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Trace spaces of Counterexamples to Naimark's Problem

A Counterexample to Naimark's Problem (CNP) is a C*-algebra with only one irreducible representation up to unitary equivalence which is not isomorphic to the algebra of compact operators. In 2004 Akemann and Weaver showed how to produce, assuming the extra set-theoretic axiom known as Jensen's diamond principle, such counterexamples. Starting from their proof, we undertake the study of the trace spaces of such algebras. By improving the Kishimoto-Ozawa-Sakai Theorem on the transitivity of the action of asymptotically inner automorphisms on the pure state space of a separable simple unital C*-algebra, we show that there exists a CNP whose trace space is nonseparable, and that for every metrizable Choquet simplex X there is a CNP whose trace space is homeomorphic to X.