Research topics - Ayudas Intro-SO 2023

Roe algebras over metric spaces

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Abstract

The class of Roe algebras provide a beautiful link between discrete (and countable) metric spaces (X, d) and algebras of bounded operators in a Hilbert space $\mathcal{H} = \ell_2(X)$:

$$X \mapsto \mathcal{R}(X) \subset \mathcal{B}(\ell_2(X))$$

These algebras are generated by so-called operators with bounded propagation on the discrete space X. In this project we will relate metric space properties (like property A, amenability etc.) with operator algebraic notions (like nuclearity, existence of tracial states etc.). Depending on the candidates background interest we may also explore possible applications of this algebra to certain quantum mechanical systems.

References

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3. J. Roe, *What is a coarse space?*, Notices of the AMS **53** (2006) 668-669.