G. Birkhoff's problem in irreversible quantum dynamics

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Abstract

Let $\mathcal{A}$ be a matrix algebra over real or complex field. The set of trace preserving unital completely positive maps CP_ϕ on $\mathcal{A}$ form a compact convex subset of an Euclidean space. The main result says that the set of ergodic elements in the boundary of CP_ϕ forms a convex open subset of the boundary and thus can not be an extremal element in CP_ϕ. These results made it possible to have a reduction algorithm to find extremal elements of CP_ϕ in the lower dimensional faces made of non-ergodic elements.