

Project title: Semi-Cartan inclusions

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Helpful existing knowledge: Group Theory, Functional Analysis

Project Description:

Groupoid C^* -algebras have been playing an ever-increasing role in C^* -algebra theory since their inception in [4]; in fact, it is rare to meet a C^* -algebra that cannot be built in a natural way from some groupoids. This brings the question- what exactly distinguishes groupoid C^* -algebras from arbitrary C^* -algebras? For reduced C^* -algebras of twisted effective étale groupoids, the Kumjian-Renault theory developed in [3] and [5] provides a complete answer through the existence of Cartan subalgebras of C^* -algebras. The Kumjian-Renault theory is developed and extended to general twisted étale groupoids in [2] with the notion of semi-Cartan subalgebras. The aim of the project is to further study semi-Cartan inclusions in full, reduced and exotic C^* -algebras and their algebraic analogy in twisted Steinberg algebras (introduced in [1]).

Useful references

- [1] B. Armstrong, L.O. Clark, K. Courtney, Y.-F. Lin, K. McCormick, J. Ramagge, Twisted Steinberg algebras, *J. Pure Appl. Algebra* 226(3) (2022), 106853.
- [2] T. Bice, L.O. Clark, Y.-F. Lin, K. McCormick, Cartan semigroups and twisted groupoid C^* -algebras, *J. Funct. Anal.* 289 (2025), 111038.
- [3] A. Kumjian, On C^* -diagonals, *Can. J. Math.* 38 (1986) 969- 1008.
- [4] J. Renault, A Groupoid Approach to C^* -algebras, *Lecture Notes in Mathematics*, vol 793, Springer, Berlin, 1980.
- [5] J. Renault, Cartan subalgebras in C^* -algebras, *Ir. Math. Soc. Bull.* 61 (2008) 29- 63.