河東 泰之 (KAWAHIGASHI Yasuyuki)

A. 研究概要

Carpi, Hillier, Longo, Xu と共に，中心電荷 c が離散系列 $c < 3$ に属するときに，Neveu-Schwarz 代数の真空表現から $N = 2$ 超 Virasoro ネットを構成した．その偶部分ネットと，$U(1)_{2m+4} \subset SU(2)_m \otimes U(1)_4$ から生じるコセット・ネットを同一視し，カイラル・リングとスペクトラル・フローをその表現論の文脈でとらえた．α-誘導表現の理論とモジュラー不変行列を用いて，この超 Virasoro ネットのすべての拡張を分類した．そこには，コセット・ネットと Xu の意味でのミラー拡張の混ざった物ものが現れ，位数の高い巡回群による，新しいタイプのシンプル・カレント拡張が得られる．

With Carpi, Hillier, Longo and Xu, we construct the $N = 2$ super Virasoro net from the vacuum representation of the Neveu-Schwarz algebra for the central charge in the discrete series $c < 3$. We then identify the even part of this superconformal net with the coset net for the inclusions $U(1)_{2m+4} \subset SU(2)_m \otimes U(1)_4$. We identify the chiral ring and the spectral flow in the context of the representation theory of this superconformal net. We further classify all of their extensions using α-induction modular invariants. We have a mixture of the coset construction and the mirror extension in the sense of Xu and obtain a new type of simple current extensions with cyclic groups of large orders.

B. 発表論文

1. Y. Kawahigashi and R. Longo: "Local conformal nets arising from framed vertex operator algebras", Adv. Math. **206** (2006) 729–751.
2. Y. Kawahigashi, R. Longo, U. Pennig and K.-H. Rehren: "Classification of nonlocal chiral CFT with $c < 1$", Commun. Math. Phys. **271** (2007) 375–385.
3. Y. Kawahigashi: Conformal field theory and operator algebras, in "New Trends in Mathematical Physics", Springer (2009), 345–356.
4. C. Carpi, Y. Kawahigashi and R. Longo: "Structure and classification of superconformal nets", Ann. Henri Poincaré **8** (2008) 1069–1121.
5. Y. Kawahigashi: Superconformal field theory and operator algebras, in "Noncommutativity and Singularities", Adv. Stud. Pure Math. **55**, (2009), 69–81.
6. S. Carpi, R. Hillier, Y. Kawahigashi and R. Longo: Spectral triples and the super-Virasoro algebra, Commun. Math. Phys. **295** (2010), 71–97.
7. Y. Kawahigashi: From operator algebras to superconformal field theory, J. Math. Phys. **51** (2010), 015209.
8. C. Carpi, Y. Kawahigashi and R. Longo: On the Jones index values for conformal subnets, Lett. Math. Phys. **92** (2010), 99–108.

C. 口頭発表

1. Conformal field theory, Moonshine and operator algebras, Neumann-szeminárium, Alfred Renyi Institute (Hungary), April 2010.
2. Superconformal field theories and operator algebras, Seminar, Erwin Schrödinger Institute, Vienna (Austria), April 2010.
3. Superconformal field theory and operator algebras, The Eighth Spring Institute on Noncommutative Geometry and Operator Algebras, Nashville (U.S.A.), May 2010.
4. Superconformal field theory and operator algebras, EU-NCG 3rd Annual Meeting, Cardiff (U.K.), June 2010.
5. Superconformal field theory and operator algebras, The 23rd International Conference on Operator Theory, Timişoara (Romania), June 2010.
6. $N = 2$ superconformal field theory and operator algebras, 13th Workshop: Noncommutative harmonic analysis , Będlewo (Poland), July 2010.

7. Superconformal field theory and operator algebras, ICM Satellite Conference on Operator Algebras, Chennai (India), August 2010.

8. Superconformal field theory, operator algebras and noncommutative geometry (3 lectures), Geometry and Physics VIII, Scalea (Italy), September 2010.

9. Superconformal field theory and operator algebras, Seminal Interactions between Mathematics and Physics, Rome (Italy), September 2010.

10. Conformal field theory, operator algebras and noncommutative geometry, (4 talks), Institute for Studies in Theoretical Physics and Mathematics, Tehran (Iran), October 2010.

D. 講義

1. 解析学 VI : Fourier 解析と超関数. (理学部 3 年生向け講義)

2. 解析学特別演習 II : 上記講義の演習. (理学部 3 年生向け演習)

E. 修士・博士論文

1. (修士) 寺西功哲: Notes on GSB models and smooth Feshbach maps

2. (修士) 松村真義: Amenable actions and crossed products of C^*-algebras

3. (修士) 吉田悠人: Positive maps on matrix algbebras

4. (課程博士) 山下真: Deformation of torus equivariant spectral triples

5. (課程博士) 張欽: Noncommutative maximal ergodic inequality for non-tracial L^1-spaces

F. 対外研究サービス

1. *Communications in Mathematical Physics* の editor.

2. *International Journal of Mathematics* の chief editor.

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

4. *Journal of Mathematical Physics* の editor.

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

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

7. 研究集会「作用素環論の最近の進展」(東京大学大学院数理科学研究科, 2010 年 6 月 25〜26 日) のオーガナイザー.

8. 13th Workshop: Non-commutative Harmonic Analysis with Applications to Probability (Bedlewo, Poland, July 11–17, 2009) のサイエンティフィック・オーガナイザー.

9. A satellite conference on Operator Algebras to ICM-2010 (Chennai, India, August 9–13, 2010) のプログラム組織委員.

10. サマースクール数理物理「ランダム・シュレーディンガー作用素」(東京大学大学院数理科学研究科, 2010 年 8 月 26〜29 日) のオーガナイザー.

11. 日本数学会「第 8 回高木レクチャー」(京都大学数理解析研究所, 2010 年 11 月 23 日) のオーガナイザー.