

Noncommutative Markov Chains and Multivariate Operator Theory

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We explain some recently found connections between mathematical models for open quantum systems and constructions for noncommuting tuples of operators. We illustrate these ideas in a model of repeated interaction between quantum systems which can be thought of as a noncommutative Markov chain. It is shown that there exists an outgoing Cuntz scattering system (as considered by Ball and Vinnikov) associated to this model. This induces an input-output formalism with a transfer function corresponding to an analytic intertwining operator. Finally we show that observability for this system is closely related to a scattering theory of noncommutative Markov chains (as considered by Kümmerer and Maassen).