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#### A. 研究概要

組紐フュージョン圏上でのある種の誘導表現の理論である,  $\alpha$ -induction について, bi-unitary connection の立場から研究を行った.  $\alpha$ -induction は組紐フュージョン圏内の (可換とは限らない) Frobenius 代数の定めるテンソル関手である. これはこれまでは III 型因子環の自己準同型の延長という形で研究されてきた. 一方, connection と呼ばれるユニタリ行列の族を使ってフュージョン圏が記述できることも, 作用素環論における部分因子環論でよく知られている. そこで, connection によって記述された組紐フュージョン圏上で  $\alpha$ -induction がどのように記述されるかを明らかにした. その中で, Frobenius 代数が可換の場合には,  $\alpha$ -induction によって生じる connection が flat になることも証明した.

We have studied  $\alpha$ -induction, which is a certain machinery to deal with induced representations for a braided fusion category, from a viewpoint of bi-unitary connections.  $\alpha$ -induction is a tensor functor arising from a (not necessarily commutative) Frobenius algebra in a braided fusion category, and it has been studied as an extension of endomorphisms of a subfactor of type III to a larger factor. It is also known in subfactor theory of operator algebras that a family of unitary matrices called connections describe a fusion category. We have clarified how to describe  $\alpha$ -induction for a braided fusion category given by connections. In particular, we have shown that if a Frobenius algebra is commutative, then the  $\alpha$ -induced connection is flat.

#### B. 発表論文

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2. A characterization of a finite-dimensional commuting square producing a subfactor of finite depth, *Quantum Information Seminar, Tsinghua University and Beijing Institute of Mathematical Sciences and Applications (China)* [Online], March 2022.
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4. A characterization of a finite-dimensional commuting square producing a subfactor of finite depth, *New Frontiers: Interactions between Quantum Physics and Mathematics*, Harvard University (U.S.A.), June 2022.
  5. A characterization of a finite-dimensional commuting square producing a subfactor of finite depth, *Operator Theory* 28, Timișoara (Romania), June 2022.
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  8. A characterization of a finite-dimensional commuting square producing a subfactor of finite depth, 作用素論作用素環論研究集会, 大阪教育大学, December 2022.
  9.  $\alpha$ -induction for bi-unitary connections, 作用素環論における群作用と数理論物理の関連, 京大数理研, January 2023.
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- D. 講義
1. 数理論科学の研究フロンティア：宇宙，物質，生命，情報：理研の若手研究者によるオムニバス講義のコーディネーター。(教養学部 1,2 年生講義)
  2. エニオンの圏論的対称性と作用素環, (京都大学基礎物理学研究所集中講義, 2022 年 10 月)
- E. 修士・博士論文
1. (修士) Ayoub HAFID: KK-theory and localization algebras: functoriality and the Kasparov product
  2. (修士) 星野真生 (HOSHINO Mao): Equivariant covering spaces of quantum homogeneous 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 associate editor.
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  6. *Journal of Topology and Analysis* の editor.
  7. *Letters in Mathematical Physics* の editor.
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  9. *Reviews in Mathematical Physics* の associate editor.
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  11. サマースクール数理論物理「K. Itô meets M. Sato –確率論と可積分系の邂逅–」(東京大学大学院数理科学研究科, オンライン, 2022 年 8 月 20–22 日) のオーガナイザー.
  12. East Asian Core Doctorial Forum on Mathematics (National Center for Theoretical Sciences, Taiwan, January 9–12, 2023) のオーガナイザー.
  13. 「物質のトポロジカル相の理論的探究」(東京大学大学院数理科学研究科, オンライン, 2023 年 3 月 27–29 日) のオーガナイザー.
  14. European Research Council の Starting Grant の panel member.
- G. 受賞
- 日本数学会出版賞受賞, 2019 年 3 月.