Gaussian Quantum Markov Semigroups on a One-mode Fock Space: Irreducibility and Normal Invariant States

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The presentation is based on a joint work with J. Agredo and F. Fagnola regarding Gaussian Quantum Markov Semigroup on a One-mode Fock-Space. These are related with gaussian states, or those states under wich position and momentum operators are distributed according to a gaussian distribution. Indeed gaussian QMSs are the only QMSs that preserve "gaussianity" of states. Usually they are considered by physicists via their generator (quadratic in annihiliation and creation operators) without concerns about existance and well-definiteness of the dynamics. On the other hand mathematicians usually consider them via their action on Weyl operators of a regular representation of the CCR, but disregard the generator apart from its formal definition. We tried to get the best of both worlds by rigorously working with a quadratic generator in a generalized GKSL form which produced the usual explicit action on Weyl operators. We successfully linked some properties of gaussian QMSs with properties of the parameters of the generator. This allows one to study a gaussian QMS just with linear algebra tools. In particular our main results are: complete characterization of the irreducibility of the QMSs,characterization of existance and uniqueness of a normal invariant state for the QMS, explicit formulas for such invariant states.

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