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著者：Curtis T. MCMULLEN 氏 (Harvard University)

論文題目：Galois orbits in the moduli space of all triangles, JMSJ Volume 77, Number 1 (2025), 31–56.

受賞者のことば：

著者の希望により、謝辞は冊子版のみに掲載しています。

著者：Marius DADARLAT (Purdue University), Ulrich PENNIG (Cardiff University)

論文題目：Bundles of strongly self-absorbing C^* -algebras with a Clifford grading, JMSJ Volume 77, Number 4 (2025), 1103–1136.

受賞者のことば：

We are deeply honoured to have received the JMSJ Outstanding Paper Prize, and we would like to express our sincere gratitude to the editors and the selection committee for this recognition.

The paper lies at the interface of operator algebras and algebraic topology. Continuous fields of C^* -algebras arise naturally across many areas of mathematics. This includes index theory, representation theory, and the work on the Baum-Connes and Novikov conjectures. Classifying them is a central problem in the field. Classical Dixmier-Douady theory achieves this for locally trivial bundles of compact operators $\mathcal{K}$ through a cohomological invariant. In a series of earlier papers, we extended this classification to the much broader class of strongly self-absorbing C^* -algebras. These are algebras D with the remarkable property that D is isomorphic to its own tensor square $D \otimes D$ in a particularly strong sense, a condition that singles out a family of algebras that plays a crucial role in the classification programme of nuclear, separable, simple C^* -algebras. It includes the Cuntz algebras $\mathcal{O}_2$ and $\mathcal{O}_\infty$ and the Jiang-Su algebra $\mathcal{Z}$. We showed that bundles with fibres of the form $D \otimes \mathcal{K}$ are classified by the first group of a generalised cohomology theory $E_D^*(X)$. However, computing this group explicitly remained a challenge.

The key idea of the present paper arose from a very concrete obstacle. Classical Dixmier-Douady theory has a graded counterpart, in which the grading of the fibres is provided by complex Clifford algebras. We found that developing an analogous graded extension of our theory was precisely the tool needed to unlock the computation of the cohomology theory for purely infinite fibres. The graded theory also turned out to be the bridge needed to connect the purely infinite and the stably finite cases in the classification. We prove that the classifying spaces of the graded automorphism groups carry infinite loop space structures and thereby obtain a cohomology theory $\widehat{E}_D^*(X)$ in the Clifford graded case. By carefully relating it to the ungraded one, we arrive at the key result: for a stably finite strongly self-absorbing C^* -algebra $D \neq \mathbb{C}$, the group $E_{D \otimes \mathcal{O}_\infty}^1(X)$ is expressible as a twisted product of $E_D^1(X)$ with the first cohomology group $H^1(X; \mathbb{Z}/2\mathbb{Z})$. The twisting in this product

is governed by a rule reminiscent of the classical Brauer group.

This paper forms the first step of a two-step programme. The second step is carried out in a companion paper joint with James E. McClure, in which the foundations laid here are used to express $E_D^1(X)$ for general strongly self-absorbing D in terms of ordinary cohomology and connective K-theory, thereby making these groups fully computable. More recently, the second author's PhD student Valerio Bianchi has extended the framework further to the equivariant setting, classifying bundles of UHF-algebras equipped with group actions via equivariant K-theory. We are grateful to James E. McClure and Valerio Bianchi for their contributions to this ongoing programme, and to the anonymous referees for their careful reading and helpful suggestions. The first author was partially supported by NSF grant DMS-2247334.