rohlin flows on amalgamated free product factors
 5. (修士) 鈴木悠平 (Yuhei SUZUKI): Haagerup property for C^* -algebras and rigidity property of property (T) C^* -algebras
 6. (修士) 武石拓也 (Takuya TAKEISHI): On nuclearity of C^* -algebras associated with Fell bundles over étale groupoids
- 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10回高木レクチャー」(京都大学数理解析研究所, 2012年5月26日)のオーガナイザー.
 8. Session organizer of “Conformal Field Theory” at “The XXIX International Colloquium on Group-Theoretical Methods in Physics” (Chern Institute of Mathematics, Tianjin, China), August 8–26, 2012.
 9. サマースクール数理物理「結び目の数理と物理」(東京大学大学院数理科学研究科, 2012年9月7–9日)のオーガナイザー.
 10. 日本数学会「第11回高木レクチャー」(東京大学大学院数理科学研究科, 2012年11月17–18日)のオーガナイザー.
 11. Miniworkshop on Operator Algebras I–IV (東京大学大学院数理科学研究科, 2013年1月11日, 1月16日, 1月30日, 3月11日)のオーガナイザー.