

## $C^*$ -ALGEBRA DISTANCE FILTERS

TRISTAN BICE,<sup>1\*</sup> and ALESSANDRO VIGNATI<sup>2</sup>

Communicated by M. Mathieu

**ABSTRACT.** We use nonsymmetric distances to give a self-contained account of  $C^*$ -algebra filters and their corresponding compact projections, simultaneously simplifying and extending their general theory.

### REFERENCES

1. *If two projections are close, then they are unitarily equivalent*, MathOverflow, 2013.
2. *Extending akemann's non-commutative Urysohn lemma*, MathOverflow, 2015.
3. C. A. Akemann, *A Gelfand representation theory for  $C^*$ -algebras*, Pacific J. Math. **39** (1971), 1–11.
4. C. A. Akemann, *Approximate units and maximal abelian  $C^*$ -subalgebras*, Pacific J. Math. **33** (1970), 543–550.
5. C. A. Akemann, J. Anderson, and G. K. Pedersen, *Approaching infinity in  $C^*$ -algebras*, J. Operator Theory **21** (1989), no. 2, 255–271.
6. C. A. Akemann, J. Anderson, and G. K. Pedersen, *Excising states of  $C^*$ -algebras*, Canad. J. Math. **38** (1986), no. 5, 1239–1260.
7. C. A. Akemann and G. K. Pedersen, *Facial structure in operator algebra theory*, Proc. London Math. Soc. (3) **64** (1992), no. 2, 418–448.
8. T. Bice, *Filters in  $C^*$ -algebras*, Canad. J. Math. (2013), no. 3, 485–509.
9. T. Bice, *The projection calculus*, Münster J. Math. **6** (2013), 557–581.
10. T. Bice, *Semicontinuity in ordered Banach spaces*, preprint, [arXiv:1604.03154](https://arxiv.org/abs/1604.03154).
11. T. Bice, *Distance domains*, preprint, [arXiv:1704.01024](https://arxiv.org/abs/1704.01024).
12. T. Bice and P. Koszmider,  *$C^*$ -algebras with and without  $\ll$ -increasing approximate units*, 2017, [arXiv:1707.09287](https://arxiv.org/abs/1707.09287).

---

Copyright 2018 by the Tusi Mathematical Research Group.

Date: Received: Oct. 10, 2017; Accepted: Mar. 4, 2018.

\*Corresponding author.

2010 *Mathematics Subject Classification.* Primary 46L05; Secondary 06A75,, 46L85, 54E99.

*Key words and phrases.*  $C^*$ -algebra, filter, compact projection, nonsymmetric distance.

13. B. Blackadar, *Operator algebras: Theory of  $C^*$ -algebras and von neumann algebras*, Encyclopaedia of Mathematical Sciences, 122. Operator Algebras and Non-commutative Geometry, III. Springer-Verlag, Berlin, 2017.
14. D. P. Blecher and N. Weaver, *Quantum measurable cardinals*, J. Funct. Anal. **273** (2017), no. 5, 1870–1890.
15. L. G. Brown, *Semicontinuity and multipliers of  $C^*$ -algebras*, Canad. J. Math. **40** (1988), no. 4, 865–988.
16. I. Farah and E. Wofsey, *Set theory and operator algebras*, Appalachian Set Theory: 2006-2012, London Mathematical Society Lecture Note Series, Cambridge University Press, 2013.
17. F. Kittaneh, *Inequalities for the Schatten  $p$ -norm. IV*, Comm. Math. Phys. **106** (1986), no. 4, 581–585.
18. A. W. Marcus, D. A. Spielman, and N. Srivastava, *Interlacing families II: Mixed characteristic polynomials and the Kadison-Singer problem*, Ann. of Math. (2) **182** (2015), no. 1, 327–350.
19. E. Ortega, M. Rørdam, and H. Thiel, *The Cuntz semigroup and comparison of open projections*, J. Funct. Anal. **260** (2011), no. 12, 3474–3493.
20. G. K. Pedersen,  *$C^*$ -algebras and their automorphism groups*, London Mathematical Society Monographs, vol. 14, Academic Press Inc. [Harcourt Brace Jovanovich Publishers], London, 1979.
21. I. Ben Yaacov, A. Berenstein, C. W. Henson, and A. Usvyatsov, *Model theory for metric structures*, Volume 2 of Model Theory with Applications to Algebra and Analysis (Z. Chatzidakis, D. Macpherson, A. Pillay, and A. Wilkie, eds.), London Mathematical Society Lecture Note Series, no. 350, Cambridge University Press, 2008, pp. 315–427.

<sup>1</sup>INSTITUTE OF MATHEMATICS OF THE POLISH ACADEMY OF SCIENCES, WARSAW, POLAND.

*E-mail address:* [tristan.bice@gmail.com](mailto:tristan.bice@gmail.com)

*URL:* <http://www.tristanbice.com>

<sup>2</sup>INSTITUT DE MATHÉMATIQUES DE JUSSIEU - PARIS RIVE-GAUCHE, PARIS, FRANCE.

*E-mail address:* [ale.vignati@gmail.com](mailto:ale.vignati@gmail.com)

*URL:* <http://www.automorph.net/avignati>